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EXPLORING STIGMA AND MHEALTH ACCEPTANCE
FOR PRENATAL AND POSTPARTUM DEPRESSION SCREENING
AMONG LOW INCOME WOMEN CLIENTS OF PUBLIC HEALTH CLINICS IN
CHAMPAIGN COUNTY, ILLINOIS

BY

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DISSERTATION

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ABSTRACT

Modern technology plays a big part in our healthcare system nowadays. Mobile technology (mHealth), for example, has transformed health service delivery, including for perinatal and postpartum depression (PPD) screening. However, such technologies do not always fully address the needs of target users, such as migrants or foreign-born women. Many mHealth technologies available dismiss the experience of women, which could inform the development of these technologies. This study aimed to explore migrants' or foreign-born women's acceptance of mHealth for PPD screening. The researcher sought to understand this group's acceptance of mHealth for PPD screening and examine other factors that determine acceptance of this technology among the participants. The researcher also explores these women's perceptions and experiences on being screened for depression, stigma about PPD, and getting help for mental health issues. This study employs the convergent parallel design mixed methods approach. The modified Unified Theory of Acceptance and Use of Technology (UTAUT) guided the formulation of the qualitative and quantitative research instruments. Fifty-five local and foreign-born women from a campus town in Illinois responded to the online survey hosted using SurveyMonkey. An ordinal logistic regression was conducted to analyze the effects of the UTAUT factors and stigma on the acceptance of mHealth among the samples. Concurrently, a focus group discussion and five semi-structured interviews with migrant or foreign-born women were conducted to explore their experiences of using mHealth in screening for postpartum depression. Findings show that migrant women are valuable resources for mHealth developers when developing technology intended to serve them. Although none of the UTAUT and stigma factors from the survey seemed to strongly contribute to the behavioral intention to use mHealth, participants' optimism, positive attitudes, and trust in mHealth potential to screen for depression surfaced from the interviews and focus group discussions. Their familiarity with mobile devices, especially smartphones, made them comfortable using mHealth for depression screening too. The study also illuminates migrants and foreign-born women's experiences adjusting to the new culture in the host country with regard to maternal health care. Some other highlights of the findings include the importance of early depression screening for these moms, making mHealth among the options for depression screening tools, the role of healthcare providers, and engaging migrant women in the policy and technology development intended for them. Results of this research extended the understanding of mHealth

acceptance for PPD screening among migrant women. It also gives more insights for healthcare providers to develop a culturally competent health support system and address the challenges and barriers that deter migrants and foreign-born mothers from getting necessary mental health care on time. Organizations that provide health and health care services can also explore the use of UTAUT in informing organizational planning and development for mHealth design and deployment. Implications and recommendations for research and practice in giving a voice to migrant mothers to contribute to their flourishing are also discussed.

Keywords: mHealth, Unified Theory of Acceptance and Use of Technology (UTAUT), postpartum depression, low-income population, mental health, mixed methods

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“It always seems impossible until it is done.”

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Notes:

Pengajian = Study group

Makan-makan = Party

Adik-adik = Little brother/ little sister

Ibu = Mom

Sayang = Love/ My love

Abang = Big brother

Kakak = Big sister

Dedication

To my MFS combo...

~ Muhammad Fauzi Salihin

~ Muhammad Faris Safiy

~ Muhammad Fakhry Syafi

This one is for you, boys.

With love,

Ibu Sayang

To all moms out there, I see you.

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CHAPTER 1: INTRODUCTION

By 2030, [imagine] a world which every woman, child, and adolescent in every setting realize their rights to physical and mental health and wellbeing, has social and economic opportunities and is able to participate fully in shaping prosperous and sustainable societies.

~ Global Strategy for Women's, Children's, and Adolescent's Health (2016-2030)

Common wisdom suggests that health, including mental health, is a major element that contributes to one's well-being. The World Health Organization (W.H.O) conceptualized mental health as not only the absences of mental illness, but the presence of "...a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make contribution to his or her own community" (World Health Organization [WHO], 2004, p.12). A complete mental health was deemed as a descriptor of individual flourishing (Keyes, 2009). Keyes pointed out that individuals who are flourishing show increased productivity, have enhanced workability, and perform better in physical health, and social well-being, among others (p. 90). Relatedly, a number of global health and development policies also emphasize maternal and children's health, such as the Millennium Development Goals 2015 (MDG) and the Sustainable Development Goals (SDG). Indeed, focus on these groups remains a global priority. The Global Strategy for Women's, Children's, and Adolescent's Health (Global Strategy) is an exemplary action plan under the SDG, aiming to improve the health of women, and children by 2030. SDG promotes physical health, mental health, well-being, and life expectancy, particularly among women and children, as maternal health determines the health of one's offspring, family, and society. In this regard, WHO defines maternal health as "the health of women during pregnancy, childbirth, and the postpartum period" (WHO, n.d.). While motherhood is often a positive and fulfilling experience for many women, it is also associated with suffering, ill-health, and even death. Links between mental health problems and maternal health remain major concerns for maternal morbidity and mortality around the world

(WHO, 2008). Mobile technologies continue to bring bigger impacts on our lives, notably in the healthcare industry, as global technology develops rapidly. Evidently, the healthcare industry has extensively adopted mobile technology for its services in order to increase efficiency and the quality-of-service delivery to their clients, including in maternal health.

The ubiquity of mobile technologies has changed the landscape of service delivery in the healthcare industry. At the organizational level, mobile technology influences human labor means, service delivery, patients monitoring, patient-provider communication, management, training, development, evaluation, and assessments in healthcare facilities such as hospitals and clinics. Mobile technology is preferable since it enables faster information change, cuts through red tape, reduces errors, and increases organizational effectiveness qua information dissemination and knowledge sharing practices. Beyond that, mobile technology improves community development processes nationally and prompts innovation, such as in healthcare and education sectors. The use of mobile technologies facilitates individual health care as the usage of wearable devices and smartphone apps could help to monitor a patient's health. Nowadays, patients are more empowered to take charge of their health care and mobile device or mHealth have both leveraged and influenced this phenomenon. Various innovations for high and low resources settings, such as mobile devices, applications, mobile sites, and short messaging systems (SMS), are used to deliver health education, send appointment reminders, and notifications by healthcare providers to patients.

Using mobile and wireless technologies to support the achievement of health objectives (mHealth) has transformed the dynamic of health service delivery. A relevant example is that healthcare providers adopt mHealth to screen for perinatal and postpartum depression (PPD), which is defined pragmatically as an episode of major or minor depression that occurs either during

pregnancy or within the first 12 months postpartum (Milgrom & Gemmill, 2014). A more popular term, postpartum depression, defined as clinical depression that occurs within the first year after childbirth (Fung & Dennis, 2010), affects mothers and their infants. PPD could happen to any mother during pregnancy and after giving birth. Significantly, mHealth has become the preferred screening method for PPD. It offers practitioners an improved screening technique with greater efficiency (Pineros-Leano, et al., 2014). Improved efficiency is critical, according to the Centers for Disease Control (CDC), as 11% to 20% of women, who give birth each year, suffer postpartum depression symptoms (Brett, 2008). This percentage means that a higher number of women suffer from PPD and related illnesses in a given year than the combined number of new cases of men and women who suffer from tuberculosis, leukemia, multiple sclerosis, Parkinson's disease, Alzheimer's disease, lupus, and epilepsy (Postpartum progress, Postpartum Depression by Number, para. 11). Continued improvement for PPD screening technology is therefore desired because positive mental health contributes to high levels of emotional, psychological, and social well-being, or flourishing (Keyes, 2009).

As PPD relates to socioeconomic and ethnicity factors (Pineros-Leano, et al., 2015), it expresses higher rates among high-risk, disadvantaged, low-socioeconomic status, and minority women (Sheeder, et al. 2009; Kim, et al., 2012; Rahman et al., 2013; van der Waerden, et al., 2011; Pooler, et al., 2013). Research indicates that 41.7% of low-income women in the U.S. presented depressive symptoms during the antenatal period (Hobfoll, et al., 1995 in Gavin, et al., 2011), and African American and Asian women experienced more antenatal depression symptoms than others (Gavin et al., 2011). Further, Pooler et al. (2013) found that women enrolled in the Women, Infant, Children (WIC) supplemental nutrition program, intended for a lower-income population, are more likely to report postpartum depression syndrome. Since women of childbearing age are also at an

optimal working age, the effects of PPD could transfer to these women's professional lives in addition to their personal lives. Consequently, this disorder would affect overall workforce well-being, since female workers constitute almost 39% of the total labor force globally (World Bank, 2017), and more than 57% in the United States (Bureau of Labor Statistics, 2021). Female participation in the workforce is high; therefore, a lack of proper maternal care specifically related to PPD among employees, remains costly for employers and society at individual, organization, and national levels. For migrant women who are homemakers, mental health disabilities result in stressful physical, psychological, and financial situations at home. Such conditions impact the well-being of families as well as the environments in which they live. Importantly, mothers provide primary care for their infants after birth. Thus, if women suffering from PPD remain undiagnosed and untreated, the safety and health of the children may be compromised.

Furthermore, it becomes necessary for HRD professionals to acknowledge that workers with mental health issues will not be able to participate fully in society and may be subjected to high levels of stigma and discrimination (Chan, 2010). The World Federation of Mental Health (2017) reported that by 2030, the global societal financial cost is expected to rise to \$6 trillion. HRD professionals should be better informed about the implications of mental illness on organizational outcomes. Therefore, improved health benefits for employees are definitely necessary as good health facilitates greater concentration at work, better attention to training and development programs, and growth in strength toward tasks implementation, and decision-making skills needed for personal and organizational objectives. Without it, it will be challenging for employees to perform at work, and health concerns may result in declined productivity, increased absenteeism, and declined presenteeism (Greenberg et al., 2003; Lerner et al., 2012; Evans-Lacko & Knapp, 2016). It remains possible, then, for such employees to be terminated. Importantly,

health involves security, and an unhealthy or unstable employee might inflict harm to herself or co-workers, which will directly affect the climate and well-being of the organization. Therefore, employers bear responsibilities to eliminate stressors in the work environment, increase awareness, provide training for stress- skills management, and offer treatment or help, such as counseling services, as necessary to support the mental health and well-being of employees (Cooper, 2008).

Given that some states require mandatory depression screenings for pregnant women, many healthcare providers have begun to screen perinatal women using mobile technology (mHealth). This trend is only increasing, especially in the era of the COVID-19 pandemic, which affects the availability of in-person consultation. mHealth has become the preferred screening method among practitioners because it allows for a relatively simple and accessible range of applications (apps), including apps of a medical nature (Jiménez-Serrano et al., 2015). Thus, practitioners utilize mHealth extensively to deliver care and health services for maternal health, including screenings for PPD. mHealth, including telehealth, app, and web-based materials, was leveraged to deliver education and care for perinatal mothers, especially during the time of pandemic COVID-19, where there is a wide gap in short-term mental health services (Hermann et al., 2021). Potentially, early prediction and diagnostic practices reduce the impact of PPD among mothers and enable clinicians to provide appropriate and comprehensive medical treatment. Such practices may also help to prevent depression and avoid or limit other potential health detriments (Jiménez-Serrano et al., 2015).

Despite having been implemented in many medical and health centers, mHealth's acceptance remains unclear among patients with regard to its use, especially for PPD screening purposes. The fact that mHealth is used for PPD screenings of ethnically diverse low-income women enrolled in WIC, for instance, creates a need to improve mHealth services and reach

underserved and vulnerable populations from diverse backgrounds. If mHealth is to be effectively used in such contexts, healthcare providers need to recognize and understand the perceptions of the screening method among these populations. Women (also mHealth's end users), who are screened by the mHealth innovations, should be ready to adopt and use these technologies. Then, the insights gathered should be used strategically to determine patient-centered preferences for PPD symptom screenings with mobile technology and the training of the healthcare professionals who are administering the test. Such apps provide useful data for screening purposes and health-service recommendations. Improved screenings are crucial for a variety of reasons, including their impact on women's flourishing, the health of their offspring, living conditions, and the emotional well-being of other family members.

Background

Experiences during pregnancy are individual and vary among expecting mothers. A particular woman's emotional well-being and mental outlook influence her pregnancy experience. During pregnancy, expecting mothers are at particular risk of becoming depressed, due to changes in body composition and hormone levels. Pregnant women often struggle to stay healthy and strong when their corporeal systems work harder than usual. Also, pregnant and postpartum mothers are at risk of perinatal and postpartum depression, or PPD. PPD can occur either during pregnancy or during the first 12 months after childbirth (Milgrom & Gemmill, 2014; Fung & Dennis, 2010). If untreated, PPD can cause long-lasting detrimental effects, such as disability for the mother, and developmental, cognitive, social, behavioral, and attachment problems for the infant (Deave et al., 2008; Paulson et al., 2009; Rahman et al., 2013). Unable to care for themselves, women suffering from PPD could also harm employment organizations (Ortega & Reio Jr., 2016) and negatively influence co-workers. According to O'Hara and Swain (1996), each new mother returning to the

work force has a 25% chance of developing PPD symptoms. Also, PPD sufferers may be challenged by financial hardship resulting from hospital bills and treatments. Taking leave or underperforming in their job affects their employment organization. Such burdens also take an emotional toll on family members.

In this context, migrant and foreign-born mothers remain vulnerable to PPD risks. Immigration or migration has a significant impact on many aspects of life, from health care and the workforce to the classroom, and in communities across the country (Zong et al., 2018). Complexities of status as a migrant in a foreign land sometimes shape accessibility to available mental-health resources. This is especially true in a country like the United States, which has become home to millions of immigrants. North America, altogether, has become the home to over 50 million international immigrants (United Nations, 2015). The Pew Research Center (2015) estimated that a “modern immigration wave would bring 59 million immigrants to the U.S., driving population growth and change through 2065.” The U.S. Census Bureau uses the term “foreign born” to refer to anyone who is not a U.S. citizen at birth. This includes naturalized U.S. citizens, lawful permanent residents (immigrants), temporary migrants (such as foreign students), humanitarian migrants (such as refugees and asylees), and unauthorized migrants. According to the American Community Survey (ACS) estimates in 2019, the U.S. foreign-born population accounted for more than 44.9 million of the total U.S. population – about 13.7% of the U.S. population (U.S. Census Bureau, 2020). Immigrant populations in the U.S. arrive from diverse national origins, including Mexico, India, Korea, China, the Philippines, El Salvador, and others. In 2019, 45.2% of these immigrants identified as White, 27.2% as Asian, 9.7% as Black, and 15% as some other race; around 2% identified as two or more races, and 44% (19.5 million people) reported having Hispanic or Latino origins (American Community Survey [ACS], 2020), resulting

in a diverse American society. Between 1970 and 2015, the percentage of foreign-born workers in the labor force increased from 5% to 17%. During the same period, the foreign-born share of the total population rose from almost 5% to 13.5% (Zong et al., 2018). Specifically, women constitute approximately half of all immigrants in the world, at around 95 million (Ahuja, 2017). That is, approximately 52% of U.S. immigrant populations identified as female in 2019 (ACS, 2021). This diversity implies different needs and expectations among groups addressing issues related to daily life. Individuals from different backgrounds and cultures will require an opportunity to adjust to the local culture, as will the migrant mothers or expecting mothers. Besides, individuals speak different languages, which may challenge others to understand and consequently increase the risk of misunderstanding or misdiagnosis of mental health symptoms. Thus, women's mental health is a critical subject for discussions of immigrants' health, influencing their health and the welfare of the nation at large (Derr, 2016).

Studies consistently suggest that im/migrants underutilize mental-health services (Vega et al. 1999; Kandula et al., 2004; Aloud & Rathur, 2009). Reasons include a general distrust of Western mental-health systems, insufficient adjustments to the program, familial shame and stigmas of disease, and collectivism culture (Takeuchi. et. al., 1998; Rodriguez et al., 1992; Ngo-Metzger, et al., 2003; Lu, 2002). Even though the lower rate of the utilization of health services could also be associated with healthier and flourishing individuals (Keyes, 2005), there is insufficient evidence to suggest that this is the case with migrant women. Especially because research widely showed that antenatal migrant women will remain at risk of undiagnosed PPD, particularly when necessary screenings are not performed, due to language and cultural barriers. Indeed, screenings would prompt healthcare workers to refer women in need toward relevant treatment services. In Illinois, the Illinois Department of Human Services (IDHS) mandated that

all perinatal women are screened for mood disorders under Public Act 95-0469, the Perinatal Mental Health Disorders Prevention and Treatment Act. The purpose of the policy is to increase awareness and to promote early detection and treatment of perinatal depression. The Act requires that:

1. Licensed healthcare professionals and providers of prenatal care offer education to women and, if possible and permitted, offer education to families about perinatal mental health disorders.
2. All hospitals that provide labor and delivery services offer new mothers, prior to discharge after childbirth, and, if possible, offer fathers and other family members complete information about perinatal mental health disorders.
3. Licensed health care professionals and providers of prenatal care, postnatal care, and care to the infant, invite women to complete a questionnaire to assess whether they suffer from perinatal mental health disorders.

This mandated policy increased screenings for mood disorders during the perinatal period among women in Illinois. On account of this policy, many healthcare providers have started to screen perinatal women, and some use mobile technology (mHealth) to facilitate the screening process.

Using mHealth has proven to have benefits for perinatal women in terms of encouraging them to get better care. Through this technology, access to vital information is enabled and information or messages for perinatal women can be delivered more easily. For example, in Wyoming, research among women with Medicaid shows that those who used a customized app are far more likely to consult with doctors during maternity and are more likely to deliver healthy babies (Bush et al., 2017). Relatedly, in Thailand, under the “Better Border and Healthcare Program,” text messages were used to remind pregnant women along the Thai - Myanmar border

of their antenatal appointments and immunization program (Kaewkungwal et al., 2010). Indeed, the ubiquity of mobile technology offers conveniences to patients and healthcare providers, with opportunities to leverage the use of mHealth for maternal and newborn care, particularly in under-resourced health ecosystems (Tamrat & Kachnowski, 2012). Scholars argue that mobile health (mHealth) aims to provide patient services without boundaries, reduce barriers related to literacy and language, limit redundancy and errors, and increase privacy (Pineros-Leano, et al., 2015). Advances in mHealth enable better care for pregnant women as it could cover education about health during pregnancy, safe delivery practices, and improved infant and child protection. Current research and discussions suggest continuous improvement of mHealth to tailor it to the target users for whom it is employed.

Problem Statement

Screening low-income migrant women for PPD using mHealth is expected to reduce barriers that hinder the application and administration of necessary services. As PPD poses a health concern for many female migrants, missed or delayed diagnosis would not only affect the mothers, but would also affect their families. Mothers who suffer from PPD would jeopardize the care of their infants. In addition, employment organizations could also be affected. For instance, work performance and career longevity may be jeopardized as depression accounts for higher incidence of absenteeism (time taken off from work) and a lack of presenteeism (ability to produce effectively) (Greenberg et al., 2003; Lerner et al., 2012), which can lead to termination. These situations signal maternal health as an important aspect of an individual's flourishing, which also affects organizations, communities, and national productivity and economies. Migrant women, who make up almost half of the foreign-born population in the U.S. and a good number in the workforce, are among the clients of the mental health care system. Notably, however, many

facilities and services do not address the specificities of this group. Such neglect does not facilitate equal access to and opportunities for healthcare services.

Scholars have pointed out the importance of participatory acceptance and use of technology as a factor for the success of health-information technology (Kijisanayotin et al., 2008; Kim & Park, 2012; Or & Karsh, 2009; Rai et al., 2013; Dutta et al., 2018). This is because input from patients is important to inform healthcare providers' decisions in adopting technology, as they are important stakeholders in the services provided. Research on technology adoption is quite well-established. Yet, minimal research exists about patients' perceptions toward mHealth's use for screening low-income migrant or foreign-born women. Most research on mobile technology acceptance paid more attention to healthcare providers' experience. Moreover, available studies often only focus on the technology and rarely discuss patient's migration and adjustment experiences that might influence technology acceptance. The lack of patient's perspective is also a loss for the providers and mHealth developers serving the migrant women group. Especially as migrant women make up a great number of healthcare consumers in the U.S. health landscape.

Since adopting and accepting technology requires individuals to make a decision that leads to behavioral modification, acceptance of technology may be particularly complicated in PPD screenings among low-income migrant women. Due to PPD's association with compromised mental health-- which is a taboo subject in many cultures, including those countries where certain migrant populations originate-- there is a need to investigate if stigma around mental health actually affected their depression screening process. Significantly, there is a strong stigma attached to mental health and toward the treatment of psychological conditions (Amri & Bemak, 2013). There was not much information about the role of stigma on mental health specifically on how it might affect migrant women's acceptance (i.e., intention to use, continue using, and remain honest

when answering questions) of technology for PPD screening. Patients' experience with migration and previous depression screening could affect their acceptance to screening technology. Nevertheless, accepting technology – specifically mHealth used in the PPD screening process – remains important because it enables patients to respond efficiently to questions and to receive accurate results. In this case, patients' perceptions and stigmatic assumptions toward mental health may pose barriers to PPD-screening completion. So, developing mHealth technology that considers these factors are crucial in determining the correct diagnosis from the depression screening. Thus, this study extends our understanding of factors that encourage or hinder users' participation and engagement (acceptance) of mHealth for PPD screening by studying the intertwine of technology use, experience, and stigma held by perinatal migrant women with their behavioral intention toward using mHealth for PPD screening.

Purpose Statement

The purpose of this study was to clarify and explore factors that influence the acceptance of mHealth for PPD screening. This study was interested in focusing on low-income migrant and foreign-born women in a campus town in Illinois. In particular, this study sought participation from low-income migrant and foreign-born mothers who were pregnant or had experienced giving birth in the U.S. and underwent prenatal and postpartum checkups with the local practitioners. The status of migrant or foreign-born was assumed when the women identified as non-native born or have moved into the U.S. from another country, either voluntarily or by forced. Despite the term 'migrant' could be problematic when referring to those who fled from their country by force, the term is used rather in a neutral connotation for this study. This is because the researcher did not delve deeper into the reason these women moved away from their country. However, the researcher acknowledges that a better term could be used to refer to the groups who did not migrate

voluntarily to this country such as the refugees, irregular migrants, undocumented migrants, or asylum seekers. Additionally, these women were also assumed to be low-income when they used services intended for low-income population in the town, such as the public health clinic or resource centers meant for uninsured or underinsured people. A convergent parallel mixed methods approach was used for this study to converge and compare the qualitative (semi-structured interviews and focus groups results) and quantitative (numeric) data. From this approach, the survey measured relationships among factors in the modified UTAUT model with the behavioral intentions of participants to use mHealth for PPD screening. Simultaneously, semi-structured interviews and focus groups explored deeper into participants' experiences with adjusting, depression screening, stigma, and getting mental health services, specifically among the migrants and foreign-born participants. These groups were interviewed to explore their challenges in going through depression screening in a foreign country while adjusting to culture outside their own. Both qualitative and quantitative methods were employed with the purpose of triangulation, as the process allowed the researcher to corroborate and compare results directly from two sets of findings on the same topic.

Significance of Research

This research acknowledges that PPD is a significant social and organizational issue. It stems from the fact that PPD has the ability to hurt not only the affected mothers, but also also the individuals around them. Hence, this study sought to provide various theoretical and practical contributions to the literature. Current literature has not adequately explored the factors contributing to the acceptance of mHealth for maternal mental health screening. Besides, stigma and migration experience are rarely considered in research in determining mHealth acceptance for maternal mental health.

This study extends maternal health research to connect with technology development for human flourishing. This study answers the call for HRD scholars to expand the field to also help tackle social issues, particularly in health disparities and building a culturally sensitive healthcare system. Scholars recognized a need to focus more broadly on the HRD profession. McLean (2001) and Bates (2003) called for HRD researchers to commit to the political, social, environmental, cultural, and spiritual development of people around the world, and not only focus on economic development and workplace learning. Marquardt et al. (2004) emphasized that HRD serves strategic functions in human and social development and in health field, in particular. This approach, according to them, contributes to the development of a national health policy, strengthens all aspects of service delivery, expands and strengthens the quality of healthcare services at all levels, consolidates and strengthens basic healthcare services through synchronized measures and unified actions in battling serious diseases (p. 162). This study also contributes to the knowledge database on studies that relate to PPD and human resource development. The nexus in its current form is nearly nonexistent and just recently gained attention among scholars in HRD. This study is timely given that over 300 million people on a global level is affected by issues of mental health especially depression, and the numbers are increasing globally (WHO, 2017). Moreover, ever since the COVID-19 pandemic started, the prevalence of depression, including maternal depression, has also increased in many parts of the world.

It is important to look at this study from the perspective of technology acceptance; this study aids in a better understanding of change management within organizational settings. Although developed countries, including the United States, have advanced technology for health care purposes, many of these technologies fall short of meeting the needs of target users. By engaging patients in the design, or in the decision-making determinations for using mHealth,

organizations may make more informed decisions as to the best technology to use or continue using. This approach may facilitate future plans and investment in technology adoption. Gathering more information on the factors that influence technology acceptance of mHealth among migrant mothers helps health providers explore the maximum potential and benefits of technology and rethink investments made for such technology and its deployment. In particular, it helps to achieve desired health objectives for maternal mental health. The finding also helped mHealth developers discover if the migrant women who use mHealth express comfort and involvement in the implementation of mHealth for PPD screening. Additionally, the study informed some desirable technical aspects in the development of user-friendly and culturally sensitive methods and technologies to screen for depression during maternal checkups for migrant women. This information potentially helps to connect patients with necessary care in a timely manner. Importantly, this study forms part of a social justice agenda, aiming to provide a well-informed health service that is congruent with the particular social and cultural values of patients.

Further, forming part of mental health services, mHealth may be improved to address and serve the needs of the low-income migrant women from diverse backgrounds and to provide equal opportunities for access to the societal resource of health care. Notably, the rise of immigrant populations influences human resource development at the national level (Briggs, 1999). Since migrant populations are increasingly composed of women, often of childbearing age, understanding the health of migrant women in the perinatal period becomes critical. Although research attention on PPD increased among scholars, low-income migrant women remain an overlooked population. This study seeks to address the scarcity of scholarships on this population's participation in the development of health technology. This limitation remains particularly significant, given the rapidly changing demographics of North America. Migrant populations exist,

and these individuals actively serve to benefit the labor force. Integrating mHealth for PPD screening may improve mental health service utilization among migrant populations. As the literature reveals, the lived reality of many migrants involves significant shame and stigma associated with utilizing such services. Also, studies reveal that when mental health services are adapted for specific immigrant groups, including access to bilingual and bicultural providers, clients in need of mental health services are more likely to utilize them. In this case, scholars noted that participants are less likely to drop out after the first session, and they are more likely to present higher functioning at discharge, compared to individuals utilizing mainstream services (Sue et al., 1991; Hu Tw et al., 1993; Cheung & Snowden, 1990).

Next, healthcare providers will also benefit from this study. A particular benefit derives from selecting mHealth technology and tailoring the use of mHealth within a given organization toward the needs of low-income migrant women, whom such services aim to help. Information on the perceptions of this population group towards mHealth and the depression screening process may facilitate healthcare providers' selection of the most appropriate approach when screening for maternal depression. Indeed, it will also help them develop a culturally competent health support system to address the challenges and barriers that deter this group from getting necessary care. Information generated from this research may be used to guide the development of training modules for healthcare workers, social workers, and community development workers, all of whom work with low-income migrant women. Ultimately, policy-makers will become informed by the findings of this study, as anticipated by scholars. The findings of this study facilitate improved policies and considerations for the needs of low-income immigrant women, recognizing their multifaceted challenges that are present prior to, during, and after immigration to the United States. The study's contributions will leverage efforts to improve maternal and infant mortality, as

with the agenda of the Millennium Development Goals and the "Good Health and Well-Being" agenda for sustainable goals, as outlined by the United Nations (UN).

Theoretical Framework

As its theoretical foundation, this research adopts the Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh et al. (2003). This theory was used extensively in the field of Information Science (IS) to measure the acceptance levels of individuals towards new technology in the workplace. Researchers used UTAUT in the health field to measure users' acceptance towards technology as regard to health care and health care systems, such as electronic records, and the use of technology among physicians and healthcare staff (Watterson et al., 2015). Although the theory has been used widely in health-related studies, research on the use of UTAUT to broadly assess the PPD screening process remains scarce.

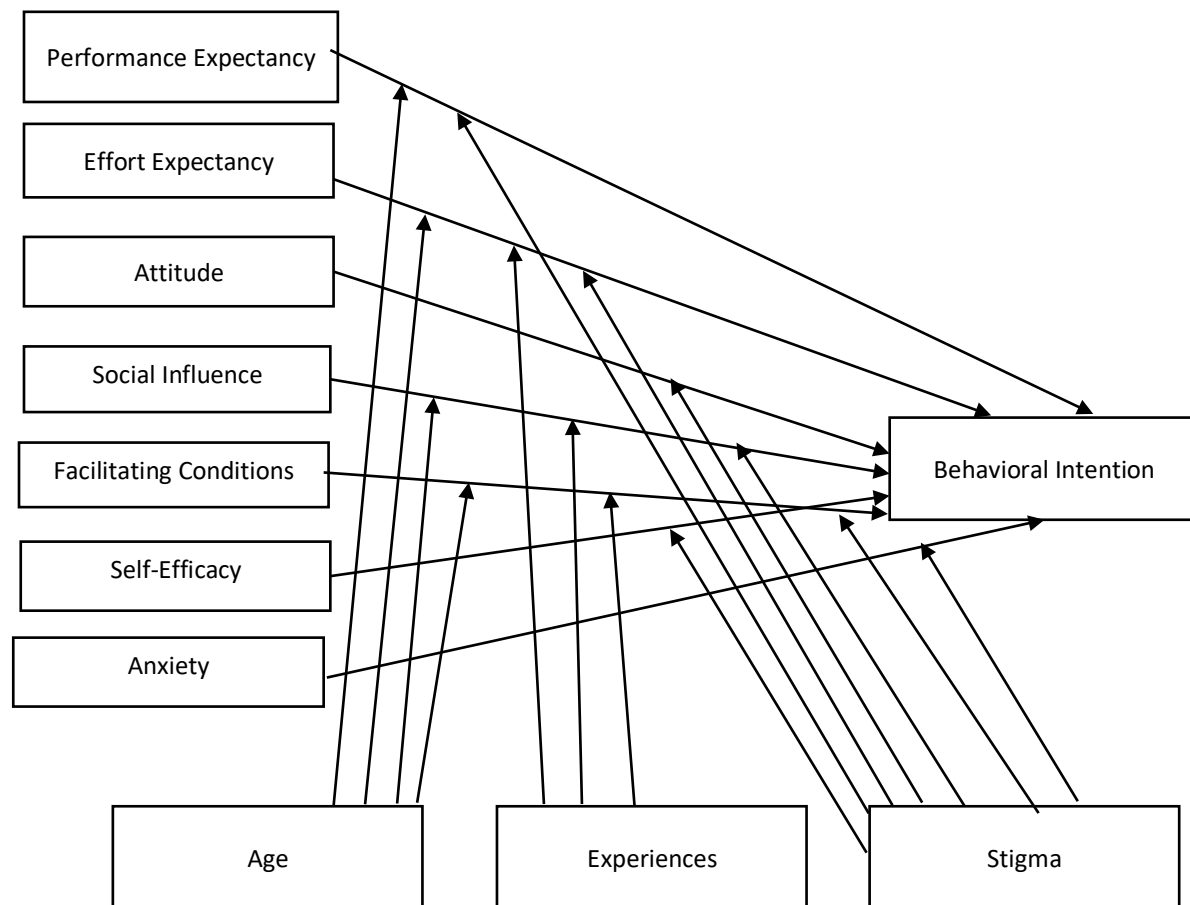
This theory was adopted in this study for several reasons. First, this theory holds the potential to inform research regarding the use of mHealth for perinatal mothers. According to this theory, users' behavioral intention to use and accept technology is influenced by how they perceive the benefits, effort, and support they receive while using the technology. Additionally, since UTAUT was tested on large data sets, cross-culturally, and on cross-industry technologies, this model is perceived among scholars to be a well-suited model for explaining users' intentions and actual use (Lee & Rho, 2013). Therefore, the study assumed that all participants have used mobile technology and could point out the benefits and harms caused by using mobile technology from their personal experience.

Second, since this theory is accepted as a valuable framework for understanding ICT acceptance that also holds in different cultures (Nunes et al., 2019), it was assumed that it could inform the study of the adoption of mHealth among migrant women from different backgrounds.

In a cross-country comparison study of mHealth adoption, Dwivedi et al. (2019) also suggested that the extended UTAUT must consider specific determinants relevant to citizens' cognitive, affective, and conative or behavioral aspects. Hence, the model has been modified to fit the population of this study, which is the migrant women. Figure 1 below depicts the theoretical framework adopted for this research project.

Figure 1

Theoretical framework for the current research



Adapted from Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 425-478.

The researcher used modified UTAUT items for the survey in the current research. The original factors retained in the model include performance expectancy, effort expectancy, attitude, anxiety, social influence, self-efficacy, and facilitating conditions. The investigated moderators include age, experience with mHealth, and stigma. Modifications included items written to address the present research study as it relates to low-income migrant and foreign-born perinatal women and the moderating factors. . Questions on stigma addressed participants' awareness, agreement, application, and harmful thoughts toward the stigma of mental illness, which were adopted from the Self-Stigma of Mental Illness Scale – Short Form (SSMIS-SF) by Corrigan and colleagues (2012). Chapter 2 of this document provides a further explanation of UTAUT.

Research Questions

The current study was guided by the following research questions:

1. What perceptions toward the use of mHealth for PPD screening are held by the sample of prenatal and postpartum low-income migrant women (PPLMW) in the study?
2. What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?
3. How, and in what ways, do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?
4. Among the participants, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?

5. How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?

In answering these research questions, participants completed a survey. Also, all who completed the survey were invited to participate in semi-structured interviews or focus group discussions. The survey was developed based on the modified UTAUT, which comprises the original factors in the model and a new moderating factor: stigma. Additionally, the interviews and focus groups addressed participants' experiences and perceptions towards mHealth and stigmas about PPD. More details regarding the research instruments are included in Chapter 3. Table 1 below details the correspondence of research questions and data sources in this study.

Table 1

Correspondence of Data Sources and Research Questions for the Current Study

Data Sources	Research Questions
Survey	RQ2, RQ3, R5
Semi-structured Interviews/ Focus Groups	RQ1, RQ2, RQ3, RQ4, RQ5

Operational Definition of Terms

This section provides operational definitions to specify meanings and uses within the context of the current study.

Technology acceptance. In this study, “technology acceptance” refers to migrant women’s reactions to using mHealth for depression screening and its effects on their future intentions to use mHealth for PPD depression screening.

mHealth. “mHealth” generally refers to the use of mobile technology to achieve the objective of health. In the proposed study, this term refers to the use of mobile technology, such

as tablets, mobile phones, or laptops, for the purposes of health providers' screening for depression among expectant mothers and mothers with children under 12 months old.

Stigma. For the current study, “stigma” is defined as a mark of disgrace or infamy for having postpartum depression or mental illness, held by migrant women who use health services at research locations.

Depression screening. “Depression screening” in this study refers to a series of questions asked during perinatal or post-partum checkups to help determine whether a mother or woman expecting a child needs to see a mental health professional for diagnosis and treatment of depression.

Mental health. In this study, “mental health” refers to the emotional, psychological, and social well-being of immigrant women that affects the way they think and act.

Migrant/ foreign-born women. This term refers to the population and focus of the current research study. In the context of this study, migrant women refer to the foreign-born women who are pregnant or at least 12 months postpartum who received perinatal health care in Champaign County at the time of the study. These women could be a transient migrant, an economic migrant, a refugee, an asylum seeker, or they could be now citizens or permanent residents of the United States. They are clients of the Champaign-Urbana Public Health District (CUPHD) or the Pregnancy Resource Center (PRC). Their eligibility to be a client at the CUPHD is determined according to the income guidelines issued by the Health and Human Services Department and the Illinois Department of Human Services.

IDHS – IDHS is the acronym for Illinois Department of Human Services

CUPHD – CUPHD is the acronym for Champaign Urbana Public Health District

PRC – PRC is the acronym for Pregnancy Resource Center

CHAPTER 2: LITERATURE REVIEW

This chapter reviews current and past literature. Therein, the research questions derived and supported the study. As outlined in Chapter 1, the research considered the following research questions:

1. What perceptions toward the use of mHealth for PPD screening are held by prenatal and postpartum low-income migrant women (PPLMW) in the study?
2. What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?
3. How, and in what ways do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?
4. Among PPLIW at the clinics, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?
5. How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?

This chapter begins with an introduction to maternal health and the importance of mental health for flourishing and social well-being. Next, it presents perinatal and postpartum depression (PPD) and the current state of this health problem among low-income migrant women in the United States. Then, the author reviews mHealth adoption and applications within the U.S. healthcare sector, focusing on uses and applications of mHealth for perinatal depression screening. Next, the

theoretical framework adopted in this study is discussed, and the author reviews the literature on the Unified Theory of Acceptance and Use of Technology (UTAUT). This chapter concludes with a summary of the literature reviewed and information about how it guided the study.

Human Flourishing and Mental Health

“There is no health without mental health.” ~Lo Ying-Ru, 2020

In discussing health, many focused on physical well-being, whereas mental health and social well-being were frequently overlooked. Undoubtedly, physical and mental health, and social well-being are essential in determining the state of complete health for human beings instead of merely the absence of disease or infirmity (World Health Organization [WHO], n.d.). Scholars have linked health to economic development, increased human potential of all kinds, and are rightly regarded as a basic human need (Perkins et al., 2001). Undeniably, quality human resources can also be seen as the result of quality health services (Perkins et al., 2001, p. 355). Health is also arguably central to a person’s sense of wholeness and well-being. As such, mental health remains as important as physical health -- it is essential for a person’s well-being or flourishing (Keyes, 2007; VanderWeele, 2017), healthy families, interpersonal relationships, and contributing to an increased potential for wholesome and productive life (Office of Disease Prevention and Health Promotion [ODPHP], 2017). Unfortunately, the burden of mental illness suffered in the United States remains among the highest of all diseases, and mental disorders are among the most common causes of disability (ODPHP, 2017). The economic burden of mental illness can amount to up to 4% of GDP, and those suffering from mental illness have poorer educational, employment, and physical health outcomes than those in good mental health (Organization for Economic Cooperation and Development [OECD], 2021). These data have only proven that mental ill-health weighs heavily on societies and economies.

It goes without saying that physical and psychological health and well-being are at the heart of human flourishing. The ancient Greek concept of *eudaimonia* is translated as well-being, flourishing, or “the good life” (Ling, 2014). VanderWeele (2017) commented that human flourishing consists of a broad range of states and outcomes, certainly including physical and mental health, encompassing happiness and life satisfaction, meaning and purpose, character and virtue, and close social relationships. He proposed five domains of human flourishing, corresponding to important aspects of human life. According to VanderWeele, if these five domains are satisfactory, it will lead to a state of human well-being. These domains are: 1) happiness and life satisfaction; 2) physical and mental health; 3) meaning and purpose; and 5) close social relationships (p. 8148). For many people with depression, these five domains are often at risk of being unsatisfactorily fulfilled. Due to facing stigma from the public and family, many people who suffer from depression did not seek treatment, and the disease did not get the necessary attention. In line with that, in his earlier work, Keyes argued that barely one-fifth of the adults in the U.S. adult population is flourishing (i.e., mentally healthy) despite the absence of mental illness (Keyes, 2002, 2003, 2004, 2005a, 2005b). He pointed out that good mental health consists of symptoms of hedonia, or emotional vitality and positive feelings toward one’s life, which is the opposite of depression, where there are symptoms of anhedonia (loss of pleasure or loss of interest in life) (2010). Keyes (2010) revealed that mental health could be measured by emotional well-being (i.e., measures of positive affect, happiness, and life satisfaction), functional psychological well-being (i.e., measures of self-acceptance, personal growth, purpose in life, environmental mastery, autonomy, and positive relations with others), and functional social well-being (i.e., measures of social acceptance, social actualization, social contribution, social coherence, and social integration). Keyes also argued that mental health flourishing could increase happiness.

Happiness in the hedonic and eudaimonic senses would mean that an individual is feeling good or functioning well (p.99). He then suggested that “to be diagnosed with flourishing mental health, individuals must have experienced in the past month every day or almost every day at least one of the three signs of emotional well-being combined with six or more of the signs of positive functioning” (pp.100-101). In conclusion, health and mental health remain an issue in the broad contexts of one’s flourishing. As such, mental health carries potential harms and benefits for human resources’ flourishing.

Mental health, particularly depression, remains a major contributor to the overall global burden of disease (WHO, 2017) and has been listed as the top cause of mental and physical disability worldwide. It impacted more than 300 million people of all ages and it is 1.5 times more common among women than men (WHO, 2017b). It is also twice as likely to be diagnosed among women than men (Gayes et al., 2005) due to competing demands at home and at work (Selix & Goyal, 2015). In the U.S., an estimated 17.3 million adults, aged 18 or older, reported at least one major depressive episode in 2017 (NIMH, 2019). Society has begun to recognize the burdens of depression and how it affects individuals and community members globally. In 2017, the World Health Day featured depression as a theme in order to raise awareness and encourage people to have open discussion about the disorder. It aimed to encourage sufferers to seek the necessary help (WHO, 2017). This campaign focused on particular populations – youth, women of childbearing age (particularly following childbirth), and older adults (over age 60) – since studies after studies revealed that these groups are prone to depression. The goals of the campaign, among others, include helping people who suffer from depression and encouraging those who might know someone who is suffering from depression to speak out and seek help. Such goals are geared toward early prevention and steps that may be taken to help depression sufferers in need.

Depression is a major public health problem among working-age adults (Tan et al., 2014). It may prevent people from working and participating in family and community life (WHO, 2017). As we know, a healthy workforce is an important economic and national asset (Davis et al., 2005). However, estimates by Organization for Economic Cooperation and Development [OECD] in 2013 revealed that 5% of the working populations in high-income countries are affected by severe mental health problems. A further 15% were reported to have moderate mental health problems, including depression, generalized anxiety, and simple phobia (Memish et al., 2017). In the United States, depression poses a threat to the workforce, which is also highly populated by women (U.S. Census Bureau, 2015). Women, especially working mothers, are much more likely to be diagnosed with depression due to vulnerability to workplace stressors such as sleep deprivation, role demands of caring for an infant, and inability to engage in health promotion activities because of competing demands from home and work (Selix, 2012). Economy wise, workplace depression in the U.S. collectively costs almost US\$250 billion (Evans-Lacko & Knapp, 2016). In their study comparing the economic costs of depression in Brazil, Canada, China, Japan, South Korea, Mexico, South Africa, and the U.S., Evans-Lacko and Knapp found that between 0.1% and 4.9% of a country's Gross Domestic Product (GDP) was lost due to absenteeism (taking off days from work) and presenteeism (attending work while dealing with depression) in the workplace. The study found that individuals who lived in these countries (with high per capita GDP) and did not disclose their depression to their employer tended toward higher levels of absenteeism. Often times, a depressed employee will be silent because they fear the effect it will have on their job. In contrast, individuals from lower-GDP regions showed more presenteeism for the same reason. These findings suggest that individuals with depression who live in higher-income countries and experience additional stress due to economic climates may cope by taking time off work. The obvious reason is because

it is more acceptable when living in a country where the economy is stable, and there is likely a stronger social safety net. Individuals in lower-income countries, however, may not feel comfortable taking time off work. As a result, they may remain at work, but they may also present lower levels of productivity, and this fact is reflected in relatively lower levels of presenteeism. As such, in the context of workforce well-being, depression is an issue that demands attention, regardless of a country's particular economic developments or cultures.

Furthermore, mental health is also a significant concern at the organizational level. OECD (2013) reported that mental health problems are prevalent among employees in all working populations around the world. A mental disorder, such as depression, causes mental anguish. It may compromise employees' abilities to complete simple, everyday tasks. Evidence reveals that mental health not only affects an individual's personal life and productivity; it also influences performance at work and career development. In 2020, the National Institute of Mental Health reported that young adults of working age, aged 18-25 years, had the highest prevalence of any mental illness (30.6%), followed by adults aged 26-49 years (25.3%), compared to those aged 50 years and older (14.5%). The global trend remains the same: females experience a higher prevalence of any mental illness than males, by almost 10%. Therefore, researchers have recently started to focus on the role of employment organizations in alleviating the effects of mental illness among workers. A U.S. based study by Shepherd-Banigan et al. (2015) found that reducing stress in the workplace and allowing women to work from home may improve mental health among women who transition back to work soon after childbirth. Using longitudinal data and causal-inferences techniques among 570 women who returned to work within 6 months after childbirth, they examined specific workplace attributes that influence depressive symptoms among women with young children. In the study, women who worked from home reported a statistically

significant decrease in depression scores over time. Additionally, women who reported a one-unit increase in job concerns experienced, on average, a 2-point increase in depression scores over time. In line with the study's finding, a review on interventions for women with PPD by Ortega and Reio Jr. (2016) affirms that acknowledging mental health as an important indicator for workforce well-being will encourage HRD professionals to stay informed of their important role and responsibility to address and skillfully attend to employees with mental health issues. Among others, they suggested a transition plan for mothers going back to work after giving birth, a training program aimed at supervisors and managers supporting postpartum mothers, and flexibility for mothers in managing their workload (p.144). Using the stress-buffering hypothesis by Cohen and Willis (1985), they concluded that social support, which could be provided by the workplace and co-workers, could support future research on helping women with PPD at work (p.145). These studies show that women who feel supported within their work community, by managers and peers, and have flexible work schedules fare best after coming back from maternity leave.

Mental health problem is indeed a societal and national problem. It affects the function, stability, and development of community members and countries. In many countries, HRD in non-profit and non-governmental organizations (NGOs) has become more important in that the methods originating in HRD have been increasingly used in wider contexts, such as community, country, or societal development (Kim, 2012). HRD may productively respond and offer solutions to address this societal problem, especially because "it is already recognized as making national-level efforts to address societal and national issues" (Cho & McLean, 2004; McLean & McLean, 2001). In terms of research, Kuchinke (2010) stated that "there has been an increase in the interest among management scholars in classic humanistic themes such as meaning of work, caring and compassionate organizations, and more broadly, positive organizational scholarship." Moreover,

scholars may further explore issues – such as improving health and safety, education, equity and disparity, poverty, social justice, human rights, spirituality, and governance policies at global, national or communal levels (Lynham & Cunningham, 2006) – from a more holistic perspective through HRD (Kuchinke, 2010; Pavlish, 2002). Pavlish (2002) specifically urged HRD scholars and practitioners to utilize HRD to improve people's overall health. However, the complexities of social reality and the systems surrounding human lives remain challenging as regards the use of HRD to solve societal problems (Kim, 2012), compared to in an organization. HRD scholars maintained that HRD can expand its application, such as in national HRD (NHRD) and global HRD (GHRD) ways, in order to improve the quality of life and living standards (Kim, 2012, p.242). To this extent, Kuchinke (2010) emphasized ‘human flourishing’ as a core guiding value for HRD, situating it in the broader notion of human development (HD). Drawing upon Amartya Sen’s concepts of capabilities, he situated his argument in the context of global mobility. He argues that:

The objective of development, then, is to expand and equalize the capability of each individual to enjoy those activities, ways of living, and general ‘functionings’ that he or she chooses as a mature and self---directing human being in the context of his or her social, political, economics and psychological context (p.578)

According to Kuchinke, the global mobility of workers has accelerated and impacted HRD in that it brings up “an opportunity to shape global organizations and a responsibility for broader political, social, and economic goals.” However, Fenwick (2011), in her response to Kuchinke’s remarks, doubted that HRD projects could genuinely address human flourishing issues as the focus of HRD is often on an individual’s performance and competency acquisition (p.5). Fenwick (2011) also questioned whether organizations responsible to shareholders will fund any human flourishing not

concerned with improving performance. Despite that, Kuchinke (2010) argues that NHRD “appears to put the discussion to rest by proposing a broad and inclusive definition” (p.580). NHRD refers to the development of a national policy for improving the well-being of its citizenry. Typically, it is devised by governmental departments. It has been accepted as a frame-breaking development in HRD (Kim, 2012). Indeed, NHRD “goes beyond employment and preparation for employment issues, to include health, culture, safety, community, and a host of other considerations that have not typically been perceived as manpower planning or human capital investment” (McLean, 2004, p. 269). In the context of mental-health disorder prevention and services, a national policy and collaborations among government, nonprofit organizations, and private-sector healthcare providers may facilitate the development of prevention and outreach programs, screening tools, and treatments for those in need. Hence, NHRD requires coordinated efforts among the government sector, private sector, and non-profit organizations, in order to address HRD and achieve the desired outcomes of HRD. Such outcomes include achieving improved health (McLean, 2014). As an example, in screening for women for PPD in the U.S., state mandates (including the IDHS) govern the screening process conducted in public and private health centers. In this process, the development of skills for healthcare professionals and improving the service delivery became a great platform to leverage NHRD’s efforts to address and manage mental health disorders.

Certainly, issues surrounding mental health remain a national concern. They require the establishment of policies, programs, and departments that work together to support the development and well-being of community members. The WHO campaign is an international collaborative effort aimed to combat depression. The National Institute of Mental Health (NIMH) is an example of a federal agency for research on mental disorder. Additionally, an organization

like the National Alliance on Mental Illness (NAMI) is leading the efforts to advocate, educate, support, and increase public awareness on mental illness issues at the grassroots level. The alignment of efforts at the national level, between government departments and agencies, private parties (such as employers and healthcare providers), as well as nonprofits and organizations that advocate for specific groups (like immigrants or low-income people), will ensure more holistic and inclusive NHRD policies and practices. These are critical to national development. As Chan (2010) puts it, “Positive mental health is linked to a range of development outcomes including better health status, higher educational achievement, enhanced productivity and earnings, improved interpersonal relationships, better parenting, closer social connections, and improved quality of life” (p. 1). Improving mental health services, therefore, is imperative, as it is the basic requirement for a broader effort toward human flourishing. As such, data from the Centers for Disease Control and Prevention [CDC] (2020) shows that 1 out of 10 women in the U.S. reported symptoms that suggest they experienced an episode of major depression in the last year. A recent report also shows that 1 in 8 women experienced symptoms of postpartum depression. Therefore, the next section will discuss the threat of maternal depression to one’s flourishing.

Maternal Depression: a threat to Women’s Flourishing

Mental health is an integral part that contributes to women’s flourishing. However, the burden of depression, a mental health disorder, is higher among females compared to males. In 2020, the prevalence of any mental illness was higher among females than males by almost 14%, while the prevalence of serious mental illness was higher among females than males by over 3% (NIMH, 2022). From a global perspective, maternal depression compromises families’ economic productivity, children’s development, and principles of social justice (Wachs et al., 2009). Maternal depression, a specific type of depression, may negatively impact an individual’s life and

affect work, family, health, and the development of offspring (Jellinek & Patel, 2002). Depression is common and costly, particularly for women during their childbearing years (Gjerdingen & Yawn, 2006). A study of employed women who gave birth at three community hospitals in Minnesota revealed that depressed women incur 90% higher health service expenditures, compared to non-depressed women (Dagher et al., 2012). Moreover, the high cost of health care will most likely burden employers that provide health insurance. It will also be likely to burden employees who receive health insurance for their families. Depression is a major risk factor that contributes to postpartum depression symptoms and anxiety while pregnant, related to unplanned or unwanted pregnancy, poor marital relationships, lack of social support, low socio-economic status, and stressful life events, including childcare-related factors (Beck, 2001; O'Hara & Swain, 1996; Robertson et al., 2004). In addition, children of depressed mothers are at risk for health, developmental, and behavioral problems (Wachs et al., 2009). Studies on high-income countries reported associations among maternal depression and disturbances in mother-child interactions (Lovejoy et al., 2000), negative perceptions of infant behavior (Foreman & Henshaw, 2002), and an increased likelihood of infants with temperamental difficulties (Edhborgh et al., 2000). Sohr-Preston and Scaramella (2006) noted that exposure to maternal depressive symptoms (during the prenatal period, postpartum period, or chronically) increased children's risk for cognitive and language difficulties. In low and middle-income countries, where more than 90% of children in the world live, the prevalence of postpartum depression symptoms is relatively higher. It is perhaps due to multiple depression-related risk factors (Broadhead & Abas, 1998), including conflict, disasters, violence, migration, and higher prevalences of HIV/AIDS (Dhanda & Narayan, 2007; Stein, et al., 2005). Maternal mental health warrants attention globally, as it involves tackling maternal depression, for the benefit of women, children's development, and society's well-being.

Risk factors for perinatal depression, as summarized by The American College of Obstetricians and Gynecologists Committee of Obstetric Practice include:

Table 2

Risk Factors for Perinatal Depression

Depression during pregnancy:	Postpartum depression:
• Maternal anxiety • Life stress • History of depression • Lack of social support • Unintended pregnancy • Medicaid insurance • Domestic violence • Lower income • Lower education • Smoking • Single status • Poor relationship quality	• Depression during pregnancy • Anxiety during pregnancy • Experiencing stressful life events during pregnancy or the early postpartum period • Traumatic birth experience • Preterm birth/infant admission to neonatal intensive care • Low levels of social support • Previous history of depression • Breastfeeding problems

Adapted from: American College of Obstetricians and Gynecologists' Committee on Obstetric Practice., A. (2018, November). Screening for perinatal depression. Retrieved February 19, 2021, from <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/11/screening-for-perinatal-depression>

Although depression affects people of all ages and from various backgrounds, the risk of becoming depressed increases in accordance with several factors. These include the following: poverty, unemployment, life events (such as the death of a loved one, war, or a relationship termination), physical illness, and problems caused by alcohol and drug use (WHO, 2017). In 2013, immigrant women, approximately 15% of all women in the U.S. at that time (Ruiz et al., 2015), remained a vulnerable group at risk of perinatal depression (Chan, 2010). Many immigrant women deal with these factors even prior to migration. This is because, although they are less likely to serve in the labor force compared to native-born women in the U.S., migrant women are less likely to be unemployed, compared to their male counterparts (Ruiz et al., 2015).

Summary

This section presented arguments and evidence on the importance of mental health as regards population well-being, specifically among migrant and foreign-born mothers. Health remains an important aspect of HRD. Recently, HRD scholars called for attention to a more holistic approach and research on HRD, which includes focusing on physical and mental aspects of health. Positive health and mental health are linked to positive development outcomes for a country's population. Mental health is a major factor that determines an employee's productivity. Absent health, an employee's job could not be executed or effectively implemented; productivity generally will be compromised. Some research connects health and the financial effects of an organization. Migrant women, who account for more than half of women's labor-force participation in the United States, are a vulnerable group at risk of perinatal depression, a mental health problem. This fact is particularly alarming; given high levels of participation in the labor force, women's mental health will greatly affect the industry. Consequently, it affects the well-being of families and co-workers.

Attention to mental health issues in the HRD field is timely since mental health is overlooked in research and national policy development. The call for human flourishing to be at the core of HRD definitely applied in the healthcare organizations industries. Mental health care services that give voice to the underprivileged groups and competency training in depression screening for healthcare professionals are definitely among HRD projects that contribute to human flourishing. In the context of health organizations in the U.S., this could also mean an opportunity to train healthcare workers to provide services to the floods of global migrant workers and family who are clients at the organizations. Complexities surrounding mental health issues abound. These

include how mental health may fall into other types of non-communicable diseases (Collins et al., 2011) and challenges to developing interventions or treatments that are culturally informed. Such unresolved complexities hinder researchers, policymakers, and practitioners from more fully addressing mental health issues as a team. Indeed, interdisciplinary understanding and collaborative efforts remain necessary, especially regarding NHRD. It is crucial to recognize the importance of mental health issues as it relates to workforce well-being. Also, it is relevant to study how it affects the large population of immigrant women in the workforce and the people surrounding their lives. The question to be addressed is why maternal mental health care is important for this population. A closer look at advancing mental health research and practice reveals that it remains absent mainly from HRD perspectives. Given the importance of mental health, more effort should be directed towards tackling this issue, so that HRD policies and practices could impart practitioners with proper management guidelines for mental healthcare delivery. Such policies may be implemented more holistically.

In the next section the researcher provides further background regarding maternal depression and PPD among migrant women.

Migrants and Mental Health

The number of migrants and foreign-born populations in the U.S. continues to increase. This rate affects formal and informal systems in the country and American society. Diminescu (2008) asserts that the concerned institutions and research spheres defined international migrants as the following:

Any person who moves to a country other than that of his or her usual residence, any person who crosses at least one national border. Unlike the immigrant, who comes to stay, the

migrant is usually thought of as someone in transit, who comes to work, travels across our territories and cities, and who goes back home or leaves for somewhere else. (p. 568)

There is no universally accepted definition for “migrant” exists at the international level. However, the International Organization for Migration (IOM) uses the term ‘migrant’ as an umbrella term for ‘person who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons’ (International Organization for Migration [IOM], 2022, para. 39). Two approaches are generally adopted to define the term “migrant” according to Carling (2022): the inclusivist approach and the residualist approach. The inclusivist view holds that migrants are people who have moved from their usual place of residence, regardless of their legal status and their motivations for moving, including refugees, foreign workers, trafficking victims, trailing spouses, international students, and many other more or less precise categories of individuals. The residualist view, while holding the same view about the movement, excludes those fleeing war or persecution, i.e., the refugees (Carling, 2022). In the current study, the term ‘migrant’ refers to the group that moved away from their country and resided in the United States of America during the time the study was conducted. The term ‘foreign-born’ is also used interchangeably when referring to this group to show that they are non-native to the country and its culture.

Population change could have implications in the electorate, education levels, and national birth patterns (Cohn, 2015). Intergroup contact and the transformation levels of American communities and institutions also increased (National Academy of Sciences, 2015). Additionally, immigrants send remunerations to their countries of origin, encouraging currency exchange that strengthens economies. Consequently, education systems need to be more integrated with students’ and educators’ demographics since many immigrants are highly educated as U.S. citizens (Cohn,

2017). Another developmental element affected by immigration includes a healthcare system that may serve the needs of increasingly diverse society members, especially immigrants, who often have less access to adequate health care (National Academy of Science, 2015). Providing equal access to health care and ensuring that immigrants' healthcare concerns are heard remains relevant in order to deliver quality health care for this population.

As such, the developmental impacts of immigration in the U.S. include changed social and labor demographics. Many of these immigrants are of working age. In fact, they are overrepresented in some industries (Desilver, 2017). This change in workforce demographics affects employee training, recruitment policies, management of human resources, development and health policies, and others. Scholars postulate that increased migration levels cause social, political, and economic consequences for migrating groups, as well as sending and hosting societies (Castles & Miller, 1998; Arango & Baldwin-Edwards, 2014). In 2019, the U.S. reported 48.8 million immigrants (U.S. Census Bureau, 2020); therefore, their mental health concerns have implications for the overall health of the nation (Derr, 2016). Immigrants are among the groups most vulnerable to health issues. Moreover, the processes and associated stressors affect migrating individuals and their families (Bhugra, 2004). Latino immigrants, for instance, are adversely affected by restrictive immigration policies. Health care or health treatment may be out of reach for them, regardless of citizenship or legal immigration status (Pedraza et al., 2017). Other common reasons among immigrant populations for avoiding health care include a lack of social support, language barrier, lack of knowledge of the health system, or lack of information pertaining to care access (Tobin et al., 2014). Many immigrants also hold diverse cultural beliefs about health and health care. Such established beliefs are not easily eradicated.

Literature suggests that immigrants have lower rates of mental illness than the U.S. born and second- or third-generation immigrants. This situation may be caused by the fact that many immigrants delayed diagnosis and underutilized mental-health services (Patterson & Gong, 2009; Eisenman et al., 2003; Wells et al., 2001; Pescosolido & Boyer, 2010). As a result, they usually have a severe mental illness when diagnosed (Flaskerud & Kim, 1999). As such, Nadeem et al. (2008) reported ethnic differences in mental health care preferences among low-income immigrants and U.S. born women. A recent review on the uses of mental health services among immigrants in the U.S. was conducted by Derr (2016). The study concluded that, in general, immigrants reported lower rates of using mental health services compared with persons born in the U.S. (see Aguilera & Lopez, 2008; Chen & Vargas-Bustamante, 2011; Jackson et al., 2007; Lee & Matejkowski, 2012; Le Meyer et al., 2009). According to Derr, lower rates of use of services relate to barriers that include, as follows: lack of insurance, stigma, preference for alternative care, culturally incompetent providers, language, wait time, cost, transportation, lack of knowledge, lack of collaboration between church and services, embarrassment and discomfort, fear of deportation, fear of missing work, inconvenient service hours, gender of the provider, confidentiality, beliefs about mental illness, self-reliance, and lack of awareness. Despite many countries, especially high-income countries, providing mental health services to help these populations, these barriers deter immigrants from receiving the necessary care. Thus, it jeopardizes the safety of their family and other community members. Also, it undermines efforts to provide equal access to health care.

Migrant Women in the Workforce

The burden of depression among women would affect labor force health. According to the data from the World Bank, approximately 38.8% of the worldwide labor force was made up of women in 2019 (World Bank, 2020). The Immigration and Nationality Act (INA) broadly defines

an “immigrant” as any alien in the U.S., except one legally admitted under specific nonimmigrant categories (INA § 101(a)(15)) (USCIS, Definition, para. 24). Data from the Center for Immigration Studies indicates that the nation’s immigrant (foreign-born) population, which includes legal and illegal immigrants, was 44.93 million, constituting 14.2% of the nation’s total population. This figure accounts for the largest share ever recorded since 1850 (Center for Immigration Studies, 2021). Relatedly, the Bureau of Labor Statistics at the U.S. Department of Labor reported 23.6 million foreign-born persons in the U.S. labor force in 2020, comprising 17% of the total figure. Women of foreign-born persons made up 59.8% of the labor force in 2020, compared to 74.7% of the native-born labor force (Bureau of Labor Statistics, 2016). In 2020, labor force participation differences between foreign-born and native-born mothers were greater among those with younger children than among those with older children. The labor force participation rate of foreign-born mothers with children under age six was 51.6% in 2020. Specifically, almost 44% were reported as having children under the age of three (U.S. Bureau of Labor Statistics, 2021). In Illinois, women comprise 58.8% of total labor force participation (U.S. Bureau of Labor Statistics, 2016). This figure is higher than the national labor force participation rate generally. There is a high level of participation in the labor force in Illinois, especially among Hispanic minorities, compared to African Americans and Whites. Generally, minority populations in Illinois are comprised of a high number of im/migrants (U.S. Census Bureau, 2016). According to statistics, half of the foreign-born population in Illinois was born in Latin America. Representing over 7% of the entire workforce in the U.S. (American Immigration Council, 2017), im/migrant women constitute a large part of the national workforce; consequently, their health and well-being should be properly addressed to facilitate productivity maintenance and healthy lifestyles. Im/migrant women, including those not employed in the work force, play crucial roles in family dynamics. Their

mental health impacts their abilities to manage the household and take care of children. Their health affects familial well-being and financial situation. For instance, their mental states will affect the well-being of their family and their spouse's focus on their job.

Perinatal and Postpartum Depression among Migrants

Perinatal and postpartum depression (PPD) is a devastating condition that can have long-lasting traumatic effects on a woman and her family (Bonari et al., 2004; Stewart, 2004; Mechakra-Tahiri et al., 2007; Beck, 2008). The migration process itself is challenging (Bhugra, 2004). Hitherto, refugee and immigrant women may be at risk for lack of early detection and treatment (Affonso et al., 2000; Stewart, 2008) and reduce the chance of connecting to treatment. Since immigrant women are most likely to live in poverty, this vulnerable population carries a higher risk of reporting postpartum depression syndrome (Pooler et al., 2013). A meta-analysis conducted by Falah-Hassani et al. (2015) on the prevalence of postpartum depression among immigrant women suggests that about 20% of immigrant women experience postpartum depression symptoms in the first year following childbirth. Complex experiences related to status as an immigrant in a foreign land sometimes make connecting with available mental health resources more difficult. Adding to this already complicated experience, immigrants in countries that require health insurance, like the U.S., have extremely low health insurance coverage rates and poor access to healthcare services (Derr, 2016). Thus, barriers to health care and public benefits have significant implications for immigrants, their children, and society generally.

In a Canadian study, results on postpartum depression symptoms among newcomers recognized that immigrants, asylum seekers, and refugees have three to almost five times increased levels of risk for PPD symptoms (Stewart et al., 2008). The study reported that women who could only afford lower prenatal care levels, found themselves more likely to experience PPD symptoms.

Women in the study reported lower social support scores, compared to Canadian-born women. PPD prevalence among immigrants from highly industrialized countries was found to be higher among Arab women in their home countries (Alhasanat & Fry-McComish, 2015). In a study of Hispanic immigrant women, the prevalence of women with positive PPD screenings was recorded at 54% (Lucero et al., 2012). This review concludes that migration could be a risk factor for PPD among immigrant women. Other risk factors cited in the literature for PPD among immigrants include: lack of social support, lack of access to health care, language barriers, and violence (as cited in Alhasanat & Fry-McComish, 2015).

Summary

This section discussed how maternal depression contributed to PPD among immigrants. It addressed how depression might, consequently, affect immigrants and their families. Migration impacts social, political, and economic factors. It relates to sending and hosting countries. Therefore, mental health concerns among immigrants have become a national health problem. Further, literature that directly addresses the issue of mental health, or prenatal and postpartum depression (PPD) among migrants, specifically, is still growing. Studies recognized that immigrants remain at risk for mental health issues. However, they are not generally keen on seeking help or care. This is problematic because there are available services for them, especially in more developed nations. Many factors, including language and lack of knowledge and support, hinder sufferers from seeking necessary help. A consequence is that it affects the well-being of their family, employment industry, and society. In an effort to reduce barriers to mental health care among immigrant women, specifically for PPD treatment, reliable technologies are needed. Technologies may facilitate screening patients. Healthcare workers may connect patients to the services they need. Exploring the use of mobile devices to achieve this objective would be a

relevant effort. Usage of mobile devices for achieving health objectives is currently trending. Many recorded benefits may apply to help immigrant women. Greater detail on this subject follows in the next section of this literature review.

Mobile Health (mHealth)

The ubiquity and penetration of mobile technology have changed the landscape of service delivery in many industries. The healthcare industry was greatly affected by the development. Indeed, the use of mobile and wireless technologies to support health-related goals (mHealth) has transformed health-care delivery the globe (Konschak et al., 2013). Istepanian et al. (2006) define “mHealth” as the “emerging mobile communications and network technologies for health care systems.” The Foundation of the National Institutes of Health defines it as “the delivery of health care services via mobile communication device” (as cited in Konschaket al., 2013). As a subset of electronic health (eHealth), mHealth was broadly defined as “the use of mobile computing and communication technologies in health care and public health” (Free et al., 2010, p.2). According to the WHO Global Observatory for eHealth, mHealth is “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices” (Ali, et al., 2016). Other devices, such as smartphones, portable media players, and tablet personal computers (tablet PCs), involve important applications as regards mHealth (Free, et al., 2013). The functionalities of these devices used in the healthcare industry include, among others, the following aspects: short messaging system (SMS), paging, automated sensing, mobile applications (apps), media capabilities, and videoconferencing (Free, et al., 2013; Klasnja & Pratt, 2012).

In the past decade, mHealth has constantly expanded (WHO, 2011). Evidence reveals that mHealth helps to improve healthcare quality, reduce errors, and cost efficiency (Cortez, 2014). Mobile technologies are utilized in the public health sector for health education and disease monitoring, such as weight loss (Patrick et al., 2009), diabetes management (Kirwan et al., 2013), pregnancy monitoring (Song, et al., 2013), and mental health (Bakker et al., 2016; BinDhim et al., 2016). Extensively, mHealth was used to deliver care and health services for maternal health, newborn, and child health in low and middle-income countries (for examples, see review by Lee et al., 2016 and Tamrat & Kachnowski, 2012). To date, healthcare providers have shown an increasing interest in integrating mobile technologies into service delivery and client service (Healthcare Information and Management System Society [HIMSS], 2015a). According to the HIMSS 2015 Mobile Technology Study of 238 healthcare providers, healthcare organizations are beginning to widely deploy mobile technologies into their operating system. It involves an effort to engage patients within their organizations (HIMSS, 2015). Over half of the respondents in the study indicated that their organization has a mobile technology policy (p.2). Indeed, mHealth continues to evolve and drive healthcare efficiency (HIMSS, 2015b). Evidence suggests that the use of mobile technology can improve diagnosis, compliance with treatment guidelines, patient information, administrative efficiency (Sherry & Ratzan, 2012), engage patients and lower costs (HIMSS, 2015), and increase the effectiveness of community health workers in resource-constrained settings (Braun et al., 2013). Undoubtedly, mHealth presents unique advantages for mental health assessment. It holds the potential to reduce or eliminate errors associated with perception, impression-formation, and recall (Bitsch et al., 2015, p.153). It augments traditional diagnostic evaluation and processes and acts as an intermediary between patients and clinicians (Bitsch et al., 2015, p.153). Studies recognize that mobile technology is feasible and acceptable as

outpatient screening devices among perinatal women (Kola et al., 2021; La Porte et al., 2020; Silver et al., 2017). Indeed, it motivated patients to seek further mental health care (BinDhim et al., 2016).

The Evolution of mHealth

Mobile health relates to personal digital assistants (PDA), health-related websites, and the early 90s electronic medical records era. Mobile health's popularity and development were catapulted post-iPhone introduction (Cortez, 2014). Providers consequently offered solutions in health care using the mobile communication device. Apple company opened up a new chapter in the evolution of mHealth as the company first connected the iPhone to a blood glucose meter in 2009 (Cortez, 2014). Subsequently, healthcare professionals, application developers, network service providers, researchers, and policymakers have become more interested in investigating how mHealth could be implemented and launched. It focused on how to support businesses, services, and health objectives. Moreover, mHealth is one of the four domains of information and communication technology (ICT). It functions alongside telemedicine, telehealth, and e-health (Simmons, 2014). Bashshur and colleagues (2011) define "ICT" as the full scope of healthcare service delivery. It is generally characterized as having electronic communication and system networking capabilities. It substitutes and complements traditional face-to-face personal methods. These domains provide, exchange, and facilitate health-related information. ICT makes it easier for networked computers to connect providers and patients, allowing access to health information, decision-making, and support systems (Simmons, 2014). Further, Bashshur and colleagues identify four domains of ICT, which include telemedicine, telehealth, e-health, and mHealth. The following section describe these domains briefly from an evolutionary perspective.

Telemedicine. Telemedicine evolved in 1905 with the first telephonic transmission of electrocardiographic information exchanged among providers. This technology is comparable to today's fax machine. The term is frequently used to refer to all ICT systems, modalities, and applications. It remains an independent domain.

Telehealth. Experts in 1978, aiming to expand the original scope of telemedicine, coined the term "telehealth." This technology promised to include dimensions of health care that could be affected without the usual physical patient-provider interactions and contextual settings. This domain also includes other elements, such as patient and provider education and patient care.

e-Health. E-Health, or electronic health, was introduced in the late 1990s. This technology refers to increased Internet functionality and electronic data systems that capture, analyze, and exchange healthcare information (Bashshur et al., 2011). It is difficult to distinguish what should be included under the designation "e-Health." Bashshur and colleagues, for instance, suggested that any content that does not match with other domains and is Internet-driven might be included in this domain.

mHealth. The rise of mHealth began in 2003 when the term was introduced to refer to the network personalization of mobile phones. Due to the pervasiveness of the Internet and mobile phones, patient-centered care is now available anywhere and at any time. . Given the definition offered by Istepanian et al. (2006), "mHealth" includes emergent mobile communications, such as mobile computing, medical sensors, and network technologies for health care. According to Istepanian and colleagues, mHealth is an evolution of e-Health systems that advanced from traditional wired desktop systems (platforms) to wireless and mobile configurations. Moreover, mHealth focuses on device mobility and patients' capacities for mobility (thus becoming fully patient-centered) (Pawar et al., 2012). Devices and patient mobility are the key factors in the

development of mHealth, contributing to its popularity. In less developed countries, mHealth has revealed itself to be the solution for developing a healthcare system where patients may exist in a remote location, perhaps with limited resources, and remain able to receive care (Konschak et al., 2013).

Many countries have established mHealth initiatives. The most common activity was the creation of health call centers that are designed to respond to patient inquiries (Xiaohui et al., 2014). Other initiatives include SMS for appointment reminders, using telemedicine, accessing patient records, measuring treatment compliance, raising health awareness, monitoring patients, and supporting physician decisions (Xiaohui et al., 2014). In the U.S., mHealth use continues to increase. Specifically, an increasing number of people use mobile devices to find medical information (Pew Internet, 2013). High numbers of smartphones, tablet PCs, and laptop ownership make mHealth adoption rates more likely among people in the U.S., compared to other parts of the world.

Roles of mHealth in Mental and Maternal Health Care

A review considered 30 types of health and wellness technology used by 19 historically underserved populations. Results indicated that different health technologies could positively affect the health of the underserved population, at least for the 23 health issues discussed in the paper (Montague & Perchonok, 2012). The author posits that social media, cell phones, and videotapes are the types of technology that should be used more prevalently in order to make necessary interventions with these groups. Since mobile technology, including mobile phones, cell phones, mobile computers, and PDAs, is also included in the review, it may be inferred that technologies under the domain of mHealth generate positive effects for these groups. Further, a study involving 2538 participants from Australia, Canada, New Zealand (NZ), the United

Kingdom (UK) and the U.S. was conducted to investigate the relationship between the use of mobile phone apps and depression screening. Mobile phone apps were found to motivate some users to seek a depression diagnosis (BinDhim et al., 2016). The result indicates that mobile phone screening apps potentially influence users to discuss results with healthcare professionals. This potential impact of mHealth for mental health treatment-seeking behaviors may benefit the underserved group since the ownership of mobile devices among this group is high and continues to increase (Pew Internet Research, 2013). Collins et al. (2011) conducted a Delphi study among researchers, advocates, program implementers, and clinicians from more than 60 countries. Their research suggested a need to advance the prevention and implementation practices of early interventions, improve treatments, and expand access to mental health care around the globe (Collins et al., 2011). This effort involves developing an evidence-based set of primary prevention interventions to ensure the effectiveness of screening tools for the detection of disorders in routine care settings. This goal could be achieved by developing mobile and IT technologies (p. 9). The study shows further that, scholars and practitioners globally maintain concern for mental health disorders. Thus, there is a need for joined efforts to address this health issue. However, the challenge will be to develop culturally informed methods to eliminate stigma, discrimination, and social exclusion of patients and families across diverse cultural settings (Collins et al., 2011). Researchers have accepted these challenges, so research on a culturally informed mHealth technology has intensified over the years. For example, a recent study investigated the use of mHealth to improve health literacy among immigrant populations (Fernández-Gutiérrez et al., 2019). It applied a quasi-experimental design study with a group of immigrants in the southern Spain area. Preintervention and postintervention measurements were taken among 93 participants from 17 nationalities who volunteered for the study. The participants navigated a mobile

application called e_SaludAble in their native languages. The app is “a native application for mobile health, education, awareness, and navigation of sociomedical resources in the Autonomous Community of Andalusia and is compatible with iOS and Android 6.0 and up” (p.144). Participants were involved in the development of the app. Their performance after using the app was measured, together with their socio-economic background. The results show that participants recorded improvements in the postintervention scores compared to the preintervention scores. It concludes that the cognitive and social skills required to access and use health services in participating immigrants are improved. Thus, the findings demonstrate that it is possible to develop a culturally appropriate mHealth intervention to improve health literacy levels among immigrants.

A cited benefit of mHealth is the fact that it offers the potential for improving access and affordability of health care. This is accomplished by lowering disparities based on geography and income (Xiaohui et al., 2014). An analysis of mHealth related to maternal and newborn health programs and outcomes from different parts of the world reveals that the integration of mobile health for prenatal and newborn health services in low- and middle-income countries demonstrated positive outcomes (Tamrat & Kachnowski, 2012). Such outcomes include increased referrals, a decreased maternity mortality ratio by 50% in 3 years (Musoke, 2002), and increased satisfaction and confidence in health workers during delivery (Jareethum et al., 2008). A recent meta-analysis on mHealth interventions for maternal, newborn, and child health in the same economy revealed that interventions via short messaging systems (SMS) were associated with an increased utilization of health care and infant feeding (Lee et al., 2016). These studies are examples of how mHealth is useful in low-resource settings. They relate to low-income and underserved populations, even in high-income countries. In the U.S., mobile phone interventions were tested to address maternal depression among Latina women (Baker-Ericzén et al., 2012). In the study, the impact of reducing

depression symptoms remains under investigation. Nevertheless, participants reported higher satisfaction levels and increased awareness of appropriate community services available to receive help for depression. Such interventions invite sufferers to talk to someone about their concerns.

Another study, among low-income racial and ethnic minority women with postpartum depression, indicated that text messaging is a feasible and well-accepted method for adjunct therapy among participants (Broom et al., 2015). In the study, participants reported that the message was easily received, read, and personally relevant. The study emphasized text messaging as an inexpensive-but-working solution that support low-income, minority mothers at-risk of suffering from PPD.

PPD screening

Many studies have cited the use of mHealth for maternal depression. However, studies on the use of mHealth for PPD screening, explicitly addressing the usage of mobile devices for PPD screening by healthcare providers, remain scarce. . It was recommended that extensive screening for depression in postpartum women be implemented (Henegan et al., 2000; Horowitz et al., 1995), although later, some researchers argued that screening for depression is problematic and unwarranted (Coyne et al., 2000). There are four PPD screening measures most often noted in the literature. These measures are as follows: Postpartum Depression Screening Scale (PDSS) (Beck & Gable, 2000a), Postpartum Depression Predictors Inventory-Revised (PDPI-R) (Beck, 2001, 2002; Beck, Records, & Rice, 2006), Patient Health Questionnaire-9 (PHQ-9) (Kroenke, et al., 2001), and Edinburgh Postnatal Depression Scale (EDPS) (Cox, et al., 2009; Haßdenteufel, et al. 2021).

Postpartum Depression Screening Scale (PDSS). PDSS was developed for use after delivery. It demonstrates greater sensitivity and specificity than PDPI-R. This instrument involves

self-reporting measures, comprised of 35 questions, and is administered in 5-10 minutes. It assesses seven dimensions. These dimensions are as follows: sleeping/eating disturbances, anxiety/insecurity, emotional liability, cognitive impairment, loss of self, guilt/shame, and contemplating self-harming. The validity and reliability of the PDSS were assessed, using a sample of 525 women. The mean length of time since delivery was 6 weeks (Beck & Gable, 2000a). Confirmatory factor analysis on the scale shows that PDSS has good construct validity (t-value = 14.79); the Tucker-Lewis index of 0.87 and root mean square residual of 0.05 were judged as supportive of model fit (Beck & Gable, 2000b). Further, Beck and Gable recommended a PDSS cut-off score of 80 (sensitivity 94% and specificity 98%) for major postpartum depression and a cut-off score of 60 (sensitivity 91% and specificity 72%) for major or minor depression.

Postpartum Depression Predictors Inventory-Revised (PDPI-R). PDPI is used before and after delivery. Its purpose is to identify risk factors for PPD, and it serves as an interview tool for the clinician. It was developed from the findings of an updated meta-analysis of the risk factors of PDS (Beck, 2001, 2002; Beck, Records, & Rice, 2006). It consisted of 13 predictors of PDS, including 10 prenatal factors and 3 postnatal factors. Screening is administered during each trimester and within six weeks of delivery. It assesses factors in the following areas: prenatal depression, life stress, social support, perinatal anxiety, marital relationships, depression history, self-esteem, planned/unwanted pregnancy, marital status, socioeconomic status, childcare stress, infant temperament, and maternity blues. A descriptive cross-sectional research study, conducted among 316 women within 6 weeks after childbirth in Korea, demonstrates that this scale has a sensitivity and specificity of 87.3% and 85.1%, respectively. The cutoff point is 9.5 for the full version and 91.5% and 66.1%, respectively, at a cutoff point of 5.5 for the prenatal version. It has shown a good degree of correspondence between the estimated and observed probabilities of

postpartum depression symptoms (Hosmer-Lemeshow (HL) fit = 3.554, $p=.829$ for the prenatal version and HL fit = 8.305, $p=.404$ for the full version) (Youn & Jeong, 2011).

Patient Health Questionnaire-9 (PHQ-9). PHQ-9 is a self-report diagnostic instrument used for the assessment of mental psychiatric disorders. Its brief self-report tool incorporated the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) depression diagnostic criteria with other leading major depressive symptoms. The tool rates the frequency of symptoms. These rates factor into the scoring severity index. PHQ scores of 10 and higher indicate that the patient is showing depression, with higher severity as the score increases (Kroenke, Spitzer, & William, 2001). Kroenke et al. concluded that PHQ9 is a reliable and valid measure of the severity of depression among primary care and obstetrics-gynecology samples. Their work involved conducting interviews with 580 patients. It found that a PHQ-9 score, above or =10, had a sensitivity of 88%, and a specificity of 88% for major depression. PHQ-9 scores of 5, 10, 15, and 20 represented mild, moderate, moderately severe, and severe depression, respectively. Another validation study was conducted in Minnesota with a sample of 745 pregnant women. There, the PHQ-9 score cutoff of 10 yielded sensitivity and specificity rates of 85% and 84%, respectively, for a depression diagnosis, and 75% and 88% for sub-diagnosis, respectively (Sidebottom, Harrison, Godecker, & Kim, 2012). In the study, researchers found that PHQ-9, embedded within a multidimensional risk screening interview, could effectively identify pregnant women who met the criteria for depression.

Edinburgh Postnatal Depression Scale (EDPS). During the postpartum phase, EDPS is used for screening. It is utilized in the U.K. and Europe. This self-report instrument comprises of 10 items and takes less than 5 minutes to complete. A score above 12 identifies women with PPD. The tool is written at a fifth-grade reading level. It is effective for identifying women from all

socioeconomic statuses (Cole, 2009). A recent review of EDPS validation studies reported that EDPS was a valid screening instrument, particularly for depressive disorders during pregnancy. This review considered its validity in 11 different countries, including France, Sweden, Finland, and the Netherlands (Kozinsky & Dudas, 2015). Also, validation studies in the review reported an estimation of sensitivity and specificity of between 64–100% and 73–100%, respectively. The study reported that the optimal cut-off for major depression varied from 5.5 to 14.5. In general, the cut-off is lower in the post-period, compared to the antenatal period. Most validation studies included in the review revealed a variable 95% confidence interval for the sensitivity, specificity, and predictive values. This reflects the possibility of a low number of participants, the prevalence of identifiable depression cases, and differences in the EDPS characteristics of the version applied. The author suggested that the EDPS be adapted to the culture of the population. This is true in instances of same-language speaking countries where the population might record different cut-off values at different screening times.

mHealth for Depression Screening

Researchers tested mobile technology to study depression screening among patients. For instance, a study reported efforts toward the development of mHealth solutions to detect PPD. A study conducted by Jiménez-Serrano et al. (2015) documented the development of a mobile health application. It is intended to predict postpartum depression based on machine learning. In the study, the researchers developed classification models for detecting the risk of PPD during the first week after childbirth. Based on the results of the best performance model, researchers built a mobile health application on Android for clinicians to monitor patients' test. However, this technology remains untested, and the outcomes for patients and healthcare practitioners remain unknown.

In addition to using applications on mobile devices, Fann et al. conducted quasi-experimental research to evaluate the feasibility of depression screening among cancer patients. The work involved PHQ-9, which was administered via touch screen (Fann et al., 2009). The study validated the effectiveness of PHQ-9 on a touch screen computer for depression screening among diverse cancer patients. Participants were identified as 342 cancer patients from the Seattle Cancer Care Alliance (SCCA). They completed a web-based survey on a touch screen computer. PHQ-9 was integrated within a more extensive study of the clinical impact of computerized symptoms and quality of life screening. Specifically, data were collected in two phases (T1 and T2). Researchers found that touch screen computers are feasible to use when screening patients with PHQ-9, as 96% of patients completed the PHQ-9, with a mean completion time of 2 minutes. Moreover, researchers examined construct validity for PHQ-9, using Pearson correlations of the PHQ-9 total score, in combination with other depression survey questions (QLQ-30) and the Symptoms Distress Scale (SDS) domains, during T1. Results showed strong correlations: most domains predicted to converge with depression severity ($r = .711$). By comparison, correlations were low in domains predicted to discriminate from depression (i.e., digestion problems, breathing problems, and fever/chills) ($r < .367$).

Another study involving a group of 2538 participants from 5 developed countries revealed that a mobile phone depression-screening app “Health Monitor” motivated some users to seek depression diagnosis (BinDhim et al., 2016). Participants completed PHQ-9 depression screening with the app. A total number of 322 participants was found to express high-depressive symptoms and were not diagnosed with depression. They received advice to discuss their results with healthcare professionals. After a month, the research team followed up with participants. Approximately 74% of those participants completed the follow-up. Approximately 38% of the

participants consulted healthcare professionals about their depression score. This study reflects that depression screening using mobile apps motivated participants to seek treatment. Although, it was not specific to PPD. The study suggests, then, that there is a chance that the same effect could happen if mobile technology was used to screen for PPD among perinatal mothers.

Several studies have cited the use of mHealth for maternal health (Abroms et al., 2012; Song et al., 2013; and Lee et al., 2016). Research on the use of mHealth for screening PPD, especially among underserved populations, remains almost non-existent. A study, conducted by Pineros-Leano and colleagues (2015), however, is available. The research examined the attitudes of clinic staff towards the use of mHealth technology when conducting perinatal depression screenings among low-income women in a public health clinic. The qualitative study collected data from staff members employed by a public health clinic. It cited three major benefits and two major barriers in the use of mHealth to screen for perinatal depression among low-income women. Benefits include a reduction of literacy and language barriers, increased privacy for clients, and a reduction of errors, from the provider's perspective. Barriers include increased network issues and responsibility for technology, including fear of the device being stolen, lost, or broken. Further, a group of researchers at Massachusetts General Hospital's (MGH) Ammon-Pinizzotto Center for Women's Mental Health developed an application called the MGH Perinatal Depression Scale to refine how women around the world are screened for PPD. The app includes questionnaires about mood, anxiety, sleep, and stress at important time periods during and after pregnancy. The work aims to identify specific symptoms that are most critical in the diagnosis of PPD, among women ages 18-45, who are pregnant or up to 12 weeks postpartum (Wicklund, 2017). A more recent study reports preliminary findings from a pilot study of a digital screening app for perinatal depression (Vanderkruik et al., 2021). It explores the potential for app reach, engagement, and user

demographics and mental health symptoms. Data from 700 pregnant and postpartum women were collected through passive recruitment efforts and covered participants from over 30 countries. The results show that more than 50% of the women had a depression score indicative of clinical depression during pregnancy. Over 70% of women in the postpartum period also recorded the same pattern. This study is important as it explores the potential of using smartphones for depression screening locally and globally. Big data could be collected and analyzed to provide a more powerful analysis. It also opens the possibility of leveraging the app to connect women who screen above a specified threshold to an intervention or resources. Consequently, a more accurate and refined screening tool that connects women to resources could be developed.

In terms of the type of mobile technology used with patients, older research documented the reliability of electronic assessment formats, compared with paper and pencil administration (Boyes et al., 2002; Drummond et al., 1995; Skinner & Ballen, 1983; Velikova et al., 1999). More recently, touchscreen technology was found to be an acceptable modality among low-income women in risk assessment questionnaires. Specifically, it relates to the following healthcare concerns: breast health, among ethnically diverse populations (Bravo et al., 2011) and asthma screening questionnaires (ASQ) for children, completed by low-income minority parents with limited health literacy and limited English proficiency (mostly mothers) (Vargas, et al., 2010). In both cases, the use of the touchscreen was preferred by participants to answer health questions compared to a paper survey. Participants reported feeling more at ease because the technology is offered at little or no expense to them,, is easy to understand (using English language to language barriers), and it encourages them to learn new technology. Such technology involves applications and thereby offers opportunities for providers to engage these groups for intervention and education purposes using mHealth (Bravo et al., 2011). Moreover, touchscreen device use carries

the potential advantage of providing a cost-effective way of managing large volumes of data with few staff resources. Also, it makes data available for clinicians to view in real-time (Fann et al., 2009).

Summary

PPD is a common and severe depressive disorder, but it can be treated if detected early. The literature identifies a trend of using SMS for maternal health education and newborn and new mothers' monitoring in low-resource settings, or among underserved populations, in low-and medium-income countries, as well as in developed nations. SMS remained the most studied technology for delivering health information to underserved populations. There is still a lack of updated research that compares the benefits of using different types of mHealth devices for PPD screening among migrants. This is timely as mHealth could mediate intentions to seek PPD screening among underserved mothers and the mHealth technologies are consistently updated. Evidence also identifies that, women from low-income countries or low-income and migrant women in developed countries are comfortable acquiring or providing information through mobile technology. Such technology includes SMS messaging and the touchscreen device. Furthermore, research revealed that depression-screening apps motivated some patients to discuss their depression symptoms with a healthcare practitioner. The only study on PPD screening, using mHealth, examines the clinic staff perspective. Research should be conducted to investigate the same research problem with women, who were screened, to determine if they also have a concern regarding the use of mHealth in the PPD screening process.

Past research recognizes many barriers to screening. Nevertheless, an academic-community partnership exists to improve screening for PPD among low-income women. To effectively use mHealth for PPD screening, technological development should consider that

participants will be utilizing the technology and providing information through the technology. The following section discusses technology acceptance in the context of mHealth. Specifically, it addresses studies that conducted using the same theoretical framework adopted by the current research project.

Technology Acceptance: mHealth

A goal for mHealth implementation in healthcare settings aims to deconstruct barriers that impede healthcare service delivery. Barriers include, for instance, geography, finances, and human error (Xiaohui et al., 2014). These factors carry great impact, especially for underserved populations. In particular, mHealth adoption as a tool for screening underserved mothers potentially helps health providers screen this population effectively. It is important that this population accepts and adopts this technology. Moreover, technology adoption is a widely researched topic in information systems research at the individual, group, and organizational levels (Venkatesh, 2006). Successful adoption may depend on whether users are willing to adopt new technology, particularly when it differs from technology that they have used previously (Venkatesh et al., 2003). It is important to understand the factors that influence mHealth adoption to facilitate long-term success and realization of health-data benefits (Kim & Park, 2012; Or & Karsh, 2009; Rai et al., 2013). Users' acceptance of technology is a major factor in determining successful implementation of health information technology.

Further, existing research on mobile health technology acceptance explored the issue. Approaches focused on practitioners' perspectives. Consider, for example, Pineros-Leano et al. (2014). There is scarce research that discusses patients' acceptance particularly among low-income immigrant women in developed countries. Or and Karsh (2009) reviewed 52 studies to explore patients' acceptance of consumer health information technologies (CHIT). However, most articles

included in the review discussed acceptance and use of health information websites, compared to mHealth technologies. A recent review of the use of mHealth interventions in historically underserved and minority populations revealed the need for more research on mobile phones and tablet applications within this group (Anderson et al., 2018). Notably, an often-cited theory in technology acceptance literature included is the Unified Theory of Acceptance and Use of Technology (UTAUT).

Unified Theory of Acceptance and Use of Technology (UTAUT)

A theory widely adopted among scholars to explain technology acceptance is the Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by Venkatesh and colleagues (2003). The model explains user intentions for information systems (IS) and subsequent usage behavior. Initially, the theory focused on the use of technology in the workplace. More recently, however, it became a robust integrative theory used by many industries, including health care (Rho et al., 2015). Venkatesh et al. (2003) contend that “UTAUT provides a useful tool for managers needing to assess the likelihood of success for new technology introductions and helps them understand the drivers of acceptance to design interventions proactively” (p. 425). The UTAUT model aims to explain usage behavior by considering a variety of independent variables in different environment settings. Studies regarded it as the most predictive model in technology acceptance literature (Alawadhi & Morris, 2008; Al-Shafi & Weerakkody, 2010).

The UTAUT model originated from various theoretical disciplines. These include as follows: psychology, sociology, and information systems (Kijsonayotin et al., 2009). UTAUT is grounded in Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Motivational Model (MM), Theory of Planned Behavior (TPB), Combined TAM and TPB (C-TAM-TPB), Model of PC utilization (MPCU), Innovation Diffusion Theory (IDT), and Social

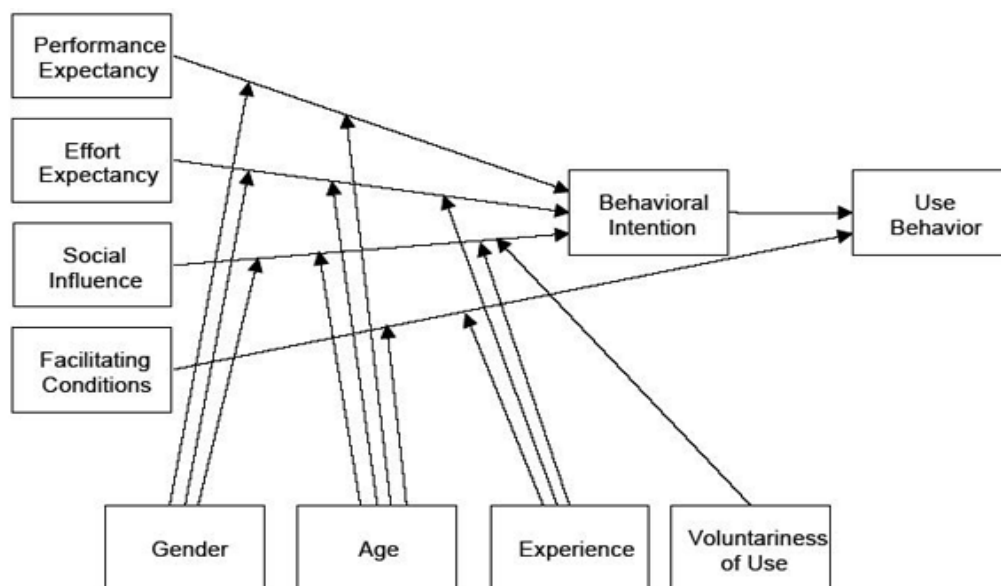
Cognitive Theory (SCT) (Venkatesh et al., 2003). UTAUT measures users' acceptance of technology. It regards various technologies and users (Curtis et al., 2010; Eckhardt et al., 2009; Hanson et al., 2011; Wang et al., 2009). Moreover, it proves valid cross-culturally (Oshlansky, et al., 2007). Also, it wields content validity through six longitudinal field studies (Venkatesh et al., 2003). Venkatesh et al. (2003) longitudinal study proved that subsequent validation of UTAUT accounted for 70% of the variance in usage intention.

UTAUT constructs. UTAUT initially held that four key constructs are direct determinants of usage intention and behavior. These constructs may be identified as follows: performance expectancy, effort expectancy, social influence, and facilitating conditions. Gender, age, experience, and voluntariness of use are suggested for moderating the impact of the key constructs of usage intention and behavior (see Figure 2 below). In the original model, Venkatesh (year) theorized that only four constructs would have significant role as direct determinants of user acceptance and usage behavior. These constructs include performance expectancy, effort expectancy, social influence, and facilitating conditions. Attitudes towards technology, self-efficacy and anxiety are theorized not to be direct determinants of intention. UTAUT has become established as a popular theoretical framework within the field of Information Systems (IS) and Information Technology (IT) adoption and diffusion (Williams et al., 2011). Citation research conducted in winter 2014 yielded 743 scientific papers in journals. These referenced the UTAUT model from 2003 to 2013 (Khechine et al., 2016). Based on a review of 450 studies citing UTAUT, Williams and his colleagues (2011) concluded that the majority of studies used UTAUT as a basis for supporting arguments or criticizing theories, rather than using the theory for investigation purposes. The majority of studies reviewed (407/450 studies) did not use UTAUT directly. Instead, they cited the originating article. Only 16 studies reported full use of the theory. Meanwhile,

another 12 studies reported partial or altered use of the theory to suit their purpose. Also, the review concluded that there is an increasing trend of using external variables and external theories in combination with UTAUT. Some of the most common external variables employed include the following: attitude, anxiety, self-efficacy, perceived ease of use, perceived usefulness, perceived ease of use, and perceived credibility. The theory could be applied for various technology and industries, which will need to be adjusted according to the needs of the particular study.

Figure 2

The Unified Theory of Acceptance and Use of Technology.



Adapted from Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

The researcher offers the following operational definitions. These are based on definitions for each factor, proposed by Venkatesh and colleagues. Definitions derive from the context of mHealth acceptance as regards PPD screening.

Table 3*Operational Definition of UTAUT Factors for the Current Study*

UTAUT Factor	Operational Definition for the Current Study
Performance Expectancy	“Degree to which a patient believes, that using mHealth will help to identify symptoms of PPD during PPD screening”
Effort Expectancy	“Degree of ease of use associated with mHealth so patient will be comfortable providing information for PPD screening”
Social Influence	“Degree to which an individual perceives that the important others believe she should use mHealth for PPD screening”
Facilitating Conditions	“Degree to which the individual believes that an organizational and technical infrastructure exists to support the use of mHealth for PPD screening”
Attitude	“Degree of positive or negative feelings about using mHealth for PPD screening”
Self- Efficacy	“Degree to which judgment of one’s ability to use mHealth to accomplish PPD screening”
Anxiety	“Degree to which the individual is anxious or his/her emotional reactions when it comes to using mHealth for PPD screening”
Behavioral Intention	“Degree of patient’s intention to use mHealth to screen for PPD”

UTAUT in mHealth Studies. UTAUT is one of the most dominant models in explaining factors that affect the acceptance of various healthcare technologies across different user groups, settings, and countries, besides the technology acceptance model (TAM) (AlQudah et al., 2021). To date, most technology acceptance studies focus on health care professionals’ technology acceptance rather than patients’ technology acceptance (Sun et al., 2013). Patients are consumers of medical services and constitute a loop in this service system. Notably, their adoption behaviors

remain largely understudied (Shareef et al., 2014). A recent study on healthcare professionals' technology acceptance using UTAUT was conducted by Kim et al. (2016). It reported factors influencing healthcare professionals' adoption of mobile electronic medical record (EMR). The study analyzed mobile EMR system logs for two years. They surveyed 455 subjects, including 97 doctors and 358 nurses, at a university general hospital in South Korea. The study revealed that performance expectancy influences end users' attitudes towards mobile EMR and behavioral intentions to use. The research concluded that healthcare practitioners exhibit positive intentions to use and positive attitudes towards a system that helps with work performance. This study is consistent with research concluding that a modified version of UTAUT provided a reasonable explanation of health professionals' acceptance of EMRs (Willis et al., 2008).

Moreover, Rho and colleagues' study (2015) might inform research on technology acceptance among patients. The study applied UTAUT to factors that influence acceptance as it relates to telemedicine for diabetes management. It collected data from 116 diabetic patients and aimed to determine causal relationships among the five variables in UTAUT. Findings indicated that a facilitating condition is an influential factor for telemedicine service acceptance as regards enhanced management of diabetes (p. 327). Performance expectancy, effort expectancy, and social influence were regarded as critical factors in accepting telemedicine service, as predicted by UTAUT (Venkatesh et al., 2003; Venkatesh et al., 2011). Research conducted by Byomere and Maiga (2015) applied UTAUT to study mobile phone adoption in maternal health care in Uganda. Specifically, researchers attempted to develop a model for the adoption of mobile phones in maternal health care. Survey respondents involved 126 maternal healthcare professionals. It involved seven factors, including the original factors of UTAUT. These were found to be critical for successful mobile phones adoption. Perceived factors include the following: perceived ease of

use, perceived usefulness, facilitating conditions, social influence, perceived value, workflow practices, and behavioral intention.

Beyond UTAUT

In addition to the factors proposed in the UTAUT, other factors warrant consideration for discussing intentions related to PPD screening among underserved populations. Evidence indicates that immigrants underutilize mental health services (Kandula, et al., 2004). Reasons found in the literature include, as follows: the stigma associated with mental illness, underdiagnosis relative to cultural and linguistic barriers, lack of access to health insurance and regular health care, and preferences towards traditional healers or health providers compared to Western mental health services (Takeuchi et al., 1998; Ngo-Metzger et al., 2003). Research indicates that immigrants remain challenged by cultural, language, and economic variables when seeking treatment for PPD (O'Mahoney et al., 2013). For these reasons, it is valuable to study the roles of these variables. Particularly, attention should be given to influencing underserved mothers' intentions to seek PPD screening.

Stigma. PPD is associated with mental health. This condition is heavily stigmatized by many cultures (Holopainen, 2002; Dennis & Chung-Lee, 2006; Teng et al., 2007). Stigma is defined as an attribute or characteristic that society deems undesirable, leading a person to feel discredited, shameful, and less than whole (Goffman, 1963). Clair (2018) describes stigma as “an attribute that conveys devalued stereotypes” (p.1). By being a member of a stigmatized group, stigmatized individuals are considered deviant, may be targeted for prejudice, encounter discrimination, and experience adverse economic and interpersonal outcomes (Crocker & Major, 1989; Goffman, 1963). Stigma is a complex construct that includes public, self, and structural components. It was cited as a hindrance to seeking care. Corrigan et al. (2014) disputed that stigma

in mental health becomes a particular concern when it undermines seeking out and participating in services critical to reducing dysfunction and disability while promoting recovery. Additionally, individuals' help-seeking behavior is thought to be influenced by personal and perceived stigma (Barney et al., 2006; Corrigan et al., 2003). Despite evidence that stigma about mental health hinders the stigmatized group from receiving mental health services, an earlier study found that the greater reluctance of individuals with psychological disabilities to disclose their disability status (which stems from stigma about psychological illness) may account for their greater desire to use mobile technology as compared to participants with only physical disabilities (Kowalski et al., 2016). This means the technology could be a 'bridge' connecting those who are feeling stigmatized to much-needed services such as services to treat mental health.

For many immigrants, there is a strong negative stigma attached to mental health and treatments for psychological conditions (Amri & Bemak, 2013). In this case, migrant women define PPD variably, and their attitudes towards the condition vary. Such factors strongly influence how they utilize and access social support networks and mental health care services (O'Mahoney et al., 2013). For example, the social stigma towards mental health among Muslim immigrants is profound because this community regards Islam as a source of healing and strength (Ali et al., 2005; Ghaffari & Ciftci, 2010). Therefore, the community often considers those suffering from mental health issues as not religious or unstable, having lost their way from God. Although cultural values and practices such as praying and family culture could become protective factors, in some instances, they might exacerbate PPD (Fung & Lee, 2010). Many immigrants choose to hide their true feelings and pretend to be coping with PPD (O'Mahony, & Donnelly, 2012). Often, they do not seek professional help for fear of being shunned by their family and community (O'Mahony et al., 2013). Lack of validation by family and society regarding depressive symptoms influences

intentions to seek screening (Teng et al., 2007). O'Mahony et al. (2013) found that, according to immigrants from some countries, PPD was not a common event after childbirth. In contrast to some host countries, some home countries may not usually acknowledge depression. For some immigrant mothers, culture becomes a barrier to PPD screening because of a lack of interpretation of the symptoms. This barrier is constructed as a result of culture since most screening instruments interpret PPD symptoms based on Western cultural perspectives.

Researchers associated mental illness with poverty indicators and lower education levels (WHO, 2010). Economically disadvantaged women are particularly vulnerable to PPD because they may experience barriers to depression detection (Sterk et al., 2006). This situation is prevalent among the most underserved populations, including immigrants, on accounts of their status as foreigners. Further, studies reveal that low-income women and ethnic minorities are less likely to seek mental health services in the perinatal period compared to European Americans (Kurz, 2005; Song et al., 2004). Women living in poverty express higher rates of PPD than women with greater financial stability (Segre et al., 2007; Mayberry et al., 2007). Logistical issues, such as lack of adequate transportation, lack of access to health insurance resources due to poverty status, and lack of sufficient funding resources for childcare (especially when making efforts to be screened) are among the barriers that deter low socioeconomic status women from seeking PPD screening. Relatedly, Silver et al. (2017) emphasized the value of collecting information about low-income women regarding assessing barriers to mobile screening for perinatal depression. An important reason cited is the fact that women from low-income groups (publicly insured) are less likely to complete mobile perinatal screenings compared to other women (privately insured) (Silver et al., 2017).

Language. Lack of language skills among immigrants is cited as a barrier to depression screenings and health, generally. About 46% of immigrants in the U.S. are categorized in the Limited English Proficient (LEP) group (American Community Survey [ACS], 2020). This figure means that immigrants reported speaking English at a lower standard than “very well,” as classified by the U.S. Census Bureau (Batalova & Zong, 2016). Accordingly, immigrant women experience limited abilities to navigate healthcare systems in a host country or to communicate with healthcare providers. Communication via translators is sometimes frustrating (Teng et al., 2007; Falah-Hassani et al., 2015) and may lead to tragic consequences due to misinterpretation (Flores, 2006). The use of ad-hoc interpreters, including family members, friends, untrained support staff, and strangers found in waiting rooms or on the street, are common in clinical encounters. Such interpreters are more likely than professionally trained personnel to commit errors (Flores et al., 2005; Flores, 2003). Their presence might ease the language barriers, but as the translation travels across the language, some important information might be missed, miscommunicated, or not communicated to the patients (Ellaham, 2021). Therefore, health literacy, culture, and language are deemed interrelated and need to be addressed together to overcome healthcare barriers (Singleton & Krause, 2009).

Summary

Technology acceptance is relevant to the implementation of mHealth technology and ensuring its sustainability. Such acceptance is important for the achievement of objectives as outlined by respective organizations. In the context of PPD screening, it is important to understand the factors influencing mHealth adoption. This is relevant for the long-term success and use of technology. Notably, mHealth carries great potential for limiting barriers to screening practices. Such potential relates to several factors, among others, as follows: language, time consumption,

and error. However, minimal research exists to investigate technology acceptance for mHealth among patients, compared to health practitioners. In the context of PPD screening, this is objectionable; patients are the end-users of the device. Patients' acceptance of the technology used in screening will determine the success of the use of this technology in screening for depression. This is particularly relevant for perinatal mothers. Acceptance would facilitate connections between patients and necessary mental health services.

Moreover, UTAUT was adopted widely in the field of information systems. It gained popularity in other fields, too. UTAUT was used, modified, and cited in health-related research to examine user acceptance of various types of health technologies. These technologies include, as follows: mobile phones, electronic medical records, wearable technologies, and others. Reviews recognize the fact that many researchers cited this theory alone rather than applying it to actual research. Significantly, UTAUT is now prominent in researching technology acceptance because it helps to capture critical factors that determine the successful adoption of suitable technology for use across fields and cultures. Also, researchers modified UTAUT, based on the context and particularities of the field study. This practice implies the adaptability of UTAUT to be used across contexts. The theory generates reliable results. It is useful for making decisions about technology acceptance and adoption. Other moderating factors, such as age, experience, gender, and voluntariness of use, are keys to accounting for this theory. However, they are often not assessed in great depth by many reviews (Keichne et al., 2016; Taiwo & Downe, 2013).

Summary of Literature Review

This literature review revealed that mental health issues among low-income immigrant women are a major health issue nationwide. The reason is due to the fact that the well-being of women involves equal access to health care, well-being in the community and work place, and

organizational concerns that relate to the implementation of technology for assessing mental health states. Based on the review, the researcher continues to explore available evidence and present gaps in mHealth adoption for PPD screening among low-income migrant women. A lack of attention was given to patients' perspectives when implementing mHealth technology. Research focused on technology acceptance from health providers' perspectives; yet, patients, as the end users of many of these technologies, do not receive adequate attention in the literature. Patients' input would be valuable for the implementation of mHealth technology. The implementation of PPD screening, using mobile devices at the research location, is unique. Indeed, this technology can be used by health workers and patients. Arguably, patients' perspectives are as important as health workers' perspectives when it comes to adopting this technology. A consistent theme remains related to a lack of depression screening tools that could serve patients from different backgrounds. Backgrounds include low-income migrant populations in PPD screening. This gap motivates the first question in the current research: "What perceptions toward the use of mHealth for PPD screening are held by prenatal and postpartum low-income migrant women (PPLMW), who arrive at clinics?"

Next, researchers utilized UTAUT to study technology acceptance among many groups in different contexts. Researchers regard UTAUT as a relevant theory for identifying determinants to use information systems and information technology (Khechine et al., 2016). According to researchers, UTAUT is the most, if not the best, predictive model in the acceptance literature (Alawadhi & Morris, 2008; Al-Shafi & Weerakkody, 2010, AlQudah et al., 2021). However, little to no research discussed the use of this theory to study technology acceptance relative to PPD screening among migrant populations. This theory offers promising opportunities to inform health providers of valuable information that could affect mHealth implementation, policy development,

and resources management decisions. Moreover, technology acceptance research using UTAUT might potentially help with strategic organizational planning. Studies proved that UTAUT factors, when assessed adequately, are reliable for studying health technology acceptance. However, no research studies assessed this topic in the context of depression screening technology among migrant and foreign-born women. This gap leads the researcher in the current study to ask the next research question: “What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Tehcnology (UTAUT)?”

Further, migrant and foreign-born women in the United States come from different backgrounds and cultures. However, due to stigma, cultural barriers – such as language and beliefs and socioeconomic barriers – disconnect migrant women from adequate and necessary mental health care. Many researchers discuss these factors when explaining migrants and foreign-born women’s low utilization of mental health services. The discussion of these factors at the PPD screening level as well as attempts to link these factors to the technology acceptance of PPD screening technology, is somewhat limited. Also, studies addressing how stigma towards mental health might affect acceptance of mHealth for PPD screening are scarce. This situation brought the researcher to the third and fourth research questions: “How, and in what ways, do participants’ perceptions, of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?” and “Among PPLMW at the clinics, to what extent does mHealth affect the relationship between one’s intention of being screened for PPD and seeking help for PPD?”

The research discussed how UTAUT helped to determine rates of user acceptance and adoption of technology. This includes utilization by health organizations, health providers, and

patients. However, discussions remained limited to technology. Discussions largely overlooked opportunities to address broader realms of the organization management and development. Subsequently, discussions did not address broader perspectives of human development. Studies identified that introducing Information Technology (IT) to organizations contributed to productivity gains. Such introductions resulted in overall societal enrichment (King, 2007; Santos & Sussman, 2000). Without proper implementation, however, opportunities may become threatening to organizations, especially in terms of productivity and resources. Time and money may be wasted on implementing technology without serving its proper purpose. Moreover, technology may become intimidating or barriers to use. The current research attempts to break this ceiling and explains how organizations may use data generated from using UTAUT, for purposes of decision-making and resource-planning at organizational and national levels. Therefore, the last research question in the current study is as follows: “How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients’ perspectives, inform the implementation of mHealth at the respective organizations?”

In the next chapter, the researcher discusses details that relate to methods of research. It addresses how the study was conducted to answer these research questions.

CHAPTER 3: METHODS

This chapter describes the research methods employed in the current research study. It begins with an introduction to mixed methods research and follows with research design. Furthermore, the researcher provides information about the instruments that were used in the study. The researcher then presents intentions for data collection for the entire study. This chapter concludes with a description of how the researcher implemented data analysis for the current study.

Public Act 95-0469, the Perinatal Mental Health Disorders Prevention and Treatment Act, issued by the Illinois Department of Health Services (IDHS) mandated that all health care providers in the state screen perinatal women for mood disorders during healthcare services. The demographics of perinatal women include low-income migrant and foreign-born women who enroll in various services that are provided by IDHS. This demographic receives service at local clinics under the direction of the Health District, private practices, and non-profit providers. For purposes of the current study, the researcher focused on recruitment from clinics or centers that provide services for the target population. These clinics include: the Champaign-Urbana Public Health District Clinic (CUPHD) and the Pregnancy Resource Center (PRC). Both clinics are located in Champaign County, Illinois.

The current study proposes investigating the acceptance of mHealth for perinatal and postpartum (PPD) screening among migrants and foreign-born women. Indeed, it seeks to understand the role of stigma in the realm of mHealth acceptance, particularly as it relates to this population. Therefore, the following research questions guide the structure and intention of this study:

1. What perceptions toward the use of mHealth for PPD screening are held by prenatal and postpartum low-income migrant women (PPLMW) who arrive at clinics?
2. What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW at the clinics, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?
3. How, and in what ways do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?
4. Among PPLMW at the clinics, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?
5. How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?

Mixed Methods Research

The study specifically adopted the convergent-parallel design, a mixed-methods research design, to investigate the acceptance of mHealth for perinatal and postpartum (PPD) screening the participants. Scholars recognize mixed methods as a third paradigm research methodology (Johnson, et al., 2007). According to Johnson and colleagues, “although mixed methods research is not new, it is a new movement, or discourse, or research paradigm (with a growing number of members) that has arisen in response to the currents of quantitative research and qualitative research” (p. 113). Typically, mixed methods research adopts a pragmatic worldview. Such research practice employs three inquiring strategies: sequential: explanatory and exploratory; concurrent: triangulation and embedded; and transformative: sequential or concurrent (Creswell,

2009). According to Creswell, researchers typically utilize open and closed-ended questions, emerging and predetermined approaches, and quantitative and qualitative data analysis when using this method. Also, Creswell emphasized that a researcher who uses this method “bases the inquiry on the assumption that collecting diverse types of data best provides an understanding of a research problem” (p. 18). In terms of integration of the methods in mixed methods research, Bazeley (2018) proposed that a core characteristic of any mixed methods research lies in the multiple sources and types of data, approaches to analysis of those data, and the integration of data and analyses that should occur prior to drawing final conclusions from the research (p.7).

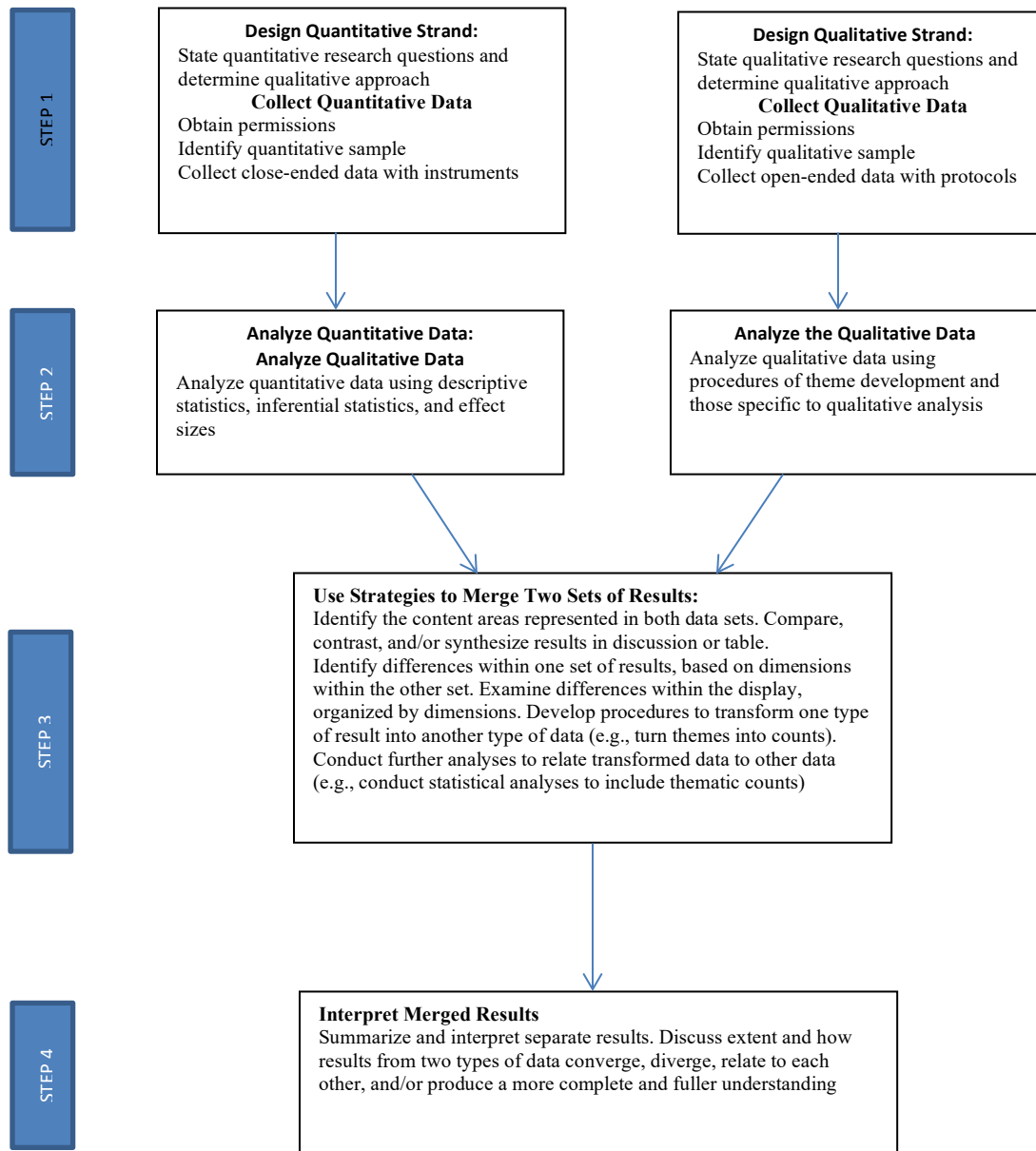
Increased interest in mixed methods research may be attributed to its capacity for broadened understanding. This method incorporates qualitative and quantitative research, recognizing how one approach may inform, explain, or develop results from another approach (Creswell, 2009). A research study reviewed trends in using mixed methods research design in the social, behavioral, and health sciences. Specifically, Ivankova and Kawamura (2010) revealed that, between the years 2000 and 2009, health and medicine accounted for the highest number of mixed methods studies, covering various disciplines (Ivankova & Kawamura, in Tashakkorie & Teddlie, 2010). Challenges that emerge from this approach involve the fact that the researcher is competent in quantitative and qualitative research methods and mixed methods research. Thereby, the researcher is equipped to conduct quality research. Research using this approach may require more time than other approaches. The reason is that data collection, data analysis, and discussions should be conducted with particular thoroughness and careful attention. It is particularly important to ensure that findings are carefully discussed from the mixed methods perspective and in mixed methods language.

Convergent parallel design

This study utilized a convergent parallel design. This strategy is most common among the six major mixed methods models (Creswell, 2009; Creswell & Plano Clark, 2011). Indeed, it is the most familiar design among basic and advanced mixed-method strategies (Creswell, 2014). Convergent parallel design is also known as “simultaneous triangulation,” “parallel study,” “convergence model,” and “concurrent triangulation” (Creswell, 1999; Creswell & Plano Clark, 2007; Morse, 1991; Tashakkori & Teddlie, 1998, as cited in Creswell & Plano Clark, 2011). The purpose of convergent design is “to obtain different but complementary data on the same topic” (Morse, 1991, p.122 as cited in Creswell, 2011). The key assumption of this approach is that “both qualitative and quantitative data provide different types of information, but together they yield the results that should be the same” (Creswell, 2014, p. 219). Researchers, who use this strategy, will collect quantitative and qualitative data concurrently. Then, researchers will “compare the data sets to determine whether there is convergence, differences, or some combination” (Creswell, 2011, p.213). Comparison is referenced variously as “confirmation,” “disconfirmation,” “cross-validation,” or “corroboration” (Greene et al., 1989; Morgan, 1998; Steckler et al., 1992, in Creswell, 2009). Figure 3 illustrates the research processes conducted using this strategy. For purposes of the current study, quantitative data will be collected using an online survey. Moreover, qualitative data will be collected via interviews and focus group discussion.

Figure 3

A Flowchart of Basic Procedures for Implementing a Convergent Parallel Design.



Source: Creswell, J. W. & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research*. 2nd ed. Thousand Oaks, CA: SAGE.

This method fit well with the current study because it helped the researcher in answering particular research questions and measure mHealth acceptance rates among low-income migrant women who received service at the clinics. It is based on previous studies and the well-established UTAUT survey. This method also enabled the researcher to explore reasons for mHealth acceptance. Also, it facilitated in the exploration of participants' experiences by utilizing interviews and focus groups. By using the data matrix, the researcher then compared and contrasted findings from both instruments. The chosen data collection methodologies helped strengthen the study's findings and provided warranted conclusions and a broader understanding of a related phenomenon.

Research Design

Research setting

This study was conducted in Champaign County, Illinois, U.S. The State of Illinois is an immigrant destination state. It consists of 102 counties. As of July 2021, the state's population was estimated at 12,671,469. Champaign County is among the most populous counties in Illinois, boasting a population total of 205,865 (U.S. Census, 2020). Illinois was home to almost 1.8 million foreign-born persons in 2018 (Migration Policy Institute, 2019). Statistics from the Department of Homeland Security reported that there were 540,000 lawful permanent residents in Illinois in 2019 (DHS, 2021). Also, census data reveals notable figures for 2011-2015. They regard "foreign-born" individuals, namely those individuals "residing in the United States at the time of the population survey who were not U.S. citizens at birth (Migration Policy, 2021). The foreign-born population includes naturalized U.S. citizens, lawful permanent immigrants (or green-card holders), refugees and asylees, certain legal nonimmigrants (including those on student, work, or some other

temporary visas), and persons residing in the country without authorization. Illinois reported almost 14% of the total regional population being foreign-born. It reported foreign-born individuals in Champaign County at a rate of 12.2% of the county's total population (U.S. Census, 2021). Estimates from the American Community Survey [ACS] in 2014-2018 also show that immigrant women in Illinois, aged 15 to 50, contributed to an increase of 3.8% of the total birth rate in that state. Nationally, in 2019, foreign-born women aged 15-50 recorded 57.2 births per 1,000 compared to the native-born, with 48.4 births per 1,000. This figure highlights the importance of perinatal and post-partum care for these mothers and is particularly critical for this country. In 2019, Champaign County reported a population of 71.8% white residents, 13.8% black or African American, 10.9% Asian, 6.3% Hispanic or Latino, 3.0% people of two or more races, and 0.5% people from other races (U.S. Census, 2017). Moreover, 17.6% of Champaign County residents speak another language at home than English. In 2019, the most common birthplace for foreign-born residents of Champaign County was reported to be China (6,194 of the residents), followed by Korea (2,605), and India (1,955) (American Community Survey, 2016). The sample population in this study also reflected the mentioned statistic. Champaign County has a relatively high number of residents born in Congo. In general, it reports a relatively high number of residents with origins from Congo, the Democratic Republic of Congo (Zaire), and Costa Rica (Data USA, 2017). In 2015, there were 232 people from Congo living in Champaign County. This figure is approximately 25.43 times more than what would be anticipated, based on national averages (American Community Survey, 2016).

Participants were recruited among those who use the services at the clinics serving a low-income population located in Champaign. The researcher chose this location because their services are mainly utilized by lower-income communities in Champaign County. These clinics provide

services (including perinatal services) at a reduced or no cost to patients. For perinatal mothers, these clinics also screened them for depression as required by the state's law. The researcher also sent targeted emails, social media postings, and fliers promoting the research to different organizations such as the La Leche League of Champaign-Urbana, the Pregnancy Resource Center (PRC), Chabnamoms.com, IDEA Women's Health Coalition, and a few others. From 2011 to 2015, more than 38% of the population in Champaign County reported low-income status, and 21% lived in poverty (UDS Mapper Census, 2017). Between 2011 and 2015, 4% of Champaign County's population, among those seeking health care from clinics that serve low-income populations, were derived from households with Limited English Proficiency (LEP) (UDS Mapper Census, 2017). The overall LEP population (foreign-born and U.S.-born) reported lower education levels and higher poverty prevalence in 2015 (Batalova & Zong, 2016).

Champaign-Urbana Public Health District (CUPHD). The Champaign- Urbana Public Health District (CUPHD) is located in Champaign, Illinois. This clinic's services are offered to all Champaign County residents. The clinic offers services at a remote office in Rantoul, Illinois. The Rantoul clinic provides solely for the management of Women, Infants, and Children (WIC) cases. Among others, the goals of CUPHD include:

1. Prevent disease, injury, and disability
2. Promote healthy lifestyles
3. Provide an early diagnosis for improved health outcomes and reduced care costs.

CUPHD also provides services and programs for different groups and people from diverse backgrounds. There are various Health District Divisions, including Administration; Community Health Nursing & Clinical Services; Community Health Surveillance, Planning & Education; Dental Health; Environmental Health; Family Health; and HIV/STD/TB Prevention &

Management. Each division serves a unique public health function. All programs within these divisions are designed to address health priorities in the Champaign-Urbana community. There are five divisions within the clinic. These include Maternal and Child Health, Dental Health, Infectious Disease Prevention and Management, and the Wellness and Health Promotion Division. Through these abovementioned divisions, the Health District offers many services and programs including maternal care, children's health, dental care, HIV/AIDS case management, and investigating disease outbreaks. In the same year, it managed 3,800 cases of women enrolled in the Women, Infant, and Children program. There is no published data on the number of migrants served by CUPHD. In its client records, CUPHD does not distinguish between foreign and native-born patients, and they do not differentiate services based on nationality or citizenship status. According to its annual report, CUPHD screened 2,455 women for perinatal depression in 2016. The screenings were done either using paper and pencil or verbally by healthcare professionals, which included nurses and case workers.

With the latest developments in mobile technology, there are advantages for clinics to move from only doing paper-based and verbal screening to also considering mHealth as an option to screen mothers for depression. After the COVID-19 pandemic hit in 2020, many services have been moved online and adjusted to remote meetings or checkups. What started as an 'emergency response' and forced adaptation due to the pandemic has now become a standard practice including in maternal healthcare services, as the benefits are immense. Prenatal and postpartum checkups are no exception. Indeed, even before the changes, documented evidence shows that the use of mHealth for mental health assessment helps in terms of reducing errors, improving diagnosis, being more cost-efficient, and effective for community health workers in resource-constrained settings (Sherry & Ratzan, 2012; Braun et al., 2013; Bitsch et al., 2015). Despite the availability

of online self-screening instruments such as by Google (can be found at <https://landing.google.com/screener/depression>), the practice of screening for depression by healthcare professionals for perinatal mothers would be necessary as the publicly available test are usually made for information purposes and cannot be counted as an official diagnosis. The tests available online also did not discriminate against the respondent as there was no background information collected before the tests could be completed. This situation dismissed any individual, social, or societal challenges faced by those who complete the test. The test could also be developed by those who do not purposely seek to address health gaps or disparities among the diverse world population. Despite that, the test results could be a trigger to seek further help as the information could be beneficial in assessing one's depression level.

In the case of public health clinics like CUPHD, despite still practicing paper-based screening with the case workers/ staff help, it is timely to explore the possibilities of using mHealth to screen patients. Ever since the pandemic hit, some appointments were made via telehealth, especially when the patients could not come over for the routine checkup. However, the possibility of mHealth supporting depression screening for these mothers could be endless. For instance, patients could complete the screening either using mobile devices provided by the clinics or at home before they come for their checkups instead of waiting for the nurse to screen them before checkups as per standard practice. In this case, the depression screening instrument could be accessed online or using an app in a mobile device such as a mobile phone or tablet. Since mobile devices have been found to be feasible and acceptable as outpatient screening devices among perinatal women (Pineros-Leano et al., Kola et al., 2021; La Porte et al., 2020; Silver et al., 2017; Pineros-Leano et al., 2015), the benefits could extend further for CUPHD when screening for depression among these mothers. Instead of only self-screening themselves before each checkup,

patients could also assess themselves whenever they feel the need and inform their healthcare practitioner about the results. As literature supports that screening using mHealth could potentially motivate patients to seek further mental health care (BinDhim et al., 2016), this process could help patients get help as early as possible. Participants in this study may or may not have experienced being screened using telehealth or mHealth by CUPHD or other clinics. The practice of screening for depression using telehealth or mHealth in CUPHD had not yet been implemented when this research took place. However, the researcher must mention that the practice might have changed ever since the COVID-19 pandemic began in 2020.

Permission to collect data and research collaboration from research locations was obtained in advance (see Appendix VII).

Population and Sample. The population of this research includes prenatal and postpartum low-income migrants and foreign-born women living outside their country of birth, including refugees, economic migrants, and all other reasons for migration and legal statuses regardless of age. The term ‘migrants’ and ‘foreign-born’ were used loosely and interchangeably in this study to include anyone who moved from their country of residence or crossed the border to the United States of America, and Champaign, specifically. The current study did not discriminate against the participants based on their legal status but used the term ‘migrant’ to describe their movement from their original country to the US. While the word ‘migrant’ in the current study brings a neutral connotation, this term should be used carefully when describing the experience of a specific group of migrants, such as refugees, as they are forced to leave their original country due to war or fear of persecution. The researcher is also aware that such a generalization of the word ‘migrant’ could be problematic for some people as it tends to lump different groups of immigrants and their status

or experiences pre- and post-migration into one, potentially undermining their trauma or challenges.

The participants in the study stated that they are currently using maternity or pediatric services provided to the low-income population in Champaign County, such as CUPHD or the Champaign Pregnancy Resources Center (PRC). The original target participants were WIC program participants, who most likely came from low-income families in the community using services for low-income groups in the community. Table 4 shows income eligibility to participate in the WIC program at CUPHD. After the initial data collection phase, the response rate recorded was lower than expected. The researcher then expanded the recruitment processes to also include the residents of the university housing, knowing that many of them also utilize the services of the CUPHD and the PRC, in addition to other free and low-cost services for students and scholars because many of them are either only working part-time or getting minimal paid as students or visiting scholars. However, many of them are not WIC participants. Prior approval was obtained from the Student Affairs division. The researcher was granted permission to display posters, promote the study at Housing events, and use the Family Graduate Housing facilities to recruit participants and collect information from them.

Table 4*WIC Income Eligibility Guidelines for the State of Illinois (Effective July 1, 2017, to June 30, 2018)*

Household Size	Annual Income	Monthly Income	Twice Monthly	Bi-Weekly	Weekly Income
1	\$21,775	\$1,815	\$930	\$859	\$419
2	\$29,471	\$2,456	\$1,252	\$1,156	\$567
3	\$37,167	\$3,098	\$1,575	\$1,453	\$715
4	\$43,863	\$3,739	\$1,897	\$1,751	\$863
5	\$52,559	\$4,380	\$2,219	\$2,048	\$1,011
6	\$60,255	\$5,022	\$2,541	\$2,346	\$1,159
7	\$67,951	\$5,663	\$2,863	\$2,643	\$1,307
8	\$75,647	\$6,304	\$3,186	\$2,941	\$1,455
Each additional family member, add	\$7,733	\$645	\$323	\$298	\$148

Note: Adapted from “Income Eligibility Guidelines” by Food and Nutrition Service, 2017, United States Department of Agriculture. Retrieved from: <https://www.fns.usda.gov/sites/default/files/wic/WIC-IEGS-2017.pdf>

Sampling procedure. Mixed methods sampling strategies involve selecting units or cases for a research study. It involves probability sampling (to increase external validity) and purposive sampling strategies (to increase transferability) (Teddlie & Yu, 2007). Mixed methods researchers often creatively combine traditional qualitative and quantitative research methods to achieve research objectives derived from their research design (p.85). The sampling scheme (Onwuegbuzie & Collins, 2007) for this study involves a combination of purposeful random sampling for quantitative and qualitative data collection and snowball/chain sampling for the focus group discussion. The sampling frame for this study includes low-income native and foreign-born women who have used any services at CUPHD, PRC, or other resources for lower-income groups, as well as students and scholars living in university graduate housing. For the qualitative portion of this study, only women identified as international migrants or foreign-born were interviewed to discuss

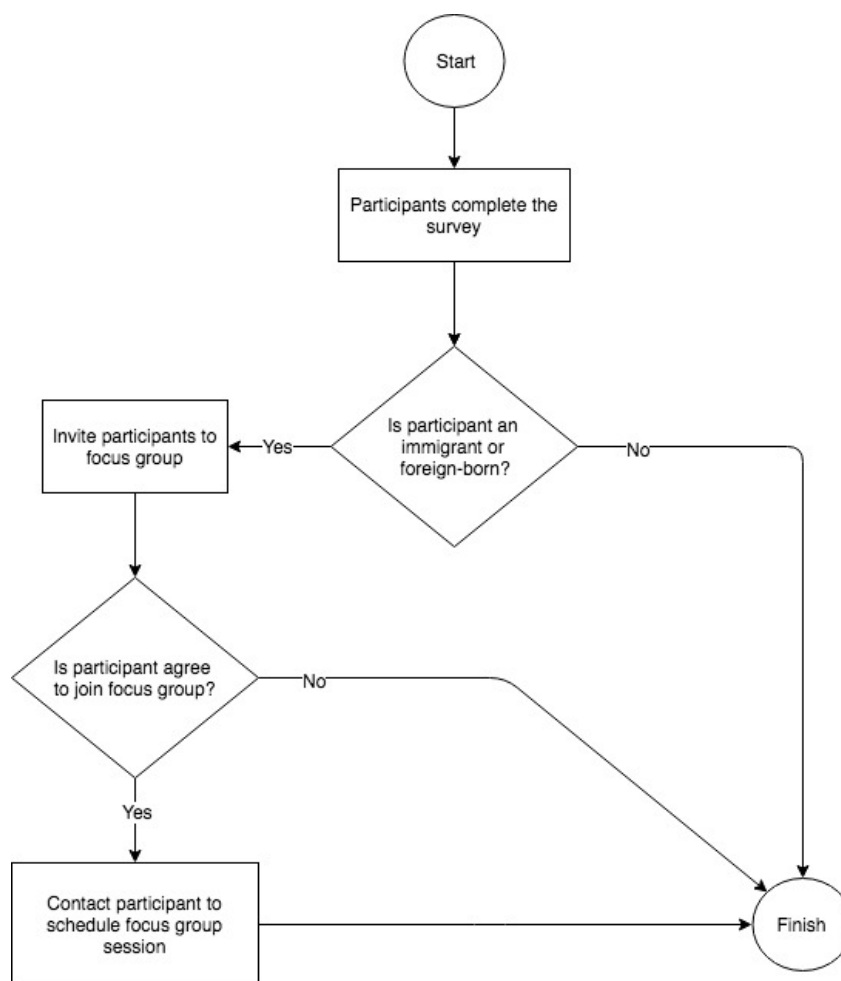
their experiences in getting screened for depression outside their native country. Since this group faced barriers in terms of language, social support, and cultural adjustment due to transferring from other countries, their input contributed to a better understanding of the acceptance of mHealth among non-native and non-English speakers. This is because during the adjustment or migration/transferring period, migrants must reconstruct their knowledge base and information behavior, which were disrupted and fragmented due to engagement with new information and resources (Benson Marshall et al., 2020). After the official data collection was launched, the response rate from the original sampling frame in this study was lower than expected. After much consideration, the researcher was granted permission to recruit among the international students, scholars, and spouses of scholars who live at the Family Graduate Housing. They are also known to have used services from CUPHD and other resources for lower-income groups. Many are new to this country and underwent the adjustment period and experience just like the original target population.

Recruitment of participants in this study was conducted via four different platforms. These include email invitations, posters and fliers, research information booth recruitment, and snowballing from other participants. In terms of recruitment through an email invitation, the researcher composed an email that targeted eligible female clients through CUPHD's email list and social media. An administrator from CUPHD sent the email to those on the listserv and published it on the CUPHD social media. However, this listserv did not distinguish migrant women from non-migrants on client records. The researcher filtered the migrant or foreign-born participants in this study based on their responses to the online survey. The reference points for this criterion would be questions 50 and 51 (see Appendix I). These questions collected information regarding the respondent's national origin, citizenship, and acculturation in American

society. Although some participants born outside the U.S. can also be American citizens, their length of stay in the country will offer the researcher an idea of their acculturation to the local culture and community. Figure 4 illustrates the summary of the sampling process flow.

Figure 4

Process Flow of Filtering Process for Participants From CUPHD.



As well, the researcher also recruits participants through research information booths at both CUPHD locations and the Frances Nelson clinic, staffed by research assistants and herself.

Research team member(s) explained the characteristics of individuals who qualify to participate in the research study verbally to potential participants. Participants were invited to complete the online survey at the information booth (using a mobile device). Moreover, participants may complete the survey at home. Another sampling strategy for this research involves snowballing/chain sampling from other participants. This strategy was implemented after focus group discussions (see focus group discussion in the Data Collection section) and interviews. Using this strategy, the researcher asked participants to connect the researcher with other qualified women. The researcher contacted the person directly if the referring participant was willing to provide an email address or contact information for the potential participant.

Data were collected concurrently for qualitative and quantitative measurements. Participants of the qualitative study were recruited via possible platforms discussed earlier. Further, those individuals, who have not completed the online survey, will be asked to do so before arriving at the interview/focus group sessions. The researcher sent a reminder email to participants about the interview/focus group. The email designated focus group sessions and included a link to the online survey.

Participation in the study is voluntary. This means that everyone, who belongs to the sample group, had the same opportunity to participate. The researcher promoted the study by hanging posters at strategic locations, distributing fliers at the research information booth, and posting the recruitment postings via social media. The target locations include buildings at the Family Graduate Housing neighborhoods, and international and ethnic-specific groceries stores. Permission from the store owners was obtained beforehand. Posters are prepared in four different languages: English, French, Korean, and Mandarin. This effort aims to cater to the population of foreign-born people in Champaign County. According to the Illinois Department of Human

Services (IDHS) report on foreign-born in Illinois, the majority of the foreign-born low-income population in Champaign County was recorded as Chinese (not-specified)-speaking and Spanish (IDHS, 2016). Champaign County is also home to a relatively high number of people who were born in Congo, the Democratic Republic of Congo (Zaire), and Costa Rica (DataUSA, 2017) who generally speaks French. These languages were also identified through personal meetings with representatives from the research locations. Representatives relied on their knowledge of clients to provide the necessary information. Each poster was translated by native speakers. All translators signed a certificate of translation by IRB (see Appendix II). The researcher asked several native speakers of each language to volunteer to read the translations and discuss effective translation. Overall, the translations served the purpose and were understood by the volunteers.

Sample size. Using the SurveyMonkey sample size calculator (SurveyMonkey, n.d), the optimal sample size for the survey part in this study is 158 participants. This particular sample size is necessary to detect moderate effect sizes, with .80 statistical power, at the 5% level of significance for ordinal logistic regression. The size of the sample in a mixed-methods study, on the other hand, should be guided primarily by the research objective, research question(s), and research design (Onwegbuzie & Collins, 2007). The response rate was lower than expected for this study despite the diverse data collection and recruitment strategies. Due to the low response rate for focus groups invitation, only one focus group discussion was conducted. To make up for the lack of focus groups, the researcher extended the data collection period and also invited participants for individual interviews. Recruitment of participants for the study was conducted across 9 months: July 2018 to June 2019. The summary of the sample size for each data collection procedure is depicted in Table 5.

Table 5*Summary of Sample Size, According to Data collection Procedure*

Data collection procedure	Sample size
Online survey	55
Focus groups	4
Individual Interviews	5

Human Subject Review and Voluntary Consent. Permission from the Institutional Review Board (IRB) was obtained (IRB number: 17347 – see Appendix VI). Permission ensures that the study complies with policies concerning the rights of human subjects, as required by the university and IRB.

Prior to responding to the survey questions, focus groups questions, or interview questions, participants were asked to sign a consent letter (see Appendix III and Appendix IV). A copy of the paper consent forms was kept in an office solely accessible to the researcher. Meanwhile, the online consent form was stored in the survey database, SurveyMonkey, which it is password-protected. Only the researcher has access to the survey database.

Participation Incentives. Providing responses to the online survey qualified participants to enter a raffle for \$50. Five winners were selected randomly using an auto-generated list created using Microsoft Excel and three responded to the notification emails. Each winner was contacted by email, and all opted for a gift card instead of cash. Individuals who volunteered to participate in the focus groups were given \$20 as an incentive for participation. If they volunteered in the pilot study, they were also awarded \$20. These incentives were given as cash immediately following the conclusion of the CI, focus groups, or interview sessions. In the event that participants decide

to revoke their participation before completing the data collection, they will not receive any reward.

Data Collection and Instrumentation

Data for this study were collected using an online survey, semi-structured interviews, and focus group discussion. A concurrent mixed methods data collection strategy was employed by mixed methods researchers for these purposes: to validate one form of data with the other form, to transform the data for comparison, or to address different types of questions (Creswell & Plano Clark, 2007, p.118). This research study survey was developed based on UTAUT items. It was modified to include questions on perception of stigma, which was adopted from the Self-Stigma of Mental Illness Scale – Short Form (SSMIS-SF). Table 6 summarizes the correspondence of research questions and data sources. This will help the researcher answer each question for this research. Interviews and focus groups discussions were conducted for pragmatic reasons (Lambert & Loiselle, 2008). Participants who refused or could not participate in the focus groups were invited for interviews. Individual interviews and focus groups were not conducted in a predetermined sequence.

Table 6*Correspondence of Research Questions and Data Sources for the Current Study*

Research Questions	Data Sources
RQ1: What perceptions toward the use of mHealth for PPD screening are held by prenatal and postpartum low-income migrant women (PPLMW) in the study?	Focus Groups Semi-structured Interviews
RQ2: What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW at the clinics, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?	Online Survey Focus Groups Semi-structured Interviews
RQ3: How, and in what ways, do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?	Online Survey Focus Groups Semi-structured Interviews
RQ4: Among PPLMW at the clinics, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?	Focus Groups Semi-structured Interviews
RQ5: How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?	Online Survey Focus Groups Semi-structured Interviews

Online Survey

The rationale for using a survey in this study is to gain a broad view of a sample or population. As such, inferences may be made about characteristics, attitudes, or behaviors prevalent among the selected population (Babbie, 1990). The survey for this study was hosted using SurveyMonkey. The first response was received in November 2018 and the last one was in October 2019. It is a well-known web-based survey platform and is often used for survey research. As mentioned, the survey, designed purposefully for this study, was developed using the modified Unified Theory of Acceptance and Use of Technology (UTAUT). The researcher added scales on stigma, which were adopted from the Self-Stigma of Mental Illness Scale – Short Form (SSMIS-SF) by Corrigan and colleagues (2012). The online platform does not filter for citizenship or

migration status before the participants complete all the scale questions, despite those questions being asked in the demographic sections. Therefore, there were also responses from local mothers included in the survey section. The input from these local moms is valuable, particularly in providing a picture of the current state of practice of maternal depression screening at clinics.

Table 7 presents UTAUT constructs with reliabilities as reported in a meta-analysis of 18 studies using UTAUT. Dwivedi and colleagues (2011) conducted the analysis. The meta-analysis demonstrates that each construct in UTAUT, examined across these studies, reveals a relatively high-reliability coefficient (average Cronbach $\alpha = > 0.7$). The items should be able to help the researcher answer the research questions regarding the use of technology across many groups of participants.

Table 7*UTAUT Constructs with Reliabilities Across 18 Studies That Have Used UTAUT*

References	PE	EE	SI	FC	BI	U
Abu-Shanab and Pearson (2009)	0.929	0.905	0.821	0.0825	0.895	-----
Anggelidis and Chatzoglou (2009)	-----	-----	-----	0.890	-----	-----
Al-Gahtani et al. (2007)	0.900	0.900	0.950	0.770	0.760	0.850
Chang et al. (2007)	0.940	0.950	0.870	0.950	0.930	-----
Chiu and Wang (2008)	0.850	0.890	0.890	0.820	0.940	-----
Chiu et al. (2010)	-----	-----	-----	-----	0.970	-----
Curtis et al. (2010)	0.840	0.870	0.890	0.720	0.960	-----
Gupta et al. (2008)	0.814	0.812	0.812	0.809	0.839	-----
Huser et al. (2010)	0.871	0.849	-----	-----	0.752	-----
Kijsanayotin et al. (2009)	0.930	0.930	0.890	0.900	0.970	-----
Laumer et al. (2010)	0.736	0.795	-----	0.787	0.870	-----
	0.707	0.842	-----	0.587	0.883	-----
Luo et al. (2010)	0.890	-----	-----	-----	0.890	-----
Nov and Ye (2009)	0.880	0.870	-----	-----	0.960	-----
Schaupp et al. (2010)	0.740	0.830	0.800	0.740	-----	0.910
van Dijk et al. (2008)	0.750	0.830	0.150	-----	-----	-----
	*NS	-----	-----	-----	-----	-----
Wang and Shih (2009)	0.921	0.916	0.939	0.819	0.905	0.863
Ye et al. (2008)	-----	-----	0.870	-----	-----	-----
Zhou et al. (2010)	0.866	0.864	0.846	0.833	-----	0.857
Number of Studies	17	15	12	13	14	4
Average Reliability	0.798	0.870	0.811	0.747	0.895	0.870

Note. Adapted from Dwivedi Y.K., Rana N.P., Chen H., Williams M.D. (2011) A Meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT). In: Nüttgens M., Gadatsch A., Kautz K., Schirmer I., Blinn N. (eds.) Governance and Sustainability in Information Systems. Managing the Transfer and Diffusion of IT. TDIT 2011. IFIP Advances in Information and Communication Technology, vol 366. Springer, Berlin, Heidelberg

A new moderator variable, self-stigma, were added to the UTAUT model. For purposes of this research, participants were asked four questions. Each question involved five sub-questions.

These questions were taken from the Self-stigma of Mental Illness Scale Short Form (SSMIS-SF),

initiated by Corrigan and colleagues (2012). Essentially, SSMIS-SF is a self-report measure of attitudes (Corrigan et al., 2012). The scale is a shorter version of the Self-stigma of Mental Illness Scale, developed by Corrigan and Watson in 2006. They previously proposed a four-stage model of the process: (1) people must first be aware of the stereotypes about mental illnesses (e.g., *The public believes most people with mental illnesses are to blame for their problems*); (2) they then may agree with these stereotypes (*I think most people with mental illness are to blame for their problems*); (3) they apply the stereotypes to themselves (*because I have a mental illness, I am to blame for my problems*); and (4) they experience harm such as a loss of self-esteem (*I currently respect myself less because I am to blame for my problems*). The original scale contained 40 items, but in SSMIS-SF, half of the items were eliminated. Retained items were rated as less offensive by a sample of consumers (Corrigan et al., 2012). These are meant to reduce perceptions that might dissuade people from using or completing the scale. A psychometric report of SSMIS-SF was re-examined. It involved three studies that administered a 40-item version of the SSMIS. It demonstrated that Cronbach's alpha for scales ranged from 0.72 to 0.89 (Corrigan et al., 2006) and from 0.82 to 0.92 (Rusch et al., 2006). Comparatively, another researcher reported an alpha ranging from 0.69 to 0.87 (Corrigan et al., 2011).

The survey was comprised of three major sections. The first section consists of items that inquire about the participant's experience and acceptance towards mHealth. Participants were asked nine (9) questions on their healthcare experience and the perinatal depression screening process. Then the participants completed the questions pertaining to their acceptance to a mobile device for perinatal depression screening and stigma. The questions were grounded using constructs from UTAUT. These include, as follows: performance expectancy, effort expectancy, attitude towards technology, social influence, facilitating condition, self-efficacy, anxiety, and

behavioral intention after using technology. Significantly, it involves an additional construct: stigma on mental health. The second section covers demographics. This section consists of items that focus on the participant's background information. The third section of the survey provides optional open-ended questions. It offers opportunities for participants to leave comments or notes regarding the survey. Participants were invited to type responses in the column provided. Furthermore, participants were invited to provide their email addresses if they wished to participate in the raffle and interviews/focus groups.

As with the original UTAUT survey, this research used a 5-point Likert scale. The scale ranges from 1 (*strongly agree*) to 5 (*strongly disagree*). Research conducted by Osteras et al. (2008) involving 6,108 people found that the 5-point Likert scale prompted better data quality, internal consistency, and discriminative validity as compared to the 4-point Likert scale. Streiner and Norman (2003) argued that the minimum number of categories for the Likert scale should be between 5 and 7 points. The complete survey is provided in Appendix I. For this study, the survey link was sent to potential participants via email, social media, and mobile technology at the research booth established at both clinics. The researcher also printed out a mini version of the flier with the link to the survey. These mini fliers were issued in English, Spanish, and French versions. The survey was pilot tested with the population beforehand. This process is explained in the Pilot Test section of this document.

Semi-structured Interviews

The second data collection strategy in this research was open-ended semi-structured interviews. Semi-structured interviews have been commonly used in qualitative research (DiCicco-Bloom & Crabtree, 2006), including in the healthcare context (Gill et al., 2008). In social research science nowadays, interviews are often used in combination with other methods

(Brinkmann & Kvale, 2018). The interview participants were recruited through emails from the online survey, those who contacted the researcher personally (based on contact numbers on the posters), and through snowballing from the other interview participants. Only participants who identify as international or foreign-born were invited to the interviews since they came from a different culture than the locals and faced challenges pre, during, and post- migration that could explain their acceptance or non-acceptance of mHealth for PPD screening. The interviews were mainly conducted to “yield direct quotations from people information from the participants on their experiences, opinions, feelings, and knowledge” (Patton, 2002, p.4). By using this approach, the researcher could explore participants’ experiences in a way that was not captured in the survey.

A total of five participants were interviewed for this study. Participants were asked to complete the online survey before the interview and were sent reminder emails before each interview. All interviews were conducted in a semi-structured format, which means they were less structured, more flexibly worded, and did not have a certain order to the questioning (Merriam, 2009). An interview protocol with a list of questions was used “to make sure all major topics were consistently covered in every interview” (Abdrahim, 2017). The same theoretical framework that was adapted to develop survey questions was used to develop interview questions, allowing for confirmation, corroboration, or disconfirmation of the findings. The questions were also informed by the research questions and formal literature review conducted by the researcher. A sample of the interview questions can be found in Appendix V. Each interview lasted approximately 45-60 minutes and was conducted at different locations based on the agreement of the researcher and the participants. Studies show that saturation occurred within the first 12 interviews, although basic elements for metathemes were present as early as the first six interviews (Guest et al., 2006). Although the sample size for the interview part of this section was small, the researcher also

conducted focus groups with four other participants. The interviews were recorded using a phone, a laptop recorder, and two audio recorders. A research assistant took notes during the interviews. The interview recordings were transcribed immediately after the interview session to avoid forgetting or missing information about the context of the conversation. Notes from the interviews were shared between the researcher and the research assistants to get a better picture of the context of the conversations and to help with the transcription. All members of the research team were approved by the IRB. The research team completed the training required to work with human subjects.

To ensure the trustworthiness of the data, the researcher sent follow-up emails to participants asking for any unclear transcriptions to get respondent validation as suggested by Long and Johnson (2000). None of the participants asked to look at the transcriptions as offered by the researcher. However, few of them responded to the follow-up emails sent by the researcher to clarify some information. Once transcribed, Atlas.ti was used to organize the interview results into themes. Member checking was conducted with a fellow doctoral graduate student after the researcher transcribed the interview to make sure that there was agreement on the themes that emerged from the interview. The data were also discussed with other research members in order to reduce any bias that the researcher may have had while interpreting the data.

Focus Group Discussion

The last data collection strategy for this research was focus group discussion. One focus group with a meeting time duration of 60 minutes, were conducted. Just like in the interviews, participants voluntarily presented their email addresses at the end of the survey, personally contacted the researcher, or visited the research booths. Some of the participants were also recruited through personal connections and snowballing from other participants.

A “focus group” refers to a particular type and collection of people according to purpose, size, composition, and procedures. Krueger and Casey (2015) wrote that focus groups are used to gather opinions and are designed purposely to understand better how people feel or think about an issue, idea, product, or service (p. 2). Focus groups have been useful for discussing acceptance rates toward technology connecting to their experiences. The researcher selected this method because it allows participants to have a conversation while recalling their experiences using the mHealth for PPD screening. Individuals were able to reinforce, support, remind, or deny information from other participants. No intimate or sensitive questions were asked, and participants shared their experiences only with regard to PPD screening practices using mobile technology. The study did not prompt details about participants’ health history. Although participants recounted some life events or history, the researcher used the focus group protocol as a guide to ensure that the participants remained comfortable to share the information with the group during the session. Additionally, group dynamic leads to brainstorming, generating ideas, and a deepening of discussion. This is because of the variety of participants and their experiences (InterQ, 2017).

Major benefits of using focus groups in this study include time-efficiency and the richness of information generated through each focus group session. Focus groups are a time-efficient strategy. Through fewer sessions, more participants may be gathered at one time. Furthermore, participants will engage in a discussion. It may supplement, verify, or reinforce information provided by other participants. Compared to individual interviews, this approach is relatively inexpensive, saving time while also offering data from more than one source within a shorter period. Seal and colleagues (1998) discovered additional insights from focus groups. Meanwhile, Stokes and Bergin (2006) concluded that focus groups offered greater breadth and context of data,

compared to other strategies. Researchers assert that the interpersonal and interactive nature of focus groups allows them to produce information that might not be gathered from a single respondent (Agar & MacDonald, 1995; Albrecht et al., 1993; Greenbaum, 2003; Kaplowitz & Hoehn, 2001; Kidd & Parshall, 2000). Moreover, focus groups generate a broader range of views and ideas, compared to those captured via individual methods (Kidd & Parshall, 2000; Kitzinger, 1994; Krueger & Casey, 2015; Powell & Single, 1996; Robinson, 1999).

Focus group approaches, however, constitute challenges. Although claimed to offer greater context, focus groups may produce more surface data than individual data collection contexts (Agar & MacDonald, 1995; Burns, 1989; Holstein & Gubrium, 1995; Powell & Single, 1996). Some participants might not be comfortable sharing opinions or stories due to a fear of being judged by other participants. Also, it becomes necessary for the researcher to schedule a time that will work for everyone. To overcome these challenges, the researcher provided options for time slots available for the participants and remained flexible in terms of scheduling. Fear of sharing will be reduced with efforts to provide a welcoming and comfortable environment for participants during the session. Such an effort includes ensuring sufficient room for all participants. It includes creating a space in private so that participants are comfortable during the discussion. As group participants may also potentially influence other participants' reaction, an explanation was provided in the "Limitation" section of the final report and elaborated in the discussion part of this study. Moreover, language might create a potential barrier. Based on participants' request, the researcher provided a translator(s) to help during the focus group session. The researcher asked the participants beforehand if they required a translator to be present during the focus group. Data collected from the focus groups include participants' experiences in being screened for depression during perinatal checkups, experiences of the depression-screening process, and collecting

thoughts about stigma towards mental illness in relation to intentions of being screened and/or seeking help if diagnosed with depression. This approach was selected because focus groups work particularly well with regard to exploring participants' perceptions, feelings, and thoughts (Krueger & Casey, 2015). In this context, focus groups will be helpful for exploring participants' perceptions about the use of mHealth in screening for PPD during perinatal checkups.

A focus group was conducted as another data collection method in this study. Just like the recruitment for the interview participants, the list of potential participants was collected from the online survey, via snowballing, and those who contacted the researcher personally. The focus group was conducted with four participants who lived in the same apartment complex. According to Krueger and Casey, to gain perspective on people's experiences and to gather in-depth insights, it is best to arrange smaller groups (p. 82). A confirmation email was sent to participants, informing them of the time and venue of the focus groups, and asking them to complete the online survey. Participants were asked to reply to the email to confirm participation. A reminder email was sent a day prior to the session to remind participants of the session and complete the online survey.

Participants were asked questions, regarding their perceptions for using mHealth for PPD screening and the stigmas associated with PPD. Questions were developed, using the UTAUT model and stigma questions. This element of question development is imperative since the key idea of convergent parallel design is to collect both forms of data using the same parallel variables, constructs, or concepts (Creswell, 2014, p. 222). Therefore, the same constructs were used in developing focus groups questions. Thus, confirmation, corroboration, or disconfirmation may be accomplished by the findings. This aligns with the purpose of the study: to corroborate and directly compare two sets of findings on a particular topic. The focus groups' guide is in Appendix IV of this document.

The focus group discussion were moderated by the researcher and recorded using two audio recorders. A research assistant took notes during the focus group sessions to ensure that important details were recorded. Notes may prove helpful for transcribing recorded discussions. The researcher transcribed the discussions' audio immediately after the focus groups to avoid forgetting about the context of the conversation. Again, all members of the research team were approved by the IRB. The research team completed the training required to work with human subjects. Similar to the interviews, the focus groups' transcription was discussed with the research members to reduce researcher bias. Member checking was conducted with an international doctoral graduate student after the findings were transcribed using Atlas.ti. This effort aimed to ensure agreement on the themes that emerged from the focus groups sessions. More information on this facet of the study is discussed in the following section.

Data Analysis

Data analysis for mixed methods research relates to the types of research strategies chosen for the procedures (Creswell, 2009). In this study, the researcher analyzed data based on qualitative and quantitative approaches respectively. Data, from the two-data collection methodology, were then compared on a joint display matrix. The matrix assisted in juxtaposing information and interpreting the key concepts or themes from the two sources (Bazeley, 2018). Ultimately, it helps in checking for confirmation, disconfirmation, cross-validation, or corroboration (Creswell, 2009) on the themes or topics.

Online Survey

The survey response was analyzed using SPSS software version 27.0. Data were exported to the SPSS software program from the SurveyMonkey host by the researcher. Descriptive statistics were conducted to obtain a profile of the sample in this study. Participants' demographic

characteristics were presented in a table, which described their basic characteristics. This information is important, such that it could be compared with characteristics of the target population in the clinics visited by the patients.

Missing Data. The appropriateness of a missing data handling method is contextual. It depends on the missing data mechanism (Cheema, 2014). Prior to conducting the main analyses, data were checked for data entry and accuracy, outliers, and missing data. Missing data were analyzed according to two steps. First, the patterns of missing data were analyzed to determine whether missing data are distributed randomly. Based on the diagnosis of the patterns, an appropriate imputation method was selected to handle missing data.

Parallel Analysis and Factor Analysis. Parallel analysis (PA) was conducted, using SPSS, prior to the exploratory factor analysis (EFA) to verify the number of factors to retain. Parallel analysis proved consistently accurate for determining the number of factors to retain in factor analysis (Franklin et al., 1995 in Hayton et al., 2004) and is the only approach that formally tests the probability of a factor due to chance (Wood et al., 2015). PA able to minimize over-identification of factors based on sampling error and is superior to reliance solely on eigenvalue scores generated by factor analytic processes alone (Wood et al., 2015). The PA approach tends to perform quite well in research evaluating the accuracy of factor retention methods (Fabrigar et al., 1999). PA is not widely used in published research (Hayton et al., 2004). According to Fabrigar et al. (1999), there are various possible reasons for the lack of widespread use of PA. These include a lack of training in graduate school, a lack of inclusion of the method in most textbook discussions of the topic, a lack of awareness by researchers (because much of the factor analysis literature is complex and heavily quantitative), difficulty in performing PA, and tradition (Fabrigar et al., 1999). Wood et al. also noted that the main challenge of doing PA prior to 2000 was the lack of

support or script for a Velicer's minimum average partial (MAP; Velicer, 1976) approach in commonly used software. However, the state of the art of EFA recommends that researchers run a parallel analysis before conducting the EFA. After performing a PA, researchers could only confidently specify the number of factors to extract in the subsequent analysis (Wood et al., 2015).

Factor analysis is a technique for identifying clusters of variables. Factor analysis simultaneously tests measurement integrity and guides further theory refinement (Henson & Roberts, 2006). In this research, the researcher utilized EFA as the factor extraction method. EFA helps the researcher determine the theoretical constructs that underlie a given data set before running other analyses. It examines the extent to which these constructs represent original variables (Henson & Roberts, 2006). In EFA, the researcher is not burdened by expectations with regard to the number or nature of variables (Williams et al., 2010). Scholars suggest that EFA is used when a researcher wishes to discover the number of factors, influencing variables, and to analyze which variables "go together" (DeCoster, 1998). This process was conducted to explore the data and decide which items should be retained in a construct. They are used for these purposes: (a) to understand the structure of variables, (b) to construct a questionnaire to measure an underlying variable, and (c) to reduce a data set to a more manageable size while retaining as much of the original information as possible (Field, 2013, p.666). It is considered as a method of choice for interpreting self-reporting questionnaires (Byrant et al., 1999) and commonly used in the fields of psychology and education (Hogarty et al, 2005).

Suggestions vary for determining the sample size required to complete factor analysis (Williams et al., 2010). Tabachnick's guideline suggests that the sample size for factor analysis should be at least 300 cases (Tabachnick & Fidell, 2007). Other researchers, however, suggest a value of 100 or higher (Hair et al., 1995). Comrey and Lee's (1973) guide suggests 100 as poor,

200 as fair, 300 as good, 500 as very good, and 1000 as excellent. This guide was cited in a number of textbooks (Williams, et al., 2010). For a factor to be considered stable, variables subjected to factor analysis should have at least 5 to 10 observations (Comrey & Lee, 1992). Field (2013) suggested 10 to 15 participants per variable (p.684). The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was also conducted to assess the suitability of respondent data for factor analysis (Williams, Onsman, & Brown, 2010). The KMO index should be greater than .50 for factor analysis to be suitable (Hair et al., 1995; Tabachnick & Fidell, 2007) and to indicate a good level of sampling adequacy. Using Spearman's rho nonparametric correlation coefficient test, correlations among variables were determined and presented in a correlation matrix. Tabachnick and Fidell (2007) recommended inspection of the correlation matrix for correlation coefficients over .30 (Williams et al., 2010). For the current study, if an item presents loading values above a cut-off value of .70, the item will be included in the construct. The reason is because the dimensions of the factors are better accounted for by the variables.

Reliability test. A reliability analysis was conducted for the overall scale based on the EFA and parallel analyses. It used Cronbach's Alpha, which models internal consistency based on the average correlation among items. Each item with a cut-off value of at least .70 or higher was used in the correlation model. A value of .70 is commonly considered to be an acceptable limit for social science research (Crotina, 1993). Any items valued at less than .30 suggest a weak relationship among variables (Tabachnick & Fidell, 2007). Leech et al. (2004), however, indicated that it is "common to see journal articles where one or more scales have somewhat lower alphas (e.g., in the .60-.69 range), especially if there are only a handful of items on the scale (p.25)". To account for items with lower reliability coefficient levels (.31 ~.69), the researcher removed item(s) with

the lowest coefficient level and ran the reliability analysis again. The aim was to increase the Cronbach's Alpha level for the scale.

Regression analysis. Once relevant factors were extracted, an ordinal logistic regression (OLR) was executed. OLR is generally preferable when analyzing data involving an ordered categorical dependent variable (Osborne, 2015). This type of regression analysis can be considered as a generalization of multiple linear regression or as a generalization of binomial logistic regression (Laerd Statistics, 2017). The researcher used SPSS with factors extracted from the factor analysis phase. This analysis aimed at predicting the dependent variable (behavior intention - BI). Moreover, this analysis allows the researcher to determine which independent variables (if any) have a statistically significant effect on the dependent variable. It facilitates a determination of how well the ordinal logistic regression model predicts the dependent variable. Ordinal logistic regression also allows for the use of interactions between independent variables to predict dependent variables (Laerd Statistics, 2017). Data were checked to make sure that it met the four assumptions for conducting ordinal logistic regression: (a) there should be one dependent variable that is measured at the ordinal level, (b) there should be one or more independent variables that are continuous, ordinal, or categorical (including dichotomous variables), (c) there should be no multicollinearity, which occurs when you have two or more independent variables that are highly correlated with each other; and (d) there are proportional odds (Laerd Statistics, 2017). The results of the ordinal logistics regression for this study are presented in the next chapter.

Interviews and Focus Group Discussions

Content analysis was used to analyze the results of the interviews and focus group discussions. Content analysis is a strategy to systematically examine a sample of artifacts or texts to discover patterns and meanings that can be generalized to a larger body of texts (Lombard,

Snyder-Duch, & Bracken, 2017). Specifically, directed content analysis (DCA) (Hsieh & Shannon, 2005) was applied in this process. The goal of a directed approach to content analysis is to validate or extend conceptually a theoretical framework or theory. This content analysis approach provided a relatively more structured process than conventional content analysis, which is analyzed through an open-coding approach (Hsieh & Shannon, 2005). In DCA, the researcher deductively analyzed the data based on pre-identified coding categories established from theory. DCA uses a guiding theory that enables researchers to develop initial coding categories based on the theory used. In this case, UTAUT and SSMIS-SF provided the initial coding themes in this study to make sense of the collected data, and it helped in identifying emerging primary themes as they evolved throughout the interviews and focus groups.

Upon completion of each interview and focus group session, the researcher transcribed the interviews and focus groups' recordings into text. This process required the researcher to listen to audio recordings from the sessions and type transcripts into a Microsoft Word processor. Field notes taken by the researcher and the research assistants during the sessions were used to help better transcribe the recordings. Once the transcribing process is complete, the researcher read the transcription again and get familiar with the transcribed sessions before categorizing the text into designated themes. It is important to get a sense of the data before using the Atlas.ti software to help manage the coding process. Once the researcher understood the data, the documents were uploaded to Atlas.Ti to manage the coding process. This process was repeated for each interview and focus group transcription. Atlas.ti was used in this study to aid with the organization of coding and quotations, as well as to make it easier to retrieve the sections of coding and return to the quotations whenever necessary. The pre-determined themes for the categorization include all variables in the UTAUT, as follows: *performance expectancy*, *effort expectancy*, *social influence*,

facilitating conditions, attitudes, self-efficacy, anxiety, and behavioral intention, and moderating variables themes – *experience and stigma*. These themes were used to predict participants' behaviors toward using mHealth for PPD screening and were used in the online survey too. Any responses that did not belong to any of the themes were categorized under new themes. Atlas.ti also helped check for cooccurrence of coding and classified the quotations and coding into groups.

In order to confirm credibility, participants were also asked if they would like to receive the transcripts. The researcher also asked permission to email the participants with any follow-up questions, if any, after the transcription was completed. Transcripts shall be shared with the participants via email for member checking (Lincoln & Guba, 1985). The participants would only get their transcript and were given opportunities to assess the data's accuracy and to reflect on whether the transcription reflects their own experience. This step was intended to examine if the participants' own impression was properly interpreted in the interview through the representation in the transcript (Forbat & Henderson, 2005; Gibbs, 2007). This step, however, was completely voluntary. Participants were not required to give any feedback if they did not find any concern on the transcription. This strategy also helped clarifying some words and statements that are not clear since the researcher and the majority of the participants in the interviews and focus groups are non-native English speakers. In this study, however, none of the participants asked to get the transcripts. The researcher only had sent emails to two participants to ask for clarifying questions and resolved the questions almost immediately.

The researcher next performed member checking on the synthesized and analyzed data, which was another layer of checking used in this investigation. (Birt et al., 2016). After each interview, the researcher checked the data and included the new findings in the interview prompt for the next interview or focus groups. For example, clarifying if the participants were getting the

same treatment if they were getting their checkups at the same clinics or the type of questions that they were asked during the PPD screening. This process is intended to “give participants an opportunity to consider whether any of the experiences or perceptions of others also applied to them” (Harvey, 2015, p. 30). Particularly in this study, the prompts also helped the participants recall their memories of getting screened during their past perinatal checkups.

Inter-coder Reliability. Reliability is as important for qualitative research as it is for quantitative research (Becker, 1970; Deutscher, 1969; Zelditch, 1970). The co-coder for this research is an international doctoral graduate student and is well-trained in qualitative data analysis. According to Campbell and colleagues, intercoder reliability requires two or more equally-capable coders to operate in isolation from each other, selecting the same code for the same unit of text (Krippendorff, 2004; Popping, 2010:1069). In this research, both coders are trained at the graduate level, but one coder is more knowledgeable about the subject matter than the other (mHealth and PPD). Therefore, it is important to establish both intercoder reliability and agreement to ensure the reliability of the coding process. Intercoder agreement refers to the ability of two or more co-coders to reconcile, through discussion, whatever coding discrepancies they may have for the same unit of text (Garrison et al., 2006; Morissey, 1974:214-15). Pre-determined themes were established before the data analysis phase. In this study, inter-coder agreement is important to ensure texts from the interviews and focus groups are coded according to the pre-determined themes and other themes relevant to answering the research questions.

In this process, the researcher identified a co-coder at the beginning of the research process. Identifying a co-coder is important from the beginning to ensure that the researcher and co-coder establish good intercoder reliability. The co-coder was briefed about the research and the whole data collection process to become familiar with it. A codebook was established for this research.

It contained clear and mutual definitions of each theme. This will ease the process of establishing inter-coder reliability (Campbell et al., 2014) between the researcher and co-coder. Themes were recorded in the codebook, ensuring consistency with regard to grouping the text in the transcription. As Atlas.ti was used to organize the qualitative data, the researcher and the co-coder reviewed the data separately before sitting together and looking into all the quotations and codings again to make sure the data fit to the themes.

After all the transcriptions were completed, the researcher randomly selected one transcript and shared the copy with the co-coder. Both coders coded the copy independently. Then, the researcher and co-coder compared the results and discussed coding discrepancies and confusion. The percentage agreement between the researcher and the co-coder was calculated. Percent agreement is the most widely used index to determine intercoder reliability (Lavrakas, 2008). A unit of text was selected from the transcript to be coded by the researcher and the co-coder. To determine the intercoder reliability for a code, the researcher divided the number of times that both coders used the code in the same text unit by the number of times that any of the other coder(s) used it in the transcript (Campbell et al., 2014, p.38). In order to calculate overall intercoder reliability, the researcher divided the total number of agreements for all codes by the total number of agreements and disagreements for all codes combined (p.39).

The researcher and the co-coder randomly selected a transcript and coded it independently based on the codebook provided by the researcher. The results were discussed to see any discrepancies and confusion, and then calculated to get the percent agreement. If the agreement is low, the researcher and the co-coder would revise the codes. Looking closely into the coding agreement, this approach works for this study because there were only two coders. It helped assess a semi-structured interview with mostly pre-determined themes for this study. The researcher was

also more knowledgeable about the subject matter than the co-coder, so the researcher coded the interview with her knowledge about the scales. The co-coder, however, had been briefed about the codebook and the research, so she used that knowledge to code the interview. Table 8 shows the inter-coder agreement table for the researcher and the co-coder for the 10 independently coded interviews. For each of the 10 segments, Coder 1, who is the researcher, selected a part of the transcript copy to record the codes. Using Coder 2's document, the codes that fall under the pre-determined themes were recorded. Whenever there was a discrepancy, Coder 1 would mark 0.

Table 8

Inter-Coder Percentage Agreement Table

Segments	Themes	Coder 1	Coder 2	Agreement
1	Experience with PPD screening	1	1	1
2	Experience with PPD	1	1	1
3	Stigma about others with PPD	0	1	0
4	Self-awareness about PPD	1	1	1
5	Self-awareness of PPD	1	1	1
6	Social support	0	1	0
7	Social support	0	1	0
8	Experience with PPD screening	1	1	1
9	Screening preferences	1	1	1
10	Screening preferences	1	1	1

Percent Agreement (PA) = number of agreements / total number of segments

$$= 7 / 10 = 0.7 = 70\%$$

Finally, to calculate the overall inter-coder reliability, the researcher divided the total number of agreements with the total number of agreement and disagreement combined for that transcript. The calculation is as follows:

$$\begin{aligned}\text{Overall percent of agreement} &= \frac{\# \text{ of agreements}}{\# \text{ of agreements} + \# \text{ of disagreements}} \\ &= 20/27 = 0.74 = 74\%\end{aligned}$$

In the current study, the percent agreement between the researcher and her co-coder is at 70% and the overall percent of agreements for the transcript is 74%. Rates of 90% to 95% agreement are suggested in order to establish intercoder reliability in health research (Allison et al., 2000; Rosen et al., 2012 in Burns, 2014). In management research, Fahy (2001), however, said that an intercoder reliability range from 70% to 94% was “acceptable” to exceptional” for his analysis of transcripts from conference discussions. In addition, Hodson (1999) held that an “inter-coder correlation” of 79% ensures a “relatively high degree of reliability” (p.51). The next chapter detailed the full results of the interviews and focus groups discussion.

Merging Strategy

Data were presented in joint displays following analysis of quantitative (close-ended questions) and qualitative (interviews/focus group). It took the form of a matrix, checking for confirmation, disconfirmation, cross-validation, or corroboration on the theme or topic (Creswell, 2009). Joint displays allow for qualitative and quantitative data to be presented visually, providing additional insight into how the data fits together (Curry & Nunez-Smith, 2015). Arrays of qualitative and quantitative domains were derived from the constructs and themes used in the survey and interviews/focus groups. The average ratings of participants’ answers for all factors in the survey are displayed in rows for quantitative arrays. As regards qualitative arrays, responses

from individual participants in interviews/focus groups are displayed in the columns. This was presented according to themes that fit best with responses.

Further, the matrix provided a clear direction for data analysis. Responses from interviews/focus groups explained the survey data and vice versa. This process was important as a merging strategy for data collection results. The example of a matrix for data display is found in Table 9 below. The completed joint matrix could be found in Chapter 6 of this document. A joint matrix was accomplished by using constructs in the UTAUT model as category themes. The last rows in the matrix included other themes that surfaced during interviews/focus groups. Results from the quantitative findings were compared and contrasted with results from the qualitative interviews/focus group analyses. The researcher sought to identify ways in which the two data sets compliment and contradict each other in relation to each research question. The themes from the survey were compared to interviews/focus group themes to understand how participants accepted the use of mHealth for PPD screening. Culture and context were explored by comparing statistical findings on the associations between stigma and acceptance of mHealth technology with the themes generated from interviews/focus groups that explored participants' experiences while using the mHealth during PPD screening. The mixed-method analysis used by the researcher systematically triangulates quantitative and qualitative findings in the discussion section, whereby the researcher explored ways in which similarities and differences in the data sets of both findings contribute to an understanding of mHealth acceptance among migrant and foreign-born women. Inferences from the data of each quantitative and qualitative component were first made before meta inferences were drawn across both sets at the end of the data comparison process to integrate the findings. This data comparison led to discussions and conclusions, which are then presented in the following chapters.

Table 9

Example of Joint Display Arraying Categories by Themes

Dimension: Qualitative Responses	
Dimension: Themes and Quantitative Ratings	Themes and Quantitative Ratings
	Performance expectancy
	Mean item responses
	Effort expectancy
	Social influence
	Facilitating conditions
	Self-efficacy
	Attitudes
	Anxiety
	Stigma
	Other
	Qualitative Responses from Interviews/ Focus Groups

Pilot Study

A pilot study was conducted before the actual research began. The pilot study was essential in this research to foresee any possible issues likely to arise with the participants as the questions in the instruments were asked. . The pilot study will identify problems that might occur with research protocols or processes (Teijlingen & Hundley, 2001). For the pilot study, the researcher conducted cognitive interviews (CI), an approach accompanied by a set of discrete techniques (Waddington & Bull, 2007). CI is “commonly conducted in an applied sense for the purpose of pretesting questions and determining how they should be modified prior to the survey fielding, to make them more understandable or otherwise easier to answer” (Willis, 2008, p.107). This technique is empirically validated for retrieving accurate and thorough recall (Waddington & Bull, 2007). It is a prominent method for identifying and correcting problems with survey questions (Beatty & Willis, 2007). Beatty and Willis (2007) defined CI as “the administration of draft survey questions while collecting additional verbal information about survey responses, which is used to evaluate the quality of the response or to help determine whether the question is generating the information that the author intends” (p. 287). In this study, the CI was conducted for several reasons, including to discuss the process elicited by the questions (Presser et al., 2004), to reveal the thought processes involved in interpreting a question, and to arrive at an answer (p. 4) among subjects. In short, the focus in CI is on the questions, not the person answering the questions. In this study, the CI was conducted with a group of volunteers recruited from the population to test the feasibility of the survey items and questions for interviews and focus groups. The procedures of the CI will be discussed in the subsequent section.

Procedures

In the pilot study, the researcher conducted the CI with four women from the target population. These women are those who volunteered to be the participants in the research. Participants of the pilot study were recruited at the CUPHD, FNHC, and through the researcher's personal connection. Four women were invited to be the volunteers for the CI. Since the population in this study is already too small and hard to approach, the women were also invited to participate in the study after the pilot study session. Two sessions of CI were conducted at two different locations: a public library and a learning resource center in the university graduate housing neighborhood. The first session was attended by two volunteers and the second session was attended by another two volunteers.

During the CI, participants discussed the survey, the interview questions, and focus group questions. The researcher elicited feedback on the survey and from the focus groups through think aloud protocol and verbal probing. Cognitive interviewing originated from a technique known as "protocol analysis." It involves subjects thinking aloud as they work on problems. The participants were asked to verbalize their thinking processes while answering the questions. Their verbalizations are recorded (Groves et al., 2009). Meanwhile, the researcher took notes of the participants' comments on any logistical challenges that may surface when participants answer the survey or engage in the focus group. The brief detailed process of the cognitive interview started as the researcher announced the first session of the cognitive interview and explained the procedure of the pilot study to the volunteers. Each session took approximately 30 minutes. The researcher started with the online survey. Volunteers opened the survey page using laptops and iPads provided by the researcher. Volunteers were asked to think aloud while independently reading and answering the questions. Participants raised any issues or concerns they had while answering

questions. The researcher also took note of comments for reference during the CI session. Among others, the researcher focused on the following aspects: volunteers' understanding of the questions and the selections of answers, feedback about the process of completing the survey, any technical issues, and confusion. Modifications were made to the survey based on the findings of the focus groups. After 30 minutes, the researcher asked volunteers to stop answering the survey questions before starting the next session with the interviews and focus groups questions.

The same procedure was applied for the second session of the CI. First, the researcher announced that the second session of the cognitive interview had begun. Volunteers were asked questions from the focus groups' guide. Participants were asked to answer the questions in the same way they would answer them in an actual focus-group setting. Responses were recorded using two voice recorders. Another research team member took notes during the interview. Upon finishing the questions, the researcher asked volunteers to reflect on the interview session. Their reflections were also recorded.

Researcher's Positionality and Assumptions

In this section, the researcher will explain her background and experiences that influenced her decision on pursuing this topic of interest. Since this research involved a selection of certain population, methodology, and analysis that could have been influenced by the researcher's worldview and bias, a statement of positionality would be helpful in informing the researcher and the reader of how data in this study were being selected, filtered, and analyzed (Creswell, 2007). This statement would also give a good picture of the researcher's decision-making pattern, bias, and judgment (or prejudgment) while designing and conducting the research, analyzing the data, and writing the research report. Prejudgment is impossible to eliminate or set aside since it is an inescapable condition of being and knowing (Gadamer, 1989); however, as a researcher, one

should be able to reflect on their prejudgment and recognize the enabling versus disabling bias or prejudice to achieve understanding on specific issues. In qualitative inquiry, which is a part of this mixed-methods study, the researcher ought to report any personal or professional information that may have affected data collection, analysis, and interpretation in the mind of the users of the findings (Patton, 2002, p.566). Furthermore, the researcher as the instrument for analysis across all phases of research (Starks & Trinidad, 2007) should be aware of their bias to maintain the rigor of the research project. The following paragraphs will enlist all the researcher's experiences and steps taken to ensure the reliability and credibility of the whole process in this research.

The interest in pursuing this topic came from the researcher's personal experience being a migrant/foreign-born woman and pregnant in a new country. When the researcher was pregnant with her first son in 2008, she was new to the U.S. and its healthcare system. As a non-native English speaker, she faced difficulties understanding jargons and even some words used during depression screening while getting her checkups. On more than one occasion, there were misunderstandings and miscommunications due to language and cultural barriers between her and the healthcare professionals. For example, she was asked, "Are you feeling blue?" in one of her checkups and she was not sure of what 'feeling blue' meant. Another time, she reported that she had a headache but was unsure if she should say 'light-headed' or 'heavy-headed'. The lack of words to explain herself and her condition sometimes frustrated her and, at some point, shunned her from talking.

Coming from an Eastern culture, the researcher's responses to depression screening questions were occasionally influenced by stigma around mental health and postpartum depression. The openness of American doctors and nurses in asking sensitive questions during doctor-patient consultations were also new to her at that time. For example, she was asked if her

husband was the father of the baby or if she drank (which is prohibited in her religion). While these questions are important, she blushed and wished the questions could be asked more ‘politely’ (with a lower tone or in private). She would imagine someone of her faith would not want to disclose if they engaged in certain behaviors that could potentially discriminate against themselves or their religion. Then, when she gave birth, one of the nurses said, “I thought he would be darker”. Thus, it made her think; if the nurse had already decided that her baby would be of a certain color/tone, would the pre-judgment affect the depression screening process? Sometimes, she wished the nurses or doctors would be more patient centered and culturally sensitive. Ultimately, it is hard enough that she is outside of her comfort zone geographically and linguistically, but she also felt a lack of social support since she was away from her immediate family member whom she often looked up to for women’s health questions – her mother. Therefore, she wonders if other mothers who might be in the same situation as her felt the same way – overwhelmed, uncertain, and at one point, frustrated and scared.

An opportunity to work with Dr. Karen Tabb and her research group to study maternal mental health and implement research and outreach efforts to connect mothers has validated her passion for studying topics pertaining to addressing health disparities. As a mom, improving access to resources for other moms that lead to their physical and mental well-being is almost as natural as wanting the best for herself in deciding on health care services. Looking at the alarming rate of depression, suicidal ideation, and many other public health concerns among minority mothers, she decided that she would do something to help these mothers, or at least contribute to understanding the phenomenon of PPD among this population.

In this research, the researcher used a technique called ‘bracketing’ to ensure that the participants’ stories were told and highlighted accurately and with minimized bias effects

throughout the study. This technique was defined as a ‘scientific process in which the researcher suspends or holds in abeyance his or her presuppositions, biases, assumptions, theories, or previous experiences to see and describe the phenomenon’ (Gearing, 2004, p.1430). As Stark and Trinidad (2007) wrote:

“Bracketing required the researcher to be honest and vigilant about their own perspective, pre-existing thoughts and beliefs, and developing hypothesis...engage in the self-reflective process whereby they recognize and set aside their priori knowledge and assumptions, with the analytic goal of attending to the participants’ account with an open mind” (p.1376).

The researcher also keeps memos of her experiences during the designing, data collection, analysis, and writing of the research report. This method was suggested by Cutcliffe (2003). While transcribing the interviews, the researcher made sure that the interpretation of the quotations was read carefully based on her questions probing and the memos together. With each interview and focus group, some of the participants’ experiences also indirectly reflected the researcher’s personal experiences. For example, on the honesty with which they responded to depression questions, as well as the lack of vocabulary and experience with perinatal care outside their culture. Thus, she had to make sure all her interpretations were made carefully and not be influenced by her previous experience.

Besides that, the researcher also presupposed that the moms that she met would have a certain perception or comparison about PPD based on their experience in their home country. In this context, the researcher might share the same experiences or stigma about PPD based on her knowledge of her home country’s culture. Additionally, the researcher also shared participants’ experiences in navigating the healthcare system while adjusting to a new country. Moreover, this group is often stigmatized as having a lower education status because they are in the middle-to-

lower income group. Moreover, some of them are using services from the public health district clinics and resources meant for the low-income populations. Based on her experience living at the family graduate housing of her university, she discovered that this assumption is not always valid,. Oftentimes, she found people making assumptions about her status. She was always asked if she was following her husband to study at the nearby university when it was actually the opposite. Some people would also assume that she was a stay-at-home mom. In contrast, she expected to meet more higher-educated moms since the location where she is conducting the current study is also a campus town with among the highest numbers of international students and scholars. Many of the stay-at-home foreign-born moms in this community might not be working, but many of them have higher education experience, obtained postgraduate degrees, or used to work in a professional career such as scientists and doctors. This insider knowledge informed her recruitment approach, research questions formulation, and how she dealt with the low-response rate during the data collection phase. Most importantly, this awareness will help her distancing and engaging herself from the data at the right time while focusing on the participants' experience.

CHAPTER 4: FINDINGS OF PILOT STUDY AND QUANTITATIVE STUDY

The purpose of this study is to investigate the current situation regarding the adoption and acceptance of mHealth for PPD screening among the target population. This chapter will present the results of this study in the following order. First, the results of the pilot study will be presented. Since the pilot study was done simultaneously for the quantitative and qualitative research instruments, the findings will be discussed only within this chapter. Next, the researcher presents the results from the quantitative instrument – the online survey. Results from the qualitative and mixed-methods sections will be discussed in the subsequent chapters.

Results of the Pilot Study

A pilot study was implemented following the proposal's approval before the actual study was conducted to ensure the feasibility and quality of the instruments. The researcher conducted two cognitive interviews (CI) sessions in the Spring of 2018 with four women from the population before the actual data collection. The limited number of participants and participant availability made it impossible to conduct a focus group discussion during the pilot study phase of this research. The CI served to identify sources of response errors in the survey, whether autobiographical, attitudinal, or knowledge-based (Willis, 2008, p. 107). The CI involved monitoring participants' answer to the survey and the interview/focus group's questions through thinking aloud and verbalizing the participants' thinking process.

Participants of Cognitive Interviews

Four women representing the characteristics of the sample in this study were recruited as the pilot study participants. They either volunteered by registering at the research booth or were recruited through snowball sampling from other participants. All of them are non-native English

speakers. However, two of them frequently converse in English since they are working locally. All of them have had experience giving birth and have undergone prenatal, postpartum, and pediatric checkups in the U.S. All identifying information, including their names, has been changed to maintain the anonymity of the participants' real identity.

Rita. Rita is a mother to a 3-year-old son. She identified as Hispanic and was originally from Puerto Rico. She has been in the U.S. for almost 5 years. She is a stay-at-home mom and has limited ability to speak English. Although she understands many English words for daily conversations, she is most comfortable speaking in Spanish.

Amalia. Amalia was born in Mexico and has been living in the U.S. for more than 15 years. She identified herself as Hispanic and Native American. She has a teenage daughter and a son who were born in the U.S. She used to work as a receptionist at a public health clinic. She also used to own a pizza place in town. Currently, she is working at a veterinary hospital while also cooking at an international deli café on part-time basis.

Lina. Lina is a scholar's spouse who came to the U.S. from Indonesia to accompany her husband, who is a Ph.D. student. She has been living at the university housing for the past 4 years. She has twin daughters and was pregnant with the third child during the pilot study (when this dissertation was written, she was already 2 months postpartum). She was a doctor in Indonesia but currently stays at home while her husband works on his Ph.D.

Amna. Amna is a mother to two daughters, aged 3 years old and 7 months old. Originally from Pakistan, she came to the U.S. 6 years ago to accompany her husband for Ph.D. and subsequently, he became a post-doctoral instructor. She is also a Ph.D. holder from a higher institution abroad. She started working full-time on campus last year before she delivered her baby and changed to part-time after the baby was born.

More information on the CI participants is included in Table 10 below:

Table 10

Overview of Participants Information for the Pilot Study

Pseudonym	Country of origin	Age	Employment	Family information
Rita	Puerto Rico	28	Not working (stay-at-home-mother)	Married with one child
Amalia	Mexico	45	Full-time	Single mother with two children
Lina	Indonesia	34	Not working (stay-at-home-mother)	Married with three children
Amna	Pakistan	40	Part-time	Married with two children

Two of the participants were given the English version of the survey and another two reviewed the Spanish version. The survey was administered using an iPad and a laptop. They were all given the English version for the interview/ focus group portion. A research assistant who was a bilingual speaker (English - Spanish) was on duty to help translate the interview/ focus group when needed. Participants were asked to verbalize their thinking process until they arrived at the answer to each question. Some participants mentioned that this is simply like talking to themselves while answering the survey. For some others, they were unsure of what to say or how to verbalize their thought process. The researcher was at the same room to support the participants throughout the process.

Discussions on the survey

Overall, the participants for both versions of the survey found that the language and words used in the survey are easy enough to comprehend for someone with a high-school education. Participants who reviewed the Spanish questionnaires said they could understand the wordings of the survey but reminded the researcher to be thoughtful of some other Spanish-speaking mothers who might not be able to understand some words because of the different ways of saying the same words in Spanish. In terms of the healthcare, maternal information, and demography section, participants did not mention any problems in understanding or answering those questions. They also did not find those questions as too sensitive. However, Lina raised a question about question 1, *“How many years of experience have you had with the health care practices in the U.S.?”*. She mentioned that she might need more clarification because she was a doctor in her home country and that the item might indicate the length of time that she has ‘practiced’ in the U.S., which is none. However, this was not an issue for other participants. No item changes were made in the final version of the survey since there were no issues brought up by the participants.

Feasibility. Participants mentioned about the length of the survey as being too long, which might discourage people from completing it. However, since the survey items were adopted from an established instrument, this is something that the researcher must take a risk with. It is understandable that the survey could be long, but past research has shown that the retained scales in this study are important to ensure the reliability and validity of the survey. To control this factor, a token of appreciation was offered as a motivation for participants to complete the questionnaire. In terms of the interface, some participants prefer to scroll through the survey, but some prefer to have different sets of questions on different pages. This function can easily look different if they are using a computer/laptop versus the SurveyMonkey app, so the researcher did not change

anything regarding it. The researcher also retained the consent page of the survey as required by the IRB, although some participants mentioned that the form was too long. The researcher, however, rescaled the fonts so they were bigger and easier to read.

Discussions on the interview/focus groups questions and protocol

Participants commented that the questions were easy to understand and could be answered directly. However, there were a few questions that seemed redundant or repeated, especially on the trustworthiness of data generated by mobile device. For example, in question 18 of the original draft of the interview guide: *‘to what extent do you think the results generated from the depression-screening survey you completed using mobile devices... a) are trustworthy? Why?, b) encourage you to seek help, if needed? Why?’*, participants feel this question is redundant with the earlier question about the screening process. They suggested this question be integrated somewhere when asking about screening in general. After the CI, the researcher changed and integrated question 18 into question 6 and question 9.

The researcher also asked whether volunteers experienced any discomfort while answering the questions. The volunteers did not raise any issues in answering the questions, such as stigma or their perceptions about people with PPD. They also did not raise any problem recalling their experience of getting screened for depression during their checkups. Since the volunteers were non-native speakers, the researchers also asked about words they found hard to understand. Most agreed that the word choices are easily understandable, but they noted that it could be challenging for some non-native speakers to reply verbally due to lack of vocabulary. They emphasized the need for a translator, interpreter, or assistance for those who need one. Some logistical issues raised by the participants include the location of the interviews that need to be conducive and hopefully child friendly. Also, the timing of the interview should be taken into consideration, since some of

the mothers might be working and it might be hard to get everyone to be at the same location at the same time for focus group discussion.

Table 11

Feedback Collected During the Interviews and the Improvements Made to the Actual Study Interviews/Focus Groups

Area Received Feedback	Before Feedback	After Feedback
Stigma section: Question 18 in the interview guide	‘To what extent do you think the results generated by the depression-screening survey you completed using mobile devices... a. Are trustworthy? Why? b. Encourage you to seek help, if needed? Why?’	Integrated to Question 6 and 9. ‘Question 6: Do you trust depression-screening results? Why or why not? <i>Will that be the same if you complete the screening using a mobile device?</i> ’ ‘Question 9: To what degree would you consider seeking help if the depression screening revealed prenatal and postpartum depression symptoms? <i>Will that be the same if you complete the screening using a mobile device?</i> ’

Results of the Actual Quantitative Data Analysis

After the feasibility and quality of the research instruments were determined from the pilot study, the actual study was conducted. In this section, the researcher presents the results from the online survey of the current study in the following order: First, the section begins with preliminary analyses, including accuracy of data entry and missing data procedures, that were performed prior

to conducting descriptive statistics. Next, the researcher presents the demographic characteristics of the research sample. Then, she presents the results of factor analysis of the scales, correlations and reliability analysis, and the results of regression analysis.

Data from the online survey will help the researcher address the following research questions: 1) *RQ2: what factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?*; 2) *RQ3: how, and in what ways, do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?*, and; 3) *RQ5: how, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?*

Response Rate

The online surveys were administered starting July 2018. The first response received was in November 2018 and the last response was received in October 2019. More information on data collection procedures for the survey has been explained in Chapter 3. The English version of the survey yielded 52 responses and the Spanish version of the survey recorded 4 responses. One response from the Spanish version was discarded because there were insufficient data to be included in the analysis. No participants responded using the French version of the survey. Compared to the estimated 158 responses needed to obtain statistically robust data for statistical inferences, the response rate in this study was at 34.81% (n=55). Within the 55 usable responses, 42 participants completed all the sections in the survey. Surveys that were not completed or

halfway completed were screened through to determine the appropriate missing data handling procedures.

Data Screening and Diagnostics

The first data analysis procedure was to conduct a preliminary data analysis to verify the quality of the gathered data prior to conducting the main analysis. The collected data for this study were examined for the accuracy of data entry, missing data, and dealing with missing data.

Accuracy of Data Entry. Data from the SurveyMonkey survey were downloaded and saved in Excel format to a password-protected cloud storage account. The file was imported into SPSS 26.0 (later upgraded to version 27.0) software for data analysis. The researcher then proofread the original data against the transformed spreadsheet to check for accuracy as suggested by Hair et al. (2009). There were no significant errors detected during the data transformation. All negative statements were recoded to reflect the overall scale of responses. These items were item FC3 in the facilitating condition scale and all items in the anxiety scale (AN1-AN4).

Missing Data. Missing data analysis in this study was done in the following steps. First, the researcher determined whether the patterns of missing data were distributed randomly. Based on the diagnosis of the patterns, an appropriate imputation method to handle the missing data was selected. Overall, from the total 55 surveys completed, 76.4% (n=42) of the participants completed the whole survey. The pairwise deletion was used on surveys where participants completed all the scale sections. This technique help increase power in the analyses, especially with the small number of samples.

Demographics Information

The total number of participants who responded to the survey in this study was 55. Noted that some of the demographic's questions were optional and participants could choose whether to answer them or not. In terms of age, most of the participants are in the 25-34 years old age group (n=30, 54.5%). The second largest group was the 35–44-year-old age group (n=10, 18.2%). Among these participants, 25 reported that they were foreign-born (45.5%). The majority of the participants have been in the US for 10 years or less (n=24, 43.7%). Even though the largest ethnic group reported was white or Caucasian (n=17, 38.6%), the number of participants identified as non-Caucasian was the largest in total (n=25, 56.8%), which was led by Asian or Pacific Islander (n=16, 36.4%). In terms of religion, the biggest religious group represented by the participants in this study was Christian (n=12, 21.8%), followed closely by those who '*did not identify with any religion nor spiritual*' (n=9, 16.4%). While only 10.9% of the participants identified as immigrants (n=6), most of the participants were non-native English speakers (n=24, 43.6%).

Education-wise, most participants reported having a graduate degree (n=22, 40%) and only three (5.5%) reported having less than a high school degree. Almost all the participants are covered by some types of insurance (n=51, 92.7%). Among the participants, only 18 (32.7%) reported being enrolled in the Woman, Infants, and Children (WIC) program. In terms of experience with US healthcare practices, slightly over 32% of the participants have had more than 10-years of experience with the healthcare system (n=18), followed closely by those with less than one year of experience (n=16, 29.1%). Moreover, from the sample, 45 participants (81.8%) reported as pregnant or had given birth within the last 12 months. The majority of the participants have given birth once in the US (n=22, 40%). More than half of the participants also reported living together with at least one child (n=28, 50.9%). Almost half of the participants reported never having been

screened for depression during prenatal checkups (n=23, 41.8%) and 16 (29.1%) of them reported having been screened more than 3 times. Additionally, the same number of participants (n=23, 41.8%) reported never been screened for depression during postpartum checkup followed by 13 of them (23.6%) reported have been screened for depression for the same type of checkup. The summary of the self-reported demographic characteristics of the research sample is as depicted in Table 12.

Table 12

Demographics Information of the Participants

Variables	Values	<i>n</i>	%
Age	25-34 years old	30	54.5
	35-44 years old	10	18.2
	45-54 years old	1	1.8
	55-64 years old	1	1.8
Place of birth	United States	17	30.9
	Foreign-born	25	45.5
Length of stay in the U.S.	Less than 1 year	3	5.5
	Between 1 – 5 years	14	25.5
	Between 6 – 10 years	7	12.7
	More than 10 years	17	30.9
Ethnicity	American Indian or Alaskan Native	--	--
	Asian or Pacific Islander	16	36.4
	Black or African American	3	6.8
	Hispanic or Latino	6	13.6
	White/ Caucasian	17	38.6
	Prefer not to answer	1	2.3
	Other	1	2.3
Religion	Atheism	1	1.8
	Buddhism	1	1.8
	Christianity	12	21.8
	Hinduism	3	5.5
	Inter/Non-denominational	1	1.8
	Islam	3	5.5
	Prefer not to answer	3	5.5
	Spiritual but do not identify with any religion	6	10.9
	Did not identify with any religion nor spiritual	9	16.4

Table 12 (cont.)

Variables	Values	<i>n</i>	%
	Other: Baptized	1	1.8
Immigrant	Yes	6	10.9
	No	31	56.4
	Prefer not to answer	4	7.3
Native English Speaker	Yes	18	32.7
	No	24	43.6
Highest Educational Level	Less than a high-school degree	3	5.5
	High-school degree or equivalent (e.g., GED)	5	9.1
	Some college but no degree	4	7.3
	Associates degree	1	1.8
	Bachelor's degree	4	7.3
	Graduate degree	22	40.0
	Other	3	5.5
Insurance	Yes	51	92.7
	No	4	7.3
WIC	Yes	18	32.7
	No	35	63.6
	Not sure	2	3.6
Experience with U.S. healthcare practices	Less than 1 year	16	29.1
	Between 1 – 5 years	9	16.4
	Between 6 – 10 years	4	7.3
	More than 10 years	18	32.7
	Not applicable	8	14.5
Pregnant or give birth in 12 months	Yes	45	81.8
	No	10	18.2
Number of births in the U.S.	0	14	25.5
	1	22	40.0
	2	13	23.6
	3	6	10.9
Number of children living together	0	3	5.5
	1	28	50.9
	2	17	30.9
	3	6	10.9
	>3	1	1.8
Screened for depression during prenatal checkup	0	23	41.8
	1	7	12.7
	2	7	12.7
	3	2	3.6
	>3	16	29.1
	0	23	41.8

Table 12 (cont.)

Variables	Values	<i>n</i>	%
Screened for depression during postpartum checkup	1	8	14.5
	2	13	23.6
	3	4	7.3
	>3	5	9.1

N = 42 after pairwise deletion

Experience with mHealth

Twenty-four participants, or 43.6% of the participants said they had used mobile devices for health-related activities before. This number is slightly lower than those who have not had such experience. Regarding the most frequently used device to connect to the internet, most participants recorded smartphones (n=40, 72.7%) and laptops (n=20, 36.4%) as their top answers. Table 13 summarizes participants' experiences of using mHealth and table 14 depicted the devices they most frequently used to connect to the internet.

Table 13

Participants' Experience with mHealth

	<i>n</i>	%
Have used a mobile device for health/healthcare-related activities before	24	43.6
Never used a mobile device for health/healthcare-related activities before	31	56.4
Total	55	100

Table 14*Device most frequently used by participants to connect to the Internet*

Device	n	%
Smartphone	40	72.7
Laptop	20	36.4
Tablet	10	18.2
Desktop	6	10.9

Performance of the UTAUT and stigma scales measure***Item's reliability***

The quantitative data for this study were collected via online surveys administered through the SurveyMonkey host. The survey items were developed using the modified Unified Theory of Acceptance and Use of Technology (UTAUT) scales by Venkatesh et al. (2003) and modified with some items from the Self-stigma of Mental Illness Scale Short Form (SSMIS-SF), developed by Corrigan et al. (2012). Each construct in the scales were measured using a 5-points Likert scale. In this study, the scales and items with a Cronbach Alpha's value of higher than .70 are considered as having a good level of internal consistency. Leech et al. (2004) indicated that it is "common to see journal articles where one or more scales have somewhat lower alphas (e.g., in the .60-.69 range), especially if there are only a handful of items on the scale" (p.25).

Overall, all scales in the survey showed a high-reliability coefficient score and showed reliability relative to internal consistency. For the UTAUT scales, all scales recorded $\alpha > .70$ except for 'Facilitating Condition' ($\alpha = .660$). Item FC03 was reverse coded for a negative statement. However, this only brought the Cronbach's Alpha of the scale down to .549. Eliminating item FC3, 'the depression survey would not be compatible with the mobile devices that I use' from this scale, however, increased the α score significantly to .844. Therefore, the researcher decided to

eliminate FC3 from the scale. On the other hand, ‘behavioral intention’ recorded the highest Cronbach’s Alpha score at .964. For the SSMIS-SF, all scales showed Cronbach’s Alpha scores higher than .70, with ‘Harm to self-esteem’ recorded the highest internal consistency at .864. Table 15 shows the number of items in each scale and the internal consistency reliabilities analysis results for both scales.

Table 15

Internal Consistency Reliabilities of the Scales

Scale		Number of items	Cronbach’s α
UTAUT	Performance expectancy	5	.922
	Effort expectancy	4	.886
	Attitude towards technology	4	.926
	Social influence	4	.835
	Facilitating condition (after deletion of item FC3)	3	.844
	Anxiety	4	.790
	Behavioral Intention	3	.964
SSMIS - SF	Awareness	5	.786
	Agreement	5	.795
	Application	5	.739
	Harm to self-esteem	5	.864

Descriptive statistics are reported for the UTAUT and SSMIS-SF scales. Table 16 summarizes Cronbach's alpha values, standard deviation, mode and mean for each item, and the overall mean score for the UTAUT scale. Mode was listed to provide a better picture of the responses for mixed methods analysis purposes. Meanwhile, Table 17 showed the same analysis results for the SSMIS-SF scale.

Table 16*Summary of reliability analysis results for UTAUT scale*

Scale	Items	(α)	Item Mean	Mode	SD	Mean Item Means
Performance Expectancy (PE)		.922				3.550
	PE1 I would find mobile devices useful when completing the depression survey for pregnant women and mothers		3.62	4	1.03	
	PE2 Using mobile devices would allow me to complete the depression survey more effectively than other methods		3.60	4	.96	
	PE3 Using mobile devices to screen for depression would increase my awareness of depression symptoms		3.40	4	1.14	
	PE4 Using mobile devices to screen for depression would increase the chances of detecting depression symptoms		3.60	4	1.02	
	PE5 Using mobile devices to screen for depression would increase my chance of finding the help I might need immediately		3.54	4	1.06	
Effort Expectancy (EE)		.886				3.800
	EE1 It would be easier to complete the depression survey using mobile devices		3.60	4	1.01	
	EE2 It would be easy for me to give an honest answer when completing the depression survey using mobile devices		3.64	4	1.16	
	EE3 I would find mobile devices easy to use as other methods for completing the depression survey		3.90	4	.91	
	EE4 Learning to operate mobile devices to complete the depression survey would be easy for me		4.06	4	.98	
Attitude Towards Technology (AT)		.926				3.553
	AT1 Using mobile devices to complete the depression survey would be a good idea		3.70	4	.95	
	AT2 Using mobile devices would make completing the depression survey more interesting		3.38	3	1.07	

Table 16 (cont.)

Scale	Items	(α)	Item Mean	Mode	SD	Mean Item Means
	AT3		3.45	4	.93	
	AT4		3.68	4	1.02	
Social Influence (SI)		.835				3.218
	SI1		2.96	3	1.02	
	SI2		3.13	3	1.04	
	SI3		3.36	4	.94	
	SI4		3.43	4	1.04	
Facilitating Condition (FC)		.844				3.865
	FC1		4.13	4	.92	
	FC2		4.19	5	.97	
	FC4		3.28	3	.95	
Self-efficacy (SE)		.835				4.136
	SE1		4.26	5	.83	
	SE2		4.02	4	1.02	
	SE3		4.22	4	.786	
	SE4		4.04	4	.942	
		.790				2.467

Table 16 (cont.)

Scale	Items	(α)	Item Mean	Mode	SD	Mean Item Means
Anxiety (ANX)	ANX1		I would feel apprehensive about using mobile devices to complete the depression survey	2.87	3	1.47
	ANX2		It would be scary to think that the depression survey will generate inaccurate results because of the mobile devices I used	2.50	2	1.13
	ANX3		I would be hesitant to use mobile devices to complete the depression survey for fear of making mistakes that will generate inaccurate results	2.39	2	1.15
	ANX4		Using mobile devices to complete the depression survey would be somewhat intimidating to me	2.11	2	1.06
Behavioral Intention (BI)		.964				3.797
	BI1		If the option is available, I intent to use mobile devices to complete the depression survey for the remainder of my pregnancy and after giving birth.	3.83	4	.95
	BI2		If the option is available, I predict that I would use mobile devices to complete the depression survey for the remainder of my pregnancy and after giving birth.	3.76	4	.92
	BI3		If the option is available, I plan to use mobile devices to complete the depression survey for the remainder of my pregnancy and after giving birth.	3.80	4	.93

Table 17*Summary of reliability analysis for SSMIS-SF scale*

Scale	Items	(α)	Item Mean	Mode	SD	Mean Item Means
Awareness		.786				2.641
	STIG_AW1	I think the public believes that... ...most people with mental illness are to blame for their problems	2.80	4	1.17	
	STIG_AW2	...most people with mental illness are unpredictable	3.16	4	1.22	
	STIG_AW3	...most people with mental illness will not recover or improve their health	2.39	3	1.10	
	STIG_AW4	...most people with mental illness are dangerous	2.34	1	1.14	
	STIG_AW5	...most people with mental illness are unable to take care of themselves	2.52	2	1.15	
Agreement		.795				2.144
	STIG_AGR1	I think that... ...most people with mental illness are to blame for their problems	1.79	1	.94	
	STIG_AGR2	...most people with mental illness are unpredictable	2.67	4	1.2	
	STIG_AGR3	...most people with mental illness will not recover or improve their health	1.91	2	.81	
	STIG_AGR4	...most people with mental illness are dangerous	2.00	2	1.02	
	STIG_AGR5	...most people with mental illness are unable to take care of themselves	2.35	2	1.07	
Application		.739				2.133
	STIG_APP1	If I have a mental illness... ...I am unable to take care of myself	2.38	2	1.04	
	STIG_APP2	...I will not recover or improve my health	1.93	2	.87	
	STIG_APP3	...I am to blame for my problems	2.17	1	1.17	

Table 17 (cont.)

Scale	Items	(α)	Item Mean	Mode	SD	Mean Item Means
	STIG_APP4	...I am unpredictable	2.40	2	1.06	
	STIG_APP5	...I am dangerous	1.79	1	.84	
Harm to self-esteem		If I have a mental illness, I might respect myself less...				2.166
	STIG_HARM1	...because I am unable to take care of myself	2.34	2	1.13	
	STIG_HARM2	...because I will not recover or improve my health	1.95	2	.89	
	STIG_HARM3	...because I am to blame for my problems	2.22	2	1.04	
	STIG_HARM4	...because I am unpredictable	2.02	1	1.04	
	STIG_HARM5	...because I am dangerous	2.29	2	1.12	

Factor Analysis and Parallel Analysis

Prior to conducting exploratory factor analysis (EFA), parallel analysis (PA; Horn, 1965) was conducted to identify factor structure in the scales adopted in the study. This analysis helped the researcher to compare the eigenvalues derived from the actual data with the eigenvalues derived from random data. Eaton et al. (1999) compared several methods of conducting PA and found that the table and regression approaches were more limited in the types of cases that could be analyzed. They concluded that random data generation and the table methods displayed the best overall performance (Hayton et al., 2004).

The PA was carried out in SPSS utilizing the parallel.sps script developed by O'Connor (2000). The number of cases and variables were entered according to the current research information. A total of 55 cases and 12 variables were included in this study. Factors above the 95th percentile line generated by the simulations are considered “beyond chance” and were retained. The researcher retained the 100 data sets to be computed and applied principal component analysis (PCA). Principal component analysis served the purpose of this study, which was not intended to generalize to a larger population but rather to explore if the findings applied to the sample collected. Using this method, conclusions are restricted to the sample collected and researchers need to do cross-validation in order to generalize the results to the entire population of interest (Field, 2013). Six eigenvalues valued at greater than 1 were generated from the PA. These values were then compared to the eigenvalues generated from the real data (see Table 18).

Initially, the factorability of the UTAUT and SSMIS-SF scales was examined. An exploratory factor analysis (EFA) was conducted to explore the data and as the factor extraction method in this study. This approach is particularly appropriate for scale development or when there is little theoretical basis for specifying a priori the number and patterns of common factors (Hurley

et al.,1997). The researcher conducted factor analysis for each of the scale separately due to the small number of samples, since running a factor analysis for the whole scale altogether will produce unreliable results. An eigenvalue valued at less than 1 indicates that the component explains less variance than a variable would and hence should not be retained. One factor with an eigenvalue greater than 1 was extracted for each scale. For the SSMIS-SF - application, two eigenvalues were extracted. EFA results show that all factors extracted from the UTAUT and SSMIS-SF scales are larger than all the eigenvalues extracted from the PA. The comparison is as depicted in Table 18.

Table 18

Correlation Matrices of Eigenvalues from Actual Data and Eigenvalues Generated from Random Data

Actual Eigenvalues	Average Eigenvalues	95 th Percentile Eigenvalues
3.815	1.841813	2.053741
3.293	1.598191	1.749269
3.282	1.411296	1.513723
3.006	1.269529	1.381797
2.801	1.129104	1.228576
2.778	1.004917	1.094047
2.734	.885143	.977264
2.713	.785364	.867963
2.675	.673917	.771955
2.532		
2.486		
2.300		
1.347		

Additionally, the Keiser-Meyer-Olkin (KMO) measure of sampling adequacy for all the scales were all well above .6, which showed an acceptable and a good level of sampling adequacy. ‘Performance expectancy’ showed the highest KMO statistics with .878 followed by ‘attitude

towards technology’ with .808. ‘Facilitating condition’ recorded the lowest KMO statistic with .638. The total variance explained by the extracted factors showed that the facilitating condition recorded the lowest value at 57.836. Other scales recorded acceptable values, including ‘attitude towards technology’, which has an 81.67 variance explained by the extracted factor. Table 19 depicts the summary of reliability and factor analysis results for this study.

Table 19

Summary of Reliability and Factor Analysis Results

Scale		Cronbach’s Alpha	Cronbach’s Alpha based on standardized items	KMO statistics	Total variance explained by extracted factor	Mean inter-item <i>r</i>
UTAUT	Performance Expectancy	.922	.922	.878	76.30	3.550
	Effort Expectancy	.866	.890	.695	74.67	3.800
	Attitude Towards Technology	.926	.926	.808	81.67	3.553
	Social Influence	.835	.833	.672	66.875	3.218
	Facilitating Condition	.844	.844	.656	76.654	3.865
	Self-efficacy	.835	.841	.700	67.826	4.136
	Anxiety	.790	.792	.747	63.31	2.467
	Behavioral Intention	.964	.964	.749	93.36	3.797

Table 19 (cont.)

Scale		Cronbach's Alpha	Cronbach's Alpha based on standardized items	KMO statistics	Total variance explained by extracted factor	Mean inter-item <i>r</i>
SSMIS-SF	Awareness	.786	.787	.754	53.29	2.641
	Agreement	.795	.790	.775	54.86	2.144
	Application	.739	.746	.600	48.55	2.133
	Harm to self-esteem	.864	.868	.824	66.05	2.166

Correlation Analysis

A non-parametric correlation analysis using Spearman's rank-order correlation test was run to assess the relationship between the independent variables in the study with the dependent variable, behavioral intention. The Spearman rank correlation was used because the Spearman rank correlation test does not carry any assumptions about the distribution of the data and is the appropriate correlation analysis when the variables are measured on a scale that is at least ordinal (Statistics Solutions, 2020). There was a low-to-moderate positive correlation between performance expectancy, effort expectancy, attitude toward technology, social influence, and self-efficacy on the UTAUT scale with behavioral intention to use mHealth for PPD screening among the participants in the study. Anxiety shows a negative correlation with behavioral intention. Notably, social influence recorded the highest positive association with behavioral intention ($r_s=.61$). All other independent variables in SSMIS-SF only recorded a low positive correlation with behavioral intention. Interestingly, effort expectancy recorded a highly positive correlation with performance expectancy ($r_s=.81$). Attitude also shows a high positive correlation with

performance expectancy ($r_s=.67$) and effort expectancy ($r_s=.76$). Social influence also recorded moderate correlations with performance expectancy ($r_s=.54$), effort expectancy ($r_s=.54$), and attitude ($r_s=.50$) towards using mHealth for PPD screening by the participants. Table 20 details the results of the correlation analysis in the study.

Table 20*Inter-correlation Matrix*

Subscale	PE	EE	ATT	SI	FC	SE	ANX	BI	AWARE	AGREE	APPLY	HARM
PE	1.00											
EE	.81**	1.00										
ATT	.67**	.76**	1.00									
SI	.54**	.54**	.50**	1.00								
FC	.45**	.52**	.52**	.46**	1.00							
SE	.37*	.41**	0.29	0.25	.54**	1.00						
ANX	0.03	-0.08	-0.03	-0.10	0.02	-0.18	1.00					
BI	.51**	.52**	.48**	.62**	0.20	0.23	-0.03	1.00				
AWARE	0.01	-0.03	0.03	.37*	0.14	-0.18	-0.07	0.21	1.00			
AGREE	-0.00	-0.10	0.00	0.13	-0.14	-0.28	0.07	0.20	.58**	1.00		
APPLY	-0.02	-0.09	-0.09	0.25	-0.06	-0.10	0.07	0.19	.61**	.81**	1.00	
HARM	0.02	-0.04	0.03	.37*	-0.08	-0.20	-0.13	.32*	.67**	.72**	.80**	1.00

**PE=performance expectancy, EE=effort expectancy, ATT=attitude towards technology, SI=social influence, FC=facilitating condition, SE=self-efficacy, ANX=anxiety, BI=behavioral intention, AWARE = stigma awareness, AGREE = stigma agreement, APPLY = stigma application, HARM = stigma self-harm. *p < .05, two-tailed. **p < .01, two-tailed.

Ordinal Logistic Regression Analysis

An ordinal logistic regression analysis was conducted to investigate the factors that influence the acceptance of mHealth among low-income migrant women in the study. Ordinal regression provides a more sensitive analysis than would be possible by arbitrarily dichotomizing the outcome variable, and does so without imposing unverifiable assumptions regarding the structure of the data (Scott et al., 1997). This analysis aimed to answer the second research question, “*What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?*” and “*How, and in what ways, do participants’ perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?*” Specifically, it allows the researcher to determine which independent variables from UTAUT have a statistically significant effect on the behavioral intention of using mHealth and how age and stigma moderated samples’ acceptance of mHealth.

Before the analysis was carried out, the data were checked to make sure that it met the four assumptions for conducting ordinal logistic regression:

1) *Assumption 1: There should be one dependent variable that is measured at the ordinal level.* This assumption was met because the dependent variable, behavioral intention, was measured at the ordinal level.

2) *Assumption 2: There should be one or more independent variables that are continuous, ordinal, or categorical (including dichotomous variables).* This assumption was met because the independent variables are all measured at either a continuous, ordinal, or

categorical level. The independent variables in this study include the rest of the scales in UTAUT, the SSMIS-SF scale, age, and experience in using mHealth.

3) *Assumption 3: There should be no multicollinearity, which occurs when you have two or more independent variables that are highly correlated with each other.* The predictor variables were tested a priori to verify there was no violation of the assumption of no multicollinearity. SPSS was used to run the data to make sure that no independent variables were highly correlated with each other. As shown in Table 21 below, no multicollinearity was detected for all independent variables. The tolerance values are all above 0.1 and the Variance Inflation Factor (VIF) results of the variables are all valued at less than 10.

Table 21

Results of Multicollinearity Test

	Tolerance	VIF
Age	0.654	1.528
mHealth Experience	0.637	1.569
Performance Expectancy	0.183	5.458
Effort Expectancy	0.192	5.222
Attitude towards mHealth	0.339	2.947
Social Influence	0.396	2.525
Facilitating Condition	0.399	2.509
Self-Efficacy	0.479	2.089
Anxiety	0.676	1.479
Stigma Awareness	0.326	3.066
Stigma Agreement	0.300	3.339
Stigma Application	0.209	4.785
Stigma Self-harm	0.204	4.913

Note. ^aDependent Variable = Behavioral Intention

Dichotomous dependent variables were created based on the cumulative splits of the ordinal dependent variable, behavioral intention (Category 1= *strongly disagree*; Category 2 = *strongly disagree, disagree*; Category 3=*strongly disagree, disagree, neither agree or disagree*; Category 4=*strongly disagree, disagree, neither agree or disagree, agree*). A separate binomial logistic regression was run on these new dependent variables to establish the viability of the assumption of proportional odds and to run a residual analysis diagnostic. (Laerd Statistics, 2017).

4) *Assumption 4: There are proportional odds*

As depicted in Table 22, the assumption of proportional odds was met. This was assessed by a full likelihood ratio test, comparing the fit of the proportional odds location model to a model with varying location parameters. The differences in model fit between the proportional odds models (Null Hypothesis) and the cumulative odds model without the proportional odds constraints/assumption (General) were small and not statistically significant ($p > .05$).

Table 22

Full Likelihood Test Results for the Research Models

		-2 Log Likelihood	Chi-Square	χ^2	Sig.
Model 1	Null Hypothesis	57.101			
	General	25.056	32.045	39	0.777
Model 2	Null Hypothesis	59.138			
	General	26.842	32.296	39	0.768
Model 3	Null Hypothesis	68.047			
	General	41.420	26.628	39	0.934

Results of Ordinal Logistics Regression

Covariate patterns and overall model fit. SPSS was used to assess cell size (including cells with no counts) prior to assessing the overall goodness of fit of the ordinal logistic regression model. The analysis of covariate patterns shows that there were 54 covariate patterns in this ordinal regression analysis, which means there were 54 unique variations of the values of the independent variables. However, there were 168 (80%) cells with zero frequencies as per processed by the PLUM procedure in SPSS. It indicates that the overall goodness-of-fit measures must be treated with suspicion.

Overall model fit. The overall model fit for the study was assessed using the likelihood-ratio test, which looks at the change in model fit when comparing the full model to the intercept-only model. The greater the difference between the intercept-only model (*Intercept Only*) compared to the model with the intercept and all independent variables (*Final*), the better the independent variables are at explaining the dependent variable (Laerd Statistics, 2017). Model 1, Model 2, and Model 3 statistically significantly predicted the dependent variable over and above the intercept-only model, as depicted in Table 23. From this result, it is safe to say that at least one independent variable is statistically significant. If the significance value was greater than .05, it indicates that the independent variables did not contribute to the prediction of the dependent variable (Laerd Statistics, 2017).

Table 23*Model Fitting Information*

		-2 Log Likelihood	Chi-Square	χ^2	Sig.
Model 1	Intercept Only	95.476			
	Final	57.101	38.375	13	.000*
Model 2	Intercept Only	100.16			
	Final	59.138	41.028	13	.000*
Model 3	Intercept Only	100.417			
	Final	68.047	32.370	13	.002**

Link function: Logit; * $p < .001$, ** $p < .05$

Overall parameter estimates using GENLIN procedure. The GENLIN procedure was used to conduct ordinal logistic regression for the sample data via SPSS. The ordinal regression model is just one type of model in a classification of models called Generalized Linear Models (GENLIN). GENLIN extends the General Linear Model (GLM) to include dependent variables that are not continuous or not (conditionally) normally distributed. The main advantages of the GENLIN procedure are that it provides an omnibus statistical test for each categorical variable and it provides odds ratios and their 95% confidence intervals.

Based on the GENLIN results, there was no difference between the odds of participants who have used mHealth with those who have never used mHealth, in having the intention to use mHealth to complete the PPD survey [2.37, 95% CI [0.374,15.005], $\chi^2(1) = 0.84$, $p = 0.359$]. The odds of participants who have used mHealth predicting they will use mHealth to complete the PPD survey were also similar to those who have never used mHealth, [2.453, 95% CI [0.41,14.682], $\chi^2(1) = 0.966$, $p = 0.326$]. Additionally, there was no difference in the odds of participants who

have used mHealth and intend to use mHealth to complete the PPD survey compared to those who have never used mHealth, [1.599, 95% CI [0.303, 8.438], $\chi^2(1) = 0.306, p = 0.58$]. The results also show that an increase in age was not associated with an increase in the odds of the participants' having the intention to use mHealth (0.377, 95% CI [0.096, 1.478], Wald $\chi^2(1) = 1.958, p > .001$), predicting that they would use mHealth (0.198, 95% CI [0.048, 0.814], Wald $\chi^2(1) = 5.038, p > .001$), or planning on using mHealth (0.347, 95% CI [0.099, 1.219], Wald $\chi^2(1) = 2.725, p > .001$) to complete the PPD survey.

Regarding the UTAUT factors, an increase in social influence was associated with an increase in the odds that the participants predicted that they would use mHealth (10.819, 95% CI [2.172, 53.883], Wald $\chi^2(1) = 8.45, p < .05$) and plan to use mHealth (4.872, 95% CI [1.169, 20.305], Wald $\chi^2(1) = 4.728, p < .05$) to complete the PPD survey. Additionally, an increase in effort expectancy (0.174, 95% CI [0.031, 0.985], Wald $\chi^2(1) = 3.909, p < .05$) and attitude towards mHealth (3.95, 95% CI [1.004, 15.547], Wald $\chi^2(1) = 3.86, p < .05$) were associated with an increase in the odds that the participants planned to use mHealth. All other factors, including stigma, did not show any significant association with the intention, prediction, or plan to use mHealth to complete the PPD screening. The full parameter estimates for the GENLIN results are depicted in Table 24, Table 25, and Table 26 below.

Table 24*Ordinal Logistic Regression Parameter Estimates for Model 1*

Parameter		Hypothesis Test			95% Wald Confidence Interval for		
		Wald Chi-Square	df	Sig.	Exp (B)	Exp(B) Lower	Upper
Threshold	[Intent.=1]	0.905	1	0.341	53.87	0.015	198692.577
	[Intent.=2]	1.487	1	0.223	159.054	0.046	549917.023
	[Intent.=3]	3.377	1	0.066	3209.5	0.584	17630439
	[Intent.=4]	7.635	1	0.006	640772.492	48.739	8424253136
[mHealth Experience=1]		0.84	1	0.359	2.37	0.374	15.005
[No mHealth Experience=2]		.	.	.	1	.	.
Age group		1.958	1	0.162	0.377	0.096	1.478
Performance Expectancy		1.426	1	0.232	3.143	0.48	20.594
Effort Expectancy		0.389	1	0.533	1.715	0.315	9.336
Attitude towards mHealth		0.099	1	0.754	0.796	0.191	3.314
Social Influence		3.611	1	0.057	4.784	0.952	24.045
Facilitating Condition		0.498	1	0.481	0.576	0.124	2.668
Self-Efficacy		0.05	1	0.824	1.163	0.308	4.393
Anxiety		0.749	1	0.387	1.577	0.562	4.422
Stigma Awareness		1.387	1	0.239	0.394	0.084	1.857
Stigma Agreement		0.101	1	0.751	1.341	0.219	8.219
Stigma Application		0.533	1	0.465	2.395	0.23	24.991
Stigma Self-harm		0.878	1	0.349	2.726	0.335	22.198
(Scale)							

Note. Dependent Variable: BI1 – Intention to use mHealth

Model: (Threshold), Experience using mHealth (Yes = 1, No = 2), age, performance expectancy, effort expectancy, attitude towards mHealth, social influence, facilitating condition, self-efficacy, anxiety, stigma awareness, stigma agreement, stigma application, stigma self-harm.

Table 25*Ordinal Logistic Regression Parameter Estimates for Model 2*

Parameter		Hypothesis Test Wald Chi-Square	df	Sig.	Exp(B)	95% Wald Confidence Interval for Exp(B)	
						Lower	Upper
Threshold	[Intent.=1]	0.418	1	0.518	0.075	2.85E-05	195.096
	[Intent.=2]	0.113	1	0.737	0.262	0	642.12
	[Intent.=3]	0.642	1	0.423	22.805	0.011	47719.471
	[Intent.=4]	3.654	1	0.056	2297.415	0.822	6422009.1
[mHealth Experience=1]		0.966	1	0.326	2.453	0.41	14.682
[No mHealth Experience=2]		.	.	.	1	.	.
Age group		5.038	1	0.025	0.198	0.048	0.814
Performance Expectancy		1.579	1	0.209	3.222	0.519	19.981
Effort Expectancy		0.251	1	0.616	0.646	0.117	3.575
Attitude towards mHealth		0.488	1	0.485	1.642	0.408	6.607
Social Influence		8.45	1	0.004	10.819	2.172	53.883
Facilitating Condition		2.636	1	0.104	0.26	0.051	1.323
Self-Efficacy		0.001	1	0.97	1.025	0.281	3.74
Anxiety		0.21	1	0.646	1.253	0.478	3.288
Stigma Awareness		0.016	1	0.900	0.91	0.209	3.97
Stigma Agreement		0.065	1	0.799	1.252	0.222	7.051
Stigma Application		0.304	1	0.581	1.912	0.191	19.145
Stigma Self-harm		0.279	1	0.597	0.599	0.09	4.001
(Scale)							

Note. Dependent Variable: BI2 – Predict to use mHealth

Model: (Threshold), Experience using mHealth (Yes = 1, No = 2), age, performance expectancy, effort expectancy, attitude towards mHealth, social influence, facilitating condition, self-efficacy, anxiety, stigma awareness, stigma agreement, stigma application, stigma self-harm.

Table 26*Ordinal Logistic Regression Parameter Estimates for Model 3*

Parameter		Hypothesis Test Wald Chi-Square	df	Sig.	Exp(B)	95% Wald Confidence Interval for Exp(B)	
						Lower	Upper
Threshold	[Intent.=1]	0.065	1	0.799	2.589	0.002	3930.909
	[Intent.=2]	0.39	1	0.532	10.399	0.007	16191.173
	[Intent.=3]	2.502	1	0.114	412.998	0.237	719960.874
	[Intent.=4]	5.975	1	0.015	18661.732	7.022	49597333.1
[mHealth Experience=1]		0.306	1	0.58	1.599	0.303	8.438
[No mHealth Experience=2]		.	.	.	1	.	.
Age group		2.725	1	0.099	0.347	0.099	1.219
Performance Expectancy		1.747	1	0.186	3.306	0.561	19.471
Effort Expectancy		3.909	1	0.048	0.174	0.031	0.985
Attitude towards mHealth		3.863	1	0.049	3.95	1.004	15.547
Social Influence		4.728	1	0.03	4.872	1.169	20.305
Facilitating Condition		0.119	1	0.73	0.777	0.185	3.261
Self-Efficacy		0.153	1	0.696	1.292	0.357	4.673
Anxiety		0.264	1	0.607	1.275	0.504	3.225
Stigma Awareness		0.843	1	0.359	0.508	0.12	2.157
Stigma Agreement		0.017	1	0.895	0.896	0.176	4.571
Stigma Application		2.499	1	0.114	6.013	0.65	55.601
Stigma Self-harm		0.107	1	0.744	0.751	0.135	4.184
(Scale)							

Note. Dependent Variable: BI3 – Plan to use mHealth

Model: (Threshold), Experience using mHealth (Yes = 1, No = 2), age, performance expectancy, effort expectancy, attitude towards mHealth, social influence, facilitating condition, self-efficacy, anxiety, stigma awareness, stigma agreement, stigma application, stigma self-harm.

Summary of the ordinal logistic regression analysis

A cumulative odds ordinal logistic regression with proportional odds was run to determine the effect of independent variables: performance expectancy, effort expectancy, attitude towards mHealth, social influence, facilitating condition, self-efficacy, anxiety, stigma, age, and participants' experience of using mHealth on the behavioral intention of using mHealth to screen for perinatal and postpartum depression. There were proportional odds, as assessed by a full likelihood ratio test comparing the fit of the proportional odds location model to a model with varying location parameters (Model 1: $\chi^2(39) = 32.045$, $p = .777$; Model 2: $\chi^2(39) = 32.296$, $p = .768$; Model 3: $\chi^2(39) = 26.628$, $p = .934$). Most cells were sparse, with zero frequencies in 80% of the cells; therefore, the deviance or the Pearson goodness-of-fit tests are unreliable, and the overall goodness-of-fit test has to be treated with suspicion. However, the final models statistically significantly predicted the dependent variable over and above the intercept-only model (Model 1: $\chi^2(13) = 38.375$, $p < .001$; Model 2: $\chi^2(13) = 41.028$, $p < .001$; Model 3: $\chi^2(13) = 68.047$, $p < .05$).

Based on the GENLIN results, there was no difference between the odds of participants who have used mHealth and those who have never used mHealth, in having the intention to use mHealth to complete the PPD survey. The odds of participants who have used mHealth predicting they will use mHealth to complete the PPD survey were similar to those who have never used mHealth. Additionally, there was no difference in the odds of participants who have used mHealth and intend to use mHealth to complete the PPD survey compared to those who have never used mHealth. All in all, participants who have used mHealth are similar in terms of their behavioral intention to use mHealth for PPD screening to those who have never used mHealth. An increase in age was not associated with an increase in the odds of the participants' having the intention, predicting, or planning to use mHealth to complete the PPD survey.

Regarding the UTAUT factors, an increase in social influence was associated with an increase in the odds that the participants predicted that they would use mHealth (10.819, 95% CI [2.172, 53.883], Wald $\chi^2(1) = 8.45$, $p < .05$) and plan to use mHealth (4.872, 95% CI [1.169, 20.305], Wald $\chi^2(1) = 4.728$, $p < .05$) to complete the PPD survey. Additionally, an increase in effort expectancy (0.174, 95% CI [0.031, 0.985], Wald $\chi^2(1) = 3.909$, $p < .05$) and attitude towards mHealth (3.95, 95% CI [1.004, 15.547], Wald $\chi^2(1) = 3.86$, $p < .05$) were associated with an increase in the odds that the participants planned to use mHealth. Finally, the association between stigma about mental health and behavioral intention among the samples could not be determined since the results did not yield any significant association.

Comments section of the online survey

The online survey also included a section where participants could leave their thoughts or comments after completing the online survey. Some participants wrote their feedback to the survey questions and their general comments on using mHealth for depression screening for mothers. Listed below are comments from the participants in the online survey:

1. “Questions on mental illness do not specify the type as well as the level of mental illness. Hence, it was a bit difficult to answer those questions.”
2. “I believe that an app would cause numerous people who have depressive symptoms to not be identified or for providers to take the concerns less seriously or less ownership over the concerns.”
3. “So far, I have been surveyed for depression at the hospital during my prenatal visits and after giving birth. The nurse just goes through the questions and I answer briefly. It is very repetitive, and for someone who doesn't feel depressed, the questions are quite annoying. But maybe for

someone who does feel depressed, it might be intimidating to answer directly and honestly. Having to do it not in person (i.e. by app) might give a chance for the person to answer more honestly without being ashamed or scared [of being] to be judged by the surveyor if done in person.”

4. “I think a mobile PPD screening is a great idea. I hope it includes a metric for PP anxiety as well. And it would be great to screen multiple times during the PP period.”
5. “In my opinion, the role of a trained health care provider in identifying depression cannot and should not be assumed by an app.”

Chapter summary

Three of the research questions guided the inquiries in this chapter:

1. RQ2: What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?
2. RQ3: How, and in what ways, do participants’ perceptions of the stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?
3. RQ5: How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients’ perspectives, inform the implementation of mHealth at the respective organizations?

Quantitative data were sought from 55 mothers and mothers-to-be in the Champaign area. An effective response rate of about 34.81% was obtained from 158 responses intended for this study. Preliminary analysis, aimed to verify the quality of the gathered data, was described before

reporting descriptive statistics and instrument reliability. Demographic information was included to present the participants' characteristics in this study.

The ordinal logistic regression conducted in this study addressed the research questions. First, regarding the UTAUT factors, experience in using mHealth had a significant effect on the intention, prediction, and plan to use mHealth to complete PPD screening among the participants. Additionally, an increase in age was not associated with an increase in the odds of the participants' having the intention to use mHealth, predicting that they would use mHealth, or planning on using mHealth to complete PPD screening. It means that age could not predict whether participants would accept mHealth. Moreover, only an increase in social influence was associated with an increase in the odds that the participants predict that they would use mHealth. Other factors in the UTAUT did not show any significant association with the odds that the participants would accept mHealth for PPD screening in the future. Second, the relationship between stigma about mental health and behavioral intention among samples could not be determined since the results did not yield any significant association. The survey did not reveal any significant relationship between participants' perception on stigma and their behavioral intention in using mHealth to screen for PPD. Therefore, from the statistical analysis, there is not enough data to conclude that stigma would influence the acceptance of mHealth among the participants. To answer RQ5, there are a few considerations worth exploring for organizations implementing mHealth to screen for depression among migrant women based on the results. To begin with, participants with experience using mHealth were more inclined to accept mHealth for depression screening. So, familiarity matters in this context. Results suggested that an interface that mimics what they have used before might influence acceptance. Also, since participants had mixed responses upon giving feedback in the survey, healthcare service providers might have to ask patients if they would prefer to use

mHealth or otherwise remain with the method that they are more comfortable with. More of the practical implications for provider organizations will be addressed in the implications and recommendations section of this study. The next chapter discusses the qualitative findings of this study, derived from the series of interviews and focus group discussion.

CHAPTER 5: FINDINGS OF THE QUALITATIVE SECTION

This chapter presents the findings from the qualitative portion of the current study in exploring the acceptance of mHealth for prenatal and postpartum depression screening among low-income migrant women in Champaign, IL. This section is organized as follows: first, the demographics of the interview participants will be presented. Next, the researcher presents the results from the qualitative interviews and focus group discussion data analysis. The results of the pilot study of the qualitative part of the research have been discussed in the previous chapter. Data from the interviews and focus group discussions will help the researcher address all the research questions from this study. This is because the topics covered during the interviews and focus groups are the same, and more. The following research questions piloted the structure and intention of this study:

1. What perceptions toward the use of mHealth for PPD screening are held by the samples of prenatal and postpartum low-income migrant women (PPLMW) in the study?
2. What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW in the study, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?
3. How, and in what ways, do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?
4. Among the participants, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?

5. How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?

Participants were recruited among those who completed the survey and agreed to participate in the interviews and focus groups. Participants must also meet the following criteria: 1) be a pregnant or postpartum mother; 2) have had prenatal or postpartum checkups (preferably having been screened for depression during the checkup(s)). In this chapter, participants' narratives were presented according to the following themes: *participants' experience with PPD screening and PPD and PPD stigma, participants' perceptions of PPD screening and PPD and PPD stigma in general, performance expectancy, effort expectancy, social influence, facilitating conditions, attitudes, self-efficacy, anxiety, and behavioral intention*. These themes were used in the survey to explore participants' behaviors toward using mHealth for PPD screening. Any responses that do not belong to any of the themes but help in understanding the phenomenon being studied were categorized under *other themes*.

Demographics information

Nine women were selected as the final informants in the current study. All of them are foreign-born and are non-native English speakers. They completed the survey prior to the interview session. Most of them have stayed in the US for between 1 and 5 years. Countries represented by the participants were China, with three participants, while the rest of them were born in Nepal, Pakistan, Belgium, Indonesia, Saudi Arabia, and Bosnia and Herzegovina, respectively. The majority of the participants are between 25-34 years old. Table 27 provides an overview of their demographic information as reported in the survey.

Table 27*Demographics Information of the Interviews and Focus Groups Participants*

No.	Pseudonym	Age	Level of Education	Country of Born	Migrant	Length of stay in USA	Native English Speaker	Pregnancy/ Children Information
1	Ananya	Between 25-34	Graduate degree	Nepal	Yes	Between 1-5 years	No	1 child
2	Aiesya	Between 35-44	Graduate degree	Pakistan	Yes	Between 1-5 years	No	2 children
3	Reena	Between 25-34	Bachelor's degree	Indonesia	Yes	Between 1-5 years	No	Pregnant + 2 children (twins)
4	Rachel	Between 25-34	Bachelor's degree	China	Yes	Between 1-5 years	No	Pregnant + 1 child
5	Fauzia	Between 25-34	Bachelor's degree	Saudi Arabia	Yes	Between 1-5 years	No	3 children
6	Indah	Between 25-34	Graduate degree	Belgium	Yes	Between 1-5 years	No	Pregnant
7	Maria	Between 35-44	Graduate degree	China	Yes	Between 6-10 years	No	1 child
8	Rania	Between 25-34	Graduate degree	Bosnia and Herzegovina	Yes	Less than 1 year	No	Pregnant + 1 child
9	Tammy	Between 25-34	Bachelor's degree	China	Yes	Between 1-5 years	No	Pregnant

Themes in the interviews and focus groups discussion

The researcher used Atlas.ti for the coding process of the interviews and focus group transcripts. Each of the transcripts was uploaded into the Atlas.ti software and coded separately before cross-analysis was executed. Twenty-eight themes were extracted during code counting, as depicted in Table 28. The codes were then grouped into six overarching themes: mHealth and mental health, PPD knowledge or experience, PPD stigma, screening process and experience, UTAUT factors, and Other. Table 28 shows the frequencies of code reoccurrence from the interviews and focus group discussion.

Table 28

Code Frequencies from Interviews and Focus Group Discussion

Theme	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Focus Group Discussion	Totals Occurrence
1. Anxiety	2	2	0	0	1	0	5
2. Attitude towards mHealth	6	6	2	2	1	0	17
3. Awareness of screening mandate	0	0	0	0	0	3	3
4. Behavioral Intention	2	0	0	1	0	1	4
5. Comfortable of sharing	1	3	2	1	1	1	9
6. Concern about privacy and confidentiality	0	1	0	0	1	5	7
7. Confidence in using mHealth/ Self Efficacy	1	2	0	0	0	4	7

Table 28 (cont.)

Theme	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Focus Group Discussion	Totals Occurrence
8. Culture	0	2	0	2	0	0	4
9. Early screening	0	0	0	0	0	3	3
10. Effort Expectancy	1	0	0	2	1	3	7
11. Experience of Depression Screening	2	2	2	2	3	1	12
12. Experience with Others with PPD	0	3	2	2	2	9	18
13. Facilitating Condition	2	0	1	3	2	4	12
14. Honesty with mHealth	0	2	0	0	3	8	13
15. Knowledge about PPD	0	0	0	0	1	1	2
16. Other Support	0	1	0	0	0	0	2
17. Perception of screening	2	4	0	1	0	0	7
18. Perception on PPD	2	5	5	2	1	1	16
19. Performance Expectancy	5	2	3	3	2	3	18
20. PPD Screening for Father/Husband	0	0	0	0	0	5	5
21. Screening	1	0	0	0	0	2	3
22. Screening preferences	1	9	3	2	2	0	17
23. Seeking Help	0	0	0	0	0	16	16
24. Self-stigma	0	0	0	1	1	1	3
25. Social Support	1	2	0	2	2	5	12

Table 28 (cont.)

Theme	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Focus Group Discussion	Totals Occurrence
26. Stigma	0	4	2	3	3	2	20
27. Unexpected pregnancy	0	1	0	0	0	5	1
28. View on Mental Health Services with mHealth	1	3	1	1	0	0	6
Totals	30	54	23	30	27	83	249

Participants' perception on PPD Screening

Through a series of interviews and two focus group discussions, participants shared their experiences of undergoing the PPD screening during their prenatal and postpartum checkups. Most participants were not aware that the state mandated that all mothers and expecting women to be screened for depression during prenatal checkups and postpartum period but appreciated that the policy was there. Some of them compared the practice with the practice and culture in their home country, when they were pregnant with their elder child(ren). All of them reported having been screened at some point by their healthcare providers, either by the nurse or the doctors. Each of them was able to articulate their experiences with the different aspects of the screening process, including method, timing, thoughts, and the types of questions being asked. Although they had different preferences for how the screening was administered, all of them agreed that PPD screening was necessary for them specifically and for all expecting and new moms in general. Familiarity of the depression screening questions from either a prior pregnancy or a research study in which they participated in have raised their awareness of the screening process. Participants who had never been screened for depression before the checkups mostly thought that the questions were asked just as small talk or a nice gesture by their healthcare providers. In regard to PPD, the

majority of the participants never had any personal encounters with women who suffered from PPD. Even though some have heard first-hand about those women, they have never had any experience dealing in person or helping those women handle or manage their PPD. As participants shared their experiences of getting screened for PPD, some of them also recalled their pregnancy and postpartum experiences, which also included episodes of scares, tears, and feeling helpless.

The importance of PPD screening

In this section, participants talk about their perception of the importance of PPD screening to expecting and postpartum moms. Rania, who underwent her prenatal checkup at a private practice in town, said that it is important for healthcare providers to screen for changes in emotion, mood, and behavior in moms because that will help detect depression earlier as moms are going through different phases in their pregnancy.

For sure [it is important to screen for PPD]. Maybe depression is a big word, but there are a lot of titles- I wouldn't say I'm in depression, but I have lots of concerns. It's also important to screen for [sic]... it doesn't have to be called depression or not, but any emotional changes we are going through in pregnancy. Like fears, concerns that can affect our mood or behavior. It's not necessarily depression in the full term but can certainly be something that is not perfect behavior like it should be. Mood, emotions, fears that we undergo through different parts of pregnancy. And maybe provide a little more help after screening because I know I was asked how I feel and in some check-ups I would say I feel great [at that time] and some I said, "No, I feel really terrible and scared", but they would just say well okay be positive. Maybe a little more help during these parts, when you know, you are really scared to be going. That you have someone to talk to for like twenty minutes

during that appointment instead of just being rushed. That could be helpful for me, for example.

She also pointed out that it was important for her to know her score for the depression screening so she could get help if needed.

Oh, If I have some problems that maybe I am not aware of, like if I feel well, I am not depressed but from my answers you can tell that I am. I would like to know some other people's opinion on my health, so I can ask for help if needed. Because some of us cannot be aware of themselves until we start sharing. I'm pretty sure I know how I feel but still... maybe that tool [PPD screening] can help detect some things I am not aware of. That's why I want this score sharing, maybe I didn't know, it was this and maybe I should pay more attention to this. Something like that...

In her interview, Tammy, the spouse of a visiting scholar on campus, stated in the interview that she would like to get tested so she could be prepared to protect herself. As it was her first pregnancy experience while being away from her family, she felt that it was important to know if she was experiencing depression symptoms that required appropriate intervention. She expressed,

(Translation) I would definitely want to be tested [screened] and would have preferred to know when they are screening. If we knew the answers from the depression test [PPD screening], we would know how to protect ourselves.

She, however, stated that she might not trust the result of the PPD screening (at the point of interview) because she was not sure of how she would answer the screening questions. Due to her lack of knowledge and exposure to the actual screening, she has doubts about how the screening process will be regulated.

(Translation) I might not trust that result [of the PPD screening]. [Because] I don't know the actual answer right now, but it's just a hunch. Just a feeling. Because I hadn't done the test before. I don't know how procedure is going to be regulated.

Maria, another participant, also agreed that screening for PPD is important for expecting and postpartum mothers. She is a doctoral student on campus and has a 17-month-old son who lives with her and her husband. Maria highlighted how screening would foster a feeling that someone cares for the mother and also be a sign of support, especially for women who do not have family support. She said,

Yeah, I think from my experience, if the pregnancy goes quite well, yes, I do think that it's important to have the screening. At least, you will know that someone's care about what you feel. And if the result was not good, then maybe someone can reach out for you. So that kind of giving a strong support especially for...for the woman who's not being with the family.

Participants' Experience with PPD Screening and PPD

All participants had been screened for PPD when they underwent their perinatal checkup, except Tammy, who had not had a chance to be screened (according to her), as her pregnancy had just reached the end of the first trimester at the time of the interview. In the following sections, participants discussed their experience with PPD screening and PPD. Among the themes discussed were the method of screening and their personal preferences for getting screened. Regarding PPD, they discussed the perception of the general public and their own toward women with PPD. They also talk about how they would react if they were diagnosed with PPD.

Experience with PPD screening

In this section, participants talked about everything related to their experiences being screened for PPD during prenatal and postpartum checkups. Most participants were unaware that the state of Illinois mandated that all mothers and expecting women be screened for depression during prenatal checkups and postpartum period but appreciated that the policy was there. Because of this, some of them thought that the nurse or doctor was just being nice or trying to make small talk when they asked some questions from the depression screening. However, for those who have already experienced giving birth in the US previously, they were expecting the PPD screening as a part of the checkup process. However, some still could not really tell that they were being screened for depression or distinguished the questions with small talk. Their opinions about making the screening more obvious are mixed between agreeing or having no preference at all. Some of them also compared the practice of screening for PPD in the US with the practice and culture in their home country.

Other important subthemes that emerged from the interviews and focus groups related to the screening topic include a) screening awareness, administration, time, and method; b) screening preferences; and c) their experience answering questions that were taboo in their native culture. As participants shared their experiences in getting screened for PPD, some of them also recalled their pregnancy and postpartum experiences.

Screening awareness, administration, time, and method. Some participants who have experienced perinatal care in countries outside the US stated that they have never been screened for depression while undergoing prenatal checkups in their home country. Rania, who had her first child in Croatia, was one of them. Regardless, she maintained a positive attitude about screening for PPD using a mobile device.

But I have a positive opinion on this mobile technology and using it for screening. I just never done that, and my first pregnancy was monitored in Croatia, in Europe. We didn't have that experience. And I actually don't know how it would work.

Because she had never been screened before, Rania didn't know that she was being screened for depression when she attended her perinatal checkup. At first, she said she was never screened during her perinatal checkup with her current provider (in the US). Based on her own experience, the interviewer expects that she should have been screened. So, the interviewer asked again to clarify Rania's answer by giving some examples of the screening questions. Rania then recalled being asked those questions and changed her answer. But she honestly thought that the questions were being asked as a small talk.

Okay, they've asked me how do I feel every time I come in and maybe a few questions, but I didn't understand specifically that they are screening me. They never mentioned, "Now, we will ask you ten questions and screen you for depression." I was only asked, "How do you feel today?" or "Is everything okay?"... These few questions.

Fauzia, a mother to three girls (3 months postpartum at the time of interview), shared that her healthcare provider used a standard survey with a specific measurement when screening for PPD during her checkups. When asked how she felt about the screening procedure, she expressed her satisfaction. She responded,

Oh, it was good. It was good. They just have a questionnaire, and they were like [asking], "How are you feeling? Are you feeling happier than before? Or sad or much better?" So, if you don't want to answer it, you just answer-no. You can select other answers too. There's four degrees for each question. Four levels of each. They were using questionnaire. They must have some formula or something.

Even though they went to the same healthcare provider for prenatal checkups (at the same hospital), Tammy, who was 22 weeks pregnant at the time of the interview, did not recall being asked any of those questions. She was also not aware that there was a state mandate that required all perinatal women to be screened for PPD. She expressed,

“(Translation) We had not done this thing, tested like this [asked questions about depression].”

Even after the interviewer gave some examples of the screening questions, she insisted that she was never asked those questions. She, however, was not alarmed or worried about not getting screened because she believed she had passed that depressing period.

“(Translation) It’s okay because I have passed the depression period. That’s what you do in the first three months, right? Now, I feel everything is okay.”

In the focus group, the four participants narrated the different experiences they had of getting screened by their healthcare providers. The group started the discussion by sharing their experiences with the screening throughout their pregnancy and after giving birth. Ananya, a mother to a 2 ½ months old baby, shared that she was screened each time she had a prenatal visit, and that went until the baby was born. She mentioned that the midwives who attended her each time would sit in front of the computer and ask her a few questions that they will code in the computer.

Yes. Every time I go [for a checkup], they screened for this [PPD]. Maybe, first trimester. Then once, like in every visit, because I joined [opted for] the midwives, I didn't actually see a doctor. But it was like a bunch of different ladies that was working together at the same time [as a team]. When you have an office visit, they do screen every time. Even after post-natal... [The way] they usually asked... they have a computer [and] they have a set of questions. Then they asked you and you have to answer a couple of questions. They give

you options and that's how they do it. But I also have a home visitor from there and I've been screened so many times I don't remember.

In the same way, Reena, who is the spouse of a doctoral student and was 28 weeks along in her pregnancy when the focus group took place, added that there was no PPD screening in her country either. Unlike her previous pregnancy, she has been screened twice by her healthcare provider for her current pregnancy in the US. Based on her own experience of being pregnant and giving birth in Indonesia, she said,

I think the experience is the same [no PPD screening for women during perinatal checkups].

I was pregnant with them in Indonesia (referring to her previous pregnancy). No one ever asked.

Participants in that group who have had experience of being pregnant and giving birth in the US, on the other hand, are aware that pregnant and postpartum moms will be screened for PPD during checkups even though they do not necessarily aware that it is compulsory for the healthcare providers to conduct the screening. Aiesya, the spouse of another doctoral student, shared that she was screened at least twice during pregnancy and once during a postpartum appointment for both pregnancies. When asked about the type of questions she was asked during the screening, she stated,

About moods. Such kind of questions. Mostly the nurse will do this [screening]. She asked questions and you gave answers. I never have to do it myself, not at the doctor's clinic.

Another participant, Rachel, was also a spouse accompanying her husband, who is a postdoctoral researcher from China. She has been living in Champaign for four years and has a daughter who, at the time of the focus group, was three years old. She was also in her third trimester with her second daughter when she participated in the focus group. Among the focus group participants,

she was the only one who mentioned having to fill in paper surveys and computer-assisted surveys despite going to the same hospital for her checkups. She also mentioned being asked questions in Chinese (she did not specify the specific language, but she speaks Mandarin). Like other participants, she mentioned being screened for PPD during her prenatal checkups and during baby well checkups.

Before the baby [was] born, every time I go to see the OB, they will [screen] —I think every time perhaps during the pregnancy, 2 to 3 times. Sometimes, they will give me paper sheet, sometimes just ask questions and they have the computers, and they also have in [a] Chinese [version]—might be easy [easier] ‘cause they also have the Chinese questions. So, after the baby [was] born, I think I still have [the screening]. [Then] 2 or 3 times when I took the baby to them, to the baby well check, [they] still have the screenings.

When Rachel mentioned she was screened at the doctor’s office when she brought her daughter for a well check, Aiesya jumped in and added that her doctor never did the screening [during the baby’s well check]. Instead, they only asked her if she was doing well. She said, “What I have experienced at the [that] time, doctor didn’t help, they didn’t actually do screening.” They asked me, “Are you doing well?” I said, “Yeah.” She also further clarified that the question was asked just in general and not specifically focused on her moods.

Maria shared that she has been screened during her prenatal checkup and her healthcare providers have never found any issues. She said, “Yes, and then [along with] the pregnancy... So, there’s no... any issue with depression.” She also shared that the nurse always commended that her depression screening was good. She also described the screening process, in which she answered questions from the nurse by selecting from a list of answer options offered by the nurse.

I think for my situation, the nurse always told me that the depression screening sounded good. And, and also, they give me choices for the answers, right? So, there's that. It's not that they interpreted my answer and then check the score for me; they let me choose (between) those two.

Ira is another new mom who had her first pregnancy and birth in this country. She is an Indonesian. She shared how she went through the same screening process as Maria, where she was asked questions verbally by her healthcare provider. According to her, her healthcare provider will give a cue that they will ask some questions and describe the process is going to look like.

So, during those screenings, they [the screening] were done verbally. So, during the visits... they had a set of questions on paper, but they asked me verbally. Oh, well, they told me first that they're, they're going to do this... process [the screening] so that I'm aware of it, and then they, they start asking me the question.

When asked if the process intimidated her, Ira said that it did not, especially because she felt that the questions was not applicable to her. She thought the questions were acceptable.

I think... I didn't find them intimidating. They are basically asking if I, if I ever feel sad, if I ever tried to... if I ever cried or tried to hurt myself or something like that. And no, I think none of them, none of the questions were intimidating or making me feel uneasy. I think they were quite okay. They were acceptable questions.

Even though she did not feel intimidated by the process and the questions, she was surprised because she never thought that she would be asked those questions. Especially because she never knew that pregnant women could get depression too.

Before? Before I was pregnant? Yeah, no, no [never know that healthcare providers screen for PPD during prenatal checkup], that's why I was a bit surprised when the first I was

screened... they asked me the question. Like, I was surprised. Oh, okay. This thing I first was thinking about it. Yes, it makes sense. And it's useful, it's necessary.

Screening preferences. In addition to sharing the different methods of screening, time of screening, and screening administration, participants also discussed their preferences for the methods used in completing the PPD screening, and the types of questions asked during screening. Aiesya made an important point when she said she was not too concerned about the questions. Instead, she mentioned that the way the screening was administered affected the way she answered the questions.

Each participant had their own reasons for their respective preferences. That was why Reena, who was more concerned about the environment, said that she preferred mobile screening because it is more environmentally friendly. She said, “[I prefer] Mobile. It's green (environmentally friendly).” Before sharing her preference to the group, Ananya highlighted that there should be options for all mothers because everyone is different; therefore, they might prefer different method of screening. This is how she described it:

I think, it depends on the choice of the person. If you give a choice [to] the mom, some moms want the paper, there should be a choice... so yeah. People prefer different things.

Some prefer mobile devices, some [prefer] papers. There should be an option.

While claiming that she did not have any preferences in completing the PPD screening, Ananya shared that a tablet would be better to complete the PPD screening due to its large screen. She also cited that the bigger screen was important to people with vision problems and that smaller fonts might compromise the screening results.

I don't like mobile [phone]; I think the tablet [is] better because it had a big screen... Sometimes you know, people have problem with vision because they can't read. Yeah. So

yeah, but I don't really have preference, but just that if the text is too small, then you might be rigging the screening because some of the questions so long and it is hard [inaudible]. Even though Aiesya mentioned that she would be more comfortable completing the screening without having to face the healthcare provider, she also thought that it will not make any difference if she has to use mobile device or paper screening. She expressed, "I think it'll be the same. There will be no difference for me. It's just like you are using the phone. It's just the feeling of not having to go through [the screening] in person."

In describing her preference for screening method, Rachel shared that if she were being screened at the hospital, she would do the screening using either method [mobile device or paper based]. However, she expressed that if the screening were paper-based and administered at the hospital, she would need to be at the hospital with her husband for translation. Whereas if she has to do the screening using a mobile device, she would hope to complete the screening at home prior to the checkup. In her own words, she described:

If I am at the hospital, I mean, just there, you [can] give me paper or mobile [phone]. There will be no difference for me. If it's a paper one, of course I need to go to be there in person. If it's in [on] the mobile [device], I [hope I] can do it perhaps at home. And yes, it's better for me, as I just said. [Because] sometimes I need my husband to translate for me. If it's [on] paper, both of us need to go [to] the hospital.

Rachel explained that it is helpful to do the screening in advance because it gave her enough time to think about the screening results before discussing them with her healthcare provider. She also added that face-to-face meeting made her nervous.

Yeah, I mean, [if] I do it before it [the checkup] and then we can talk about it, that makes me feel, [like] I know what we are talking about. For me, it'll be much better [to know what

to expect]. Yeah, just like the face-to-face meeting, just like uh answer the questions and you ask me, 'oh, so do I have any problem with this?' I need some time to think about it.

If I do it before that, I have a long, enough time to think about it.

When asked to elaborate more on why she would like more time to think, she mentioned that face-to-face meeting sometimes make her nervous. She mentioned, "If I just meet directly, I will feel a bit nervous sometimes." She also added:

I think I'll be more honest to answer the questions, on paper. With the nurse [face-to-face meeting] would be sometimes, as I said, I can't understand (due to a language barrier) ...not because I don't want to make [a] mistake... [but] because it's difficult.

She ended her sharing by emphasizing that mothers should be able to choose how they want to be screened. "Yes, I think it will be better, just to let the... let the person choose," she said. And her point was agreed upon by all of the focus group discussion participants.

During her interview, Rania mentioned that she does not really prefer the paper-based screening. She cited convenience and ease of use as the reasons for preferring to complete the depression survey via mHealth during checkups. She explained:

I think it's just more convenient [and] easy nowadays, to use [mobile] technology instead of paper. It's, you know...you don't, like if you are using paper you have to- I mean it's just more convenient to send the results, to read [them], it's quicker, easier. I just see these benefits.

In sharing her preferred screening method, Tammy said that she would prefer a face-to-face screening because she felt more connected to the screener [healthcare provider]. When asked if language was a barrier, she explained,

(Translation) So a mobile device is... It's like a procedure. They just have to ask you, but face to face, you can connect human to human. You can feel. You can express yourself more clearly. There's more feel and more connected [connection] to the person. Language is not a barrier because [it's more accurate and easier from [to understand] if you say it [verbally]. Then if there's a language barrier, we have a translator. [If] it's just the apps, [it will be easier] for them (patients) if they don't want to be honest. They would still answer but [according to] the way you want it. If you connect with that nurse face-to-face, it'll be more, I mean, the answer will be, more reliable.

She also provided an example where patients were sometimes asked to rate an item on the survey. She asserted that talking to a real person would allow the ratings to be reviewed more thoroughly.

(Translation) Well, when you are doing a survey [where] the question is more like, from [a] scale of 1 to 10, or [how] you rate yourself, that wouldn't show any differences because you are not able to clarify the score. Because there's so many different situations about [for] different people. I mean...the answer shouldn't be more than like 10. I mean, just scale from 1 to 10, but perhaps for some [people] it should be more than 10 or something else. So, uh, if you're talking to the people, you could get to know that data more precise[ly].

However, Tammy thinks that mHealth could be used for PPD screening at the earliest stage of the pregnancy. If the healthcare provider wanted to make a conclusion about the results of the screening they should eventually talk to the mothers to get a more precise answer.

(Translation) So, I think we can also use the mobile device to do the survey, but that's just for like a [the] very earliest stage. [At a] Very early stage. Okay. If we want to like make a final statement of the results or anything like that, you should talk [to the person] to get more precise of the answers.

Fauzia thinks that both mobile devices and paper are effective screening methods. She believed that using the mobile device would allow her to complete the screening even when at work. Paper screening, however, let her concentrate more. She laughed when she said that she might not be good at using mobile devices because of her age when others are using technology for everything. At this moment, however, she would prefer to complete the screening using a mobile device due to time constraints. She elaborated,

Hmm.. I think both are good. [With] the mobile is that, if I'm working, I can do that. But on paper... the concentration that I'm reading, something like that... Because I'm not that young, you know? [laughing]. Nowadays people read on computer, notes, and everything. We read the diagnose [diagnosis] and everything... Because I graduated in 2012. And in those days [in her home country], I don't think we have computers and mobile [phones] at that time. But now I have less time, I prefer mobile [phone].

Trying not to dismiss the advantage of using paper for PPD screening, she said, "If you want me to do a good one? Then I prefer the paperwork. I can differentiate which is better. It should have some portions like 20% of the paperwork and 40% of computer work [combination], or something like that, I think so...

Another participant, Maria, believed that a mixed-methods screening could produce better results for PPD screening. While she believed mobile devices would be very helpful because of its ubiquity, she believed what makes a difference is the presence of healthcare providers such as the nurse while the mother completes the screening. She believed that mothers should be given the option to complete the PPD screening either in the presence of the healthcare provider or on their own. She explained,

So (pause)... I think maybe we can do it mixed... Yeah. So, for example, if we can do it maybe at home, but also with someone who can read all these questions... I think the human contact is important if someone is really... having this depression problem. So, if there is someone [healthcare provider] reading all these questions and it seems that they are concerned about the situation, for [on] one hand, it may be helpful but maybe on the other hand, maybe the person [patient] would feel embarrassed to share. Yeah, so in that case, maybe [healthcare provider] can give the choice if you would like to have the nurse do it with you or you would prefer to do it by yourselves. I think that can be a choice.

When asked if the role of human interaction is more important if technology is used to complete the screening, she insisted that human interaction was crucial in and of itself. She believed even if the patient completed the screening on their own, they would eventually have to work with humans to address their problems, if any.

No, I think human interaction [in itself] can be helpful. Yeah, especially between [with] the person doing this. Because even if there's no human interaction, and at this stage, if there is [a] problem, then the patient will eventually work with a human to solve this problem. So, I do think that it's important.

As an environmental activist, Indah was more concerned about using paper for the screening because of its impact on the environment, especially since she knew that the results would be transferred to the computer anyway. She was not the only participants that thought paper screening would harm the environment and was firm about their choice. She said,

Well, for me, paper... filling it [out] by [on] paper and knowing that they will input the response in their computer anyway, I think it's a waste of paper and I care about the environment. Yeah, in my opinion I'm okay doing it like just verbally or by app, okay,

either way. No paper but even one, like directly asked by the provider, I'm fine with it, or with an app. That's also fine with me.

Experience and perception on PPD

Next, the researcher explores how participants were talking about the stigma of PPD. Participants' responses were categorized under four categories: 1) public perception of PPD; 2) perception of others with PPD; 3) perception of how they see themselves if they have PPD; and 4) perception on how they thought PPD would cause them to self-harm to them. All these themes are taken from the SSMIS-SF scale, a self-reported measure of attitudes, that measures an individual's internalized stigma towards mental health.

Perception on how the general public viewed people with PPD. Almost all participants in this study had never had first-hand experience with women who suffered from PPD. Many of them watch, read, or listen to it from the media or from someone they know. Rania is one of them. In terms of her view on how people are reacting toward women with PPD, Rania stated that she believed people are more open to discussing postpartum depression, now than before. She is also fine if someone told her that they are having problems [PPD] and said that she will not judge them. Hearing about PPD has become normal for her because it has been heavily portrayed in the media..

I think people more and more know about it and accept it. How doctors view it, I think they are busy. And most of the time, they are different people, different doctors. Some of them are more compassionate and others are more 'cold' and some are interested and some of them are not. Personally, if someone would come [to me] and contact me saying 'I have some problems', I would try to help-would I judge? No. Media made sure of it, now, we kinda believe it is normal. Some women just experience it, and I don't think it's such a big

deal as it was maybe fifty years ago. People are more open and less concerned to admit they have some issues.

Additionally, Rania stated that she will not be embarrassed if she has PPD because she believes people are more open about it nowadays. She believed that PPD is something that you cannot control and, again, she emphasized that people are less judgmental toward women with PPD now compared to before.

I wouldn't be embarrassed because I believe that it is something that you cannot actually affect [control]. You can think positive[ly] and do all these things [try to manage it], but if you really feel concerned [when PPD hits hard], it's out of your [control]. Like, if you get a cold, you have to take medicine to heal it. If you feel bad [have PPD], it's something you cannot control. I think so. I just view it as a part of life, and you have to get cured and think positive[ly] and go through it. I am familiar with like mood changes, [and] depression. I mean, I've heard about it on TV all the time. So, and I don't think it's so embarrassing if someone doesn't feel good for different reasons. I just wouldn't judge, and I think people now judge much, much less, than it would be before, like 50-100 years ago.

Rania also asserted that having depression would definitely affect women's self-confidence, before it affects their self-respect.

Maybe during that time, well, when I feel that- very bad or scared, - does it has to do with respect? I don't know. In my opinion, it has to do with self-confidence. But then, can that affect respect[?] [It] is a big question. I don't know what to say, maybe in the long run, lower confidence can lead to lower self-respect.

Tammy also indicated that she had never met or knew anyone with PPD nor experienced it herself. However, she has heard and learned about PPD from the media in China. She mentioned:

I haven't experienced that [knowing someone with PPD]. Maybe I didn't notice but just didn't experience it myself. In [among] friends,... I don't know exactly, but I learned a news from China about a pregnant women who was very depressed and she ended up killing herself.

Tammy also agreed that family support would ease the situation, but some stress might even come from the family. She expressed,

(Translation) Okay. Uh, that depends on the depression. I mean, how far would it go? So very slightly depression [less depressed], it's like, okay, the family could accompany her [the depressed woman] to give her some comfort that maybe ease the situation. But as the depression goes far along [enough], to very serious, maybe the family need some help from the professionals. You [would] think that families are closed to the pregnant woman [or woman who] gives birth to children but some of [the] feelings or depression maybe [may] come from the family.

Then, she further elaborated by mentioning what usually happens in China, where she came from. She also gave an example of how family might be the source of distress and how it might even lead to the death of a woman there.

(Translation) I haven't noticed that [women with PPD] a lot...but you [would] think that families are closed to the pregnant woman [or woman who] gives birth to children but some of [the] feelings or depression maybe come from the family...Sometimes, for example, in China, they live with the mother-in-law...they [the mother-in-law] live with the (depressed) mother. And I mean [also with] other family [family members]. [It] is just all the cultural things. Then they would kind of give some stress to the pregnant women. So then maybe that caused a little bit [of] depression [to the mother]. There's an example that

may sound extreme. For example, a pregnant woman was giving birth and she cannot handle the pain. She might want[ed] a c-section, but the family or the husband or the mother-in-law won't let her. Because they didn't consent. They won't let [her to have a c-section]. Because the hospital needs them to sign the paper [to consent for c-section]. So, they did not sign that. The woman cannot handle the pain, she ended up jumping off the window.

She further compared her example to the situation in the US. She believed that if the woman had lived in the United States, her fate would have been different since she would have the power to make her own decision. She said, "That [decision to have c-section] depends on the woman themselves. If you are American, if the parents don't approve, the husband also don't get any right to say this [give consent], right?"

The topic of family influence was also brought up by one of the participants in FG2, Rachel. She believed that parents or parents-in-law from her culture (China) might not understand or know about PPD. She gave an anecdote about how parents or parents in law of mothers who are depressed might put more pressure on the mother and the husband. According to her, parents and parents-in-law (of the depressed moms) might not think that depression is a big deal, but she stated that sometimes they do not understand that people with depression cannot control themselves. Even worse, because of the pressure from their parents, the husband might also get pressured and not be able to help much.

I mean, for example, for my parents or my husband's parents sometimes, they perhaps didn't know [about] prenatal depression, they maybe [might] thought it was not a big deal. [They might say] 'Just you have to calm down or something. Think about you... you are the mother's baby [mother of the baby], think of good things and you will be better', but

they don't know. Mm... sometimes we just can't control ourselves. And [on the other hand], for my husband he can understand me before and after [the] baby [was] born. Perhaps he has some pressures [or] more pressures due to pressure from the parents or in laws. So, at that time (when the wife got depressed), perhaps he also feels a little bit [of] like depression, just like me (the mom). So perhaps he can't understand [empathized with] me totally. That makes [it] more difficult.

On the other hand, Ananya, who was raised in Nepal, had firsthand experience with women who had depression. She shared about her mother who was depressed after giving birth, and her depression was ignored due to the lack of support. She then compared how people in the US are more open and understanding because there is more awareness on the subject matter. She shared how her husband supported her she gave birth and handled it well during her difficult days because he knew that her behavior could be caused by hormones rather than her willful actions. She elaborated,

My mom had depression [after giving birth] and you know, in Asia they don't really care about prenatal and postnatal depression. They don't even know about that, and it was [a] long [time] ago. I think if you have prenatal depression, the family, they just ignore it, right? But, here in the US, I think they really care about that thing and because of that information, all the families, you know, your husband is the one that support you and then they are more patient. I think he is more patient with me. Once you [the husband] know it, it's not the person, it's not the nature of the person, it's the hormones... people are more lenient.

Another participant in the focus group discussion, Aiesya, who came from Pakistan, also agreed that the way people in her country viewed women with PPD differently than they do in the US. She expressed,

Same with us [in Pakistan], no concept of prenatal, postpartum depression in our culture, [so] I've been taking it lightly. [Meanwhile] here, yeah, actually I have [PPD] when I was pregnant with MM [her first daughter] actually. Here [people] is more caring and people pay attention because there is awareness.

Indah, on the other hand, believed she has empathy for the women who have PPD, despite the fact that she has not encountered many cases of PPD.. She pointed out that some people are quick to judge that a woman should be happy for having kids when they do not know what the woman is actually going through. Instead, she believed people should offer help to women who are experiencing PPD. She explained,

Pity [sorry], maybe? I'm not sure. I haven't seen so many cases. Yeah, mostly I think they would just feel bad about the women. Yeah, sometimes people judge. For example, like they would say, you should be happy because you can have a kid or [whereas] some people cannot have kid... they just judge. I mean, they have no idea what's going on. I think that can happen. But I think mostly they feel bad. And I mean, if the people know the women [who] experienced depression then maybe they want to help. Maybe they should reach out to them and asking, "Hey, would you like to talk about it and make you feel better?"

Also being supportive, Maria would never hesitate to extend help to any woman in her circle that might suffer from PPD. She mentioned,

I think... I do think if there are [my] friends who's experiencing the depression, then maybe if they need help, I would offer help. And I do think that the reason why they got a

depression maybe they had some difficulty in her life or health or anything. And if I can, I would offer [to] help further, figure out things, and also, I would like to devote my time to accompany them to have some talk. Maybe that can be helpful and being supportive to them.

Experience with PPD. In this section, participants were asked if they had ever been diagnosed with PPD or had any encounters with women who are diagnosed with PPD. All participants, except one, had never had any experience with PPD firsthand or encounter with women who suffer from PPD. Nevertheless, even though she never met with anyone with PPD, Tammy said she was heartbroken when she heard about women who hurt themselves or others due to PPD (referring to the case in China). Again, she mentioned how a family could be the source of distress but she maintained that family and especially husband's support are crucial for postpartum mothers.

(Translation) When I learned the news, I feel very heart broken. Because people should know that being a mom is a very difficult thing. If there's anyone who encounters with that situation or problem [PPD], their family or even their husband should be more supportive to [of] their wife to make them feel more comfortable, [and] more happy.

According to Fauzia, society might have its expectations, but how someone handles those expectation will determine whether or not they will be depressed. . She said, "It [is] just your acceptance to [into] the society that's the reason for depression, I think mostly." She also added that after each of her pregnancy or giving births, she sometimes felt some mood swings. She mentioned her faith helped her coping and because she believed that she just has to keep everything balanced and she is good. She articulated calmly,

Sometimes [I feel stressed], I think, but it's not real because, we're Muslims. When we meditate, if your belief is strong, you just know... it is something from the God, you are having this... a little bit mood swing. And if your environment at home is not good, you try to adjust on that...'cause we are Asians, we always have one marriage and so, we try to stabilize [balanced] everything. It's not that hard.

Echoing what some other participants have pointed out, Fauzia also thought that the discussion on PPD was more normalized and diversified in the US. Nobody had mentioned PPD to her until she went in for a checkup when she was pregnant with her third daughter.

I don't think I know, nobody talk to me about that topic. People don't normally talk to me about that topic. [But] When I go to the hospital, they asked me about that...

When asked how she felt about the way people are reacting towards women with PPD, Fauzia mentioned that she had no idea about PPD and PPD screening prior to this because she was new in the country (US). She relocated to the US with her spouse, a postdoctoral researcher. She did, however, acknowledged that her experience as a pharmacist had taught her a lot about depression.

[I know] the types of depression and all that. Back when I was working at the pharmacy, I know that this [depression during pregnancy] is very common and there are antidepressants for pregnancy, for everyone, also the people who have this [depression]. This [medicine] helps control that [depression] and they are good. They're working, they're working differently. My observation was a little bit different... [Before this] I know that people are using [medicine] in the pregnancy and but I didn't know that it was a normal practice [common]. Yea, I don't know that it is very common here.

She also mentioned that she had a woman in her circle that suffered from PPD, but that person was cured. She shared, "But there was my friend, she lives in Virginia. She told me that her sister-in-

law, she was depressed when the second daughter was born. She wants to kill herself and thought of harming the baby but she's okay, she's okay now", -- reluctant to share more because she did not hear directly from that person.

Based on personal experience, Maria said that there were differences between how people in her country treated women with PPD and how people in other countries treated women with PPD. She brought up a unique point of view. According to her, in her country (China), if the woman came from a wealthy family or had a better social status, their family would be more concerned if she suffered depression. Women from lesser social status or poorer families, on the other hand, may be overlooked because the focus will be on the newborn baby. Additionally, they will be more depressed due to lack of resources to seek help. She explained,

I think [in] our culture, the mother... So, if she's from the... how to say, rich city or rich family and maybe the woman... the social status for the women is very high, and she's very important to her original family [blood relatives] and for her new family [in-laws], yeah. So, then I do think that depression would matters to all the family members. But if she's from the poor city or poor family, then maybe the woman was not that important for the family, [and] maybe the children, the kids, the newborn baby...will be the focus. So, maybe the mother can be neglect(ed). And she maybe feel like a huge change from the pregnancy and after delivery... kind of like a tool [to carry and give birth to the baby]?...[After she] finished her job [giving birth], that's it. So, the depression can be an issue because they have no social resources [support] to really take care of them. Yeah.

Again, she emphasized how, in the United States, healthcare practitioners, such as doctors, are more concerned about expecting and new mothers. She added that people are also nicer and there is a lot of support for perinatal women. She compared the practice with the situation in China and

believed the differences in treatment received by women suffering from PPD in both nations were due to the types of society that exist in both countries.

I think it's different because the doctors here care about the health of the pregnant woman and also the new mother. So, and maybe the social society [structure] is kind of offering help. I mean, the government or some organizations supported [through] either the government or some other funding organizations, it's kind of people here are more like, in the one hand, is more independent from the family. It's like an independent human being is protected by the whole society. But I do think that in China, it's like, it's more like family...Yes, it's a collective society. So, everyone is involved in the family. So, if the family don't care about you, then I don't think they will come and care about you and give you any help. So, but here it's kind of different.

Maria shared a story about her friend who she claimed might be suffering from PPD. Though it was not clinically diagnosed, she was under a lot of stress caring for the baby, especially at night, with little support from the family.

I heard that a friend, she may suffer from postpartum depression. I don't think that it is diagnosed but she said she might have the postpartum depression because she feels a lot of stress after the baby was delivered. So, for example, she's not getting enough help from the family. So, at night, that baby only want her to hold her (the baby) and...and the baby refused to go to sleep. So, she has to stay up all night, holding her baby... while her husband was sleeping.

Indah expressed her disbelief upon learning that pregnant women may become depressed. She mentioned that she was always happy throughout her pregnancy and never feel stressed about

it. She again reemphasized that screening for PPD for mothers are important because it also affects the child's development.

Okay, so I was surprised. To be honest, I didn't expect that there would be people [who were] depressed when they're pregnant. So, I was surprised. But then when I thought about it, it actually makes sense. And it's actually useful [to screen for PPD] because maybe in my case, I was just very happy so it didn't apply to me. But some other women might feel differently. So, I think that's quite important because it will affect their mental health during the child's development. Yeah. So, I think it's quite important.

Since it was her first pregnancy, Indah always contacted her friends who already had kids and asked them to share their experiences. Some of her friends shared that they had mood swings, but eventually things would pass.

Yes, I did [have experience with women who had PPD]. During my whole pregnancy, I always urm... I contacted a lot of my friends who already have kids. And I asked them about their experience. And some of them said that there were times where[when] they had mood swings. And it made them sad at some point. But then they told me that it will pass at some point and it's just a phase. It's just liked some hormones change.

Indah also quoted that she had a close friend who claimed to suffer from PPD. Despite her surprise, it made her more aware of her personal feelings and, of course, wished her friend the best.

Maybe one of my friends, maybe [she] had it but I didn't follow up too much on her. So, she... she was someone I knew in Illinois and she gave birth... like she was pregnant at the same time as I was and she gave birth I think two weeks before me. But then she moved out of Illinois and we kept in touch by text a few times. And then she told me at some point that she had... she had some postpartum depression. Well, I was surprised. I just hope for

the best for her. And it keeps me more self-aware. Like, like, I become more aware of how I feel... what I think, how I'm feeling right now but yeah, but apparently, I'm okay. In the beginning, I just felt tired but nothing about it. I wasn't sad, just tired.

Effects of PPD to self-respect or harm to self. This section documents participants' experiences with PPD and how they perceived PPD affected their self-esteem and tendency to harm themselves. Although they were not asked directly if they had considered hurting themselves, the participants did not raise any red flags about their self-respect and their inclination of harming themselves. Participants in the focus group discussion were mostly aware that they were not feeling like themselves, especially during the postpartum period. However, most of them mentioned giving themselves some time and being able to overcome the feelings without feeling lowly about themselves. Ananya mentioned that she sometimes felt like people were not helping, but that did not necessarily make her feel lowly.

Not really, I never feel that way. As you said.... Sometimes you just feel that people are not helping you, like people around you. Okay. And your problem is not like getting solved and that makes me depressed but not like, you know, feel low(ly) of myself.

Aiesya agreed that feeling depressed would not make her feel less about herself. She added, "I didn't feel less about myself. Support was important, but if I don't get that, that's fine." Reena, however, recalled her own experience when she gave birth to her twins.

I think because I gave birth at young age when my friends are still going for internships and getting jobs, getting very good accomplishment, but I'm not [cannot do it], I feel a bit left out. And I think I feel a little bit low self-esteem. [But I] Just give it [myself] some time and I was [became] fine.

Rachel also described having a difficult time with her first birth while reflecting on her own experience. She recalled being under so much pressure for nearly three months after the baby was born. She believed she would get better with her latest pregnancy. She stated,

When I gave birth to the first baby, I [was] just very sensitive. [My family] put the blame on me, they just talking about what I did, [said I was] not a good mother and then I feel very pressured, a lot of pressure. Just about three months after that I feel much better. I don't think I did a very good job last time; I can do a better job this time.

Even though Maria admitted that she felt like a failure when she was out of control, she never considered ending her life or anything similar. She admitted that she might need extra support during that period but on a normal day basis, she was usually able to take care of herself. She emphasized that those who suffer from depression should not give up, otherwise others would be unable to help them.

I should say that when I'm out of control, I do feel like kind of like [a] loser. It's like, 'Why I cannot do that? Why it's like that? Why I'm so unlucky?' kind of thought but not...not that bad. Not that I want to give up my life or something. So, maybe at that time I maybe need more support from my family, from my friends and their words really means to me. But if I'm in a normal situation, then maybe I can take care of myself much better. Not that I need it. I think the real problem is that the person themselves just kind of give up. So, if she gave up then others cannot help.

Indah, on the other hand, shared that she might be in a dilemma if she had to decide whether or not she would feel less respect for herself if she recognized depression symptoms in herself. As someone who is spiritual and religious, she believed that she should be grateful and should not feel

depressed. She also believed those who mattered to her would not criticize her for being depressed because that will only worsen the condition. She mentioned,

Maybe [I would respect myself less]. Maybe... because I would maybe feel [that] if I feel depressed and maybe I would also feel like I shouldn't be depressed. So, I would respect myself less. Like knowing that I should be grateful, but I'm depressed. Maybe there will be some sort of dilemma in mind, my head. Well. I really believe that the people who are close to me, they will not judge and that they will support me mentally. Really... And then it wouldn't make things better if they judge.

Fauzia was firm when she said that she did not think that she would have less respect for herself if she suffered from depression. Her answer was short, "I don't think so." She also mentioned earlier that as a devout Muslim, she believed that everything comes from God, and it is up to an individual to balance and adjust every aspect in life. As she expressed,

Sometimes [I feel stressed], I think, but it's not real because, we're Muslims. When we meditate, if your belief is strong, you just know... it is something from the God, you are having this... a little bit mood swing. And if your environment at home is not good, you try to adjust on that... 'cause we are Asians, we always have one marriage and so, we try to stabilize [balanced] everything. It's not that hard.

Getting help and views on mental health services with mHealth

This section presents the findings from interviews and focus groups on how the participants view their behavior in getting help based on mHealth screening results. Participants also discussed how they perceive mental health care as a result of their mHealth experience. All of the participants were not hesitant to seek help if their PPD screening revealed that they were suffering from PPD

symptoms. In this case, participants did not discriminate or differentiate in their reactions to the screening results regardless of the screening method they used. In the focus group discussion, all participants were more open to seeking help, but there needed to be a stage at which they pivot and consult with professionals. Ananya shared that she would be willing to seek for assistance if her screening results revealed anything concerning.. She implied that she might try to resolve the problem on her own but understood the importance of seeking help early before symptoms worsened. As she mentioned,

Yes. If it's not resolving on its own or you are having a lot of fights and depression, you have to seek help I think, because if you don't seek help that time, you know, at that point it's gonna be worse.

Others in the group agreed with her point, including Aiesya, whosaid that she would do the same thing if the screening revealed that she had PPD symptoms. Reena also expected herself to seek assistance or treatment if her depression began to impede her from functioning normally in her daily activities. “If it affects my functions, then I will go...,” she said. Just like the other participants, Rachel said she would try to solve the problem by herself or by talking to friends but would eventually seek professional help if necessary. She shared,

At first I will try to solve the problem in my way, myself. Yes [or sharing with friends] if it can't be better, but if it be [is getting] worse and worse, I'll go to find [see a] professional.

Rania does not hesitate to seek for help if the screening results using mHealth indicated that she need help. She denoted, “If needed, if results indicated I should, why not. I never did in the past but yes, why not.”

As for Tammy, she felt that her view on mental health services was not affected regardless of whether she completed the screening via mobile device or face-to-face meeting. However, she

was aware that she had that perspective because she was not depressed. If the situation was the opposite, like what happened to her friend, she believed completing the screening using a different method might make a difference in the way she viewed mental health services.

(Translation) Well, it makes no difference to me if I use a mobile device survey or face-to-face because I didn't... maybe feel so much depression. But I know a friend, she just [got] pregnant and she just found out and we believe she's going through some depression [phase] because she is asking [for] a lot of help. I think [it might make] a difference for her because she is going through depression.

Ananya mentioned that using a mobile device would change the way she viewed mental health services for mothers. She believed that the depression screening would inform women if they were depressed and, as a result, encourage them to seek help, which women do not always do under normal circumstances.

Well, you know the depression screening... it'll help you to know whether you are under depression or not so yea... I think it points out that you are under depression and need to seek help, which you don't usually, in a normal situation you don't. That's gonna help a lot, I think.

Aiesya, in her interview session, added that if healthcare providers adopted mobile device for PPD screening, resources should also be made available in case they require assistance or need help. She expressed,

I would say at one point if we are using mobile devices for depression screening, if we are diagnosed with depression based on that, there at least should be [an] option [on] where to seek help.

Reena then added that it is time for healthcare provider to use mobile device. “Yes, in this modern time, maybe it's time to get [move to mobile device],” she said. On the other hand, Rachel believed that using a mobile device would make a difference in the way she viewed mental health services. She was thinking long and suddenly said,

Yes, so if we just do [the screening] on mobile, not on paper, perhaps it's easy for me to know my situation. If I do it on the paper perhaps, I need to be at the clinic. If I do it on the paper at the hospital, the nurse or perhaps the doctor will be with me and if I have [any] problem I can just talk to them. But as I said, if it has some language problems or other problems, I can't think about it carefully [or] ask questions. something like that. If I do [the screening] on mobile phone, I [could ask] after the screening. I have some time to think about it carefully...[about] my situation, [or] if I have some problem, [or] if I need to seek professional help.

In response to the same question, Fauzia, at the end of her interview, Fauzia felt that using a mobile device would change the way she views mental health services in terms of the way people respond to the screening questions. When asked in what sense, she answered, “Yeah, because [mHealth] less time consuming, first of all. People will relax, on mobile...they feel good. And that will affect how they answer to the questions.”

Other than that, integration of mobile devices into the current mental health services would be helpful in improving mental health services, according to Maria. She mentioned,

Oh, I think since nowadays the cell phone is more and more involved in everyday life, I do think it definitely should go that way [using mHealth]. So, it's, it's like definitely can help better [in screening]... it should be integrated.

In the subsequent section, participants talked about the designated themes during the interview, which was the UTAUT measure. Their responses were categorized under the themes represented by the UTAUT factors: performance expectancy, effort expectancy, attitudes toward mHealth, facilitating conditions, self-efficacy, social influence, anxiety, and behavioral intention of using mHealth for PPD screening.

UTAUT measures

Based on participants' responses, the researcher grouped the responses into nine categories: performance expectancy, effort expectancy, social influence, facilitating conditions, attitudes toward mHealth, self-efficacy, social support, anxiety, and behavioral intention.

Performance expectancy

In this section, the interviews and focus group discussions explored participants' perceptions of mHealth capacity to help achieve the objective of PPD screening. The emerged subthemes include: 1) the level of trustworthiness of the screening results; 2) the efficiency and accuracy of the screening process and results; 3) the convenience of using the mobile device; and 4) how they reacted according to the results of the screening using the device. Some participants also raised the issue of authority and autonomy in administrating the screening process. Some participants believe that having authorities administer the test, such as nurses, rather than completing it themselves, will ensure the credibility of the results.. Some of them trust the results generated using the mobile device and argue that it is the way moving forward, but still believe the results could be true as long as the person completing it was telling the truth.

Rania, who was 6 months pregnant at the time of the interview and had undergone PPD screenings during her prenatal checkup said that she trusted the depression screening results obtained from the depression screening tool in mHealth. Rania thought that using the depression

screening tool and mobile technology would be more reliable than simply asking the patient “how are they doing”, especially if the screening tool included follow-up questions to accurately describe the mothers’ feelings.

I believe so [in screening with mHealth], because if I would say I am feeling depressed, I somehow hope they [healthcare provider] would react. It's not that literally helpful as I believe the application [mHealth] would be where I would be asked more questions to tell how I feel more precisely than just, “hey how are you doing.”

When asked if she thinks that using mobile devices improves the accuracy of the depression-screening outcome, Rania replied,

I think it is the same accuracy if people are doing their job correctly, whether you write on paper and using a mobile device. I don’t think it will improve on accuracy, maybe just improve easiness to use.”

Rania also added and emphasized that she would trust the screening results and seek help if the results indicated that she needed help. She said,

I think I can trust it and, I, [will] seek for help based on the results. I don’t have trust concerns based with the mHealth application, I just don’t. If the results said that I need help, I would seek for help. If I see that I cannot fulfill my daily activities or that I feel very bad every day when I wake up. I would certainly seek for help or if the results of the screening say, “Well, we think you should talk to someone. It will make you feel better,” I would say, “Okay, no problem!”

Tammy agreed that the patients who are being screened will determine whether the results was trustworthy. She added,

(Translation) That depends on the answers of the people who is being [screened]... I mean, [whether] the answer is honest or not. The clearer you said about yourself, express yourself, then maybe the result may more trust more reliable.

During the interview, Indah brought up the subject of honesty once more. She compared the honesty of people completing screening on a device to face-to-face and mentioned that people tend to not describe everything when they have to explain it face to face. She perceived that people would be more honest in answering the screening questions on a mobile device because they are less intimidated than when asked in person.

Maybe... if the respondents can be more honest by filling it on the mobile device, I guess so. Some people can feel intimidated when they are being asked face-to-face. So, they tend to not tell everything. But then if it's on a mobile device, they feel like, "Oh, it's not a person." They can just say everything that they feel.

When asked if she thought the results generated by the mobile device was reliable to refer to, she answered, "I guess so."

In line with that, participants in the focus group also reiterated the accuracy of the screening using mobile devices and how the honesty of the participants would affect the screening results. During the focus groups, when asked how they thought mHealth would perform for PPD screening, Reena said that the accuracy of mHealth might be higher than the other methods (in person and paper survey) because it could prevent human error. Reena also thinks that the results generated from the screening through mHealth would make patients realize what they are facing. She explained calmly and concisely that,

Maybe even more accurate with mobile, to prevent human error with mobile. It will help to realize what are you facing [depressed or not depressed or whether you need help]."

Her opinion was shared by Aiesya, who thought that PPD screening using mHealth would be more effective and accurate, but only under some conditions,

Yeah, I think it will be, apparently more effective, more accurate. [But] I think maybe if you put [give] more time when you answer the question, it might be more accurate. And an option to go back [to the previous page] just in case [you changed your mind about the answer].

Honesty was definitely an issue for Rachel. Even though she agreed with Aiesya's point, she thought that she would be more honest if she completed the screening on paper. Completing it in person would pose another challenge for her as a non-native English speaker who relied on her husband as her translator most of the time.

I think I'll be more honest to answer the questions on paper. [With] the nurse [administering the screening], sometimes, as I said, I can't understand [because of language] ... not because I don't want to make mistake... [but] because it's difficult [to understand].

In the same focus group, Ananya, on the other hand, thought that screening by paper, in person, or using mHealth would not make a difference. "For me, it's all the same," she said.

During her interview, Fauzia, who is a pharmacist, believed that PPD screening using mHealth could generate trustworthy results, but only if it is supplemented with other tests such as chemical screenings or in-person evaluation.

I don't trust [the screening results] ... Hmm... I [would] trust (changing her mind) but that can [only] be a part [of the screening] because there must be chemical screenings...because I'm a pharmacist and was trained like that. Human questionnaires are effective like 20% so there must be more parts to this screening... the expressions in the body language and also some chemistry or something like that.

As someone who believed in science and trusted a scientific approach to problem solving, Fauzia also mentioned that the results generated from PPD screening using mHealth would improve accuracy because the technology is built using software that uses statistics. However, she also asserted limitations on the software and items in the screening instrument that justified the needs for multiple tests in screening for PPD. She explained,

Yes, yes [believe mHealth would improve accuracy]. Because there's like some software they apply some stats [algorithm] on that. But also, there are drawbacks, limits of those software. I don't know how that works here. And there are [must be] some limitations on the items too... It should have some portions like 20% of the paperwork and 40% of computer work, or something like that, I think."

Although she expressed confidence in using mobile technology to screen for PPD among mothers, Fauzia added that there should be room for doubt or error in the screening procedures. She said,

"Yeah, because it's happening in real research. It happened a lot.. but it is easy for the researcher also, and also for other researchers...but not 100 percent reliable...it's the reliability [might be questionable]."

Another participant, Maria, reemphasized the need for having human interaction when administering PPD screening. She mentioned,

I think human interaction can be helpful. Yeah, especially between[with] the person doing this. Because even if there's no human interaction, and at this stage, if there is a problem, then the patient will eventually work with a human to solve this problem [technical or content support]. So, I do think that it's important.

Additionally, Maria also believed that if patients were requested to perform the exam on their own owing to a lack of authority, there would be a motivation challenge. . But she also mentioned that

people are completing online questionnaires and surveys available online to better understand themselves. She exclaimed excitedly,

Um, I think if I did it by myself on the cell phone, it might let me feel like it's not that authority as [compared to when] it is performed by a nurse. But, if the initial introduction was performed by a nurse, and it was introduced by the doctor, then I won't have any doubt with it. But on the other hand, I think there are many tests online that people want to search and do to know themselves better. And they trust all these things even. So, I don't think there's any issue with this.”

Regarding other participants’ opinions about the accuracy of the screening results, Maria disputed that completing the PPD screening on a mobile device might compromise the accuracy of the results because participants might not take much effort while answering the screening questions. However, as a researcher, she would think that adding more follow-up questions to better screen the patients might be a solution. This echoed what Rania had mentioned in her interview.

Yeah, the only thing is, that if [we] just do it by ourselves, maybe the accuracy of it. It is, for example, it's like you are forced to finish [the screening]. So, it's not from your own willingness. Or you know, for some people, they don't think that this screening is that important, then they may just do it without much caring [care]. So, the result may be not really representing their status. [And] that might be a downside of this. But do you think that you can kind of design the questions to screen these situations out? To maybe add more questions? So, it [sic] can direct...direct you to the situation [emotional state] of the user at that stage. If they’re really... they really feel like they need this screening, [sic] I think it can only be helpful if the user wants to share with you [their situation].”

Effort expectancy

In this section, participants talked about how they perceived the effort that they would need to put into using mHealth to complete the PPD screening. Participants who preferred to use mHealth mostly did not perceive additional effort required in using mHealth. In her opinion, Rania thought that adopting mHealth would improve the simplicity of PPD screening over using paper and pencil. She believed that the accuracy of the results generated from the screening would still be dependent on whether or not the individual who administer the screening process did their job correctly.. She also added that using technology to screen for depression is more convenient and easier. As she put it,

I think it is the same accuracy if people are doing their job correctly, whether you write on paper and using a mobile device. I don't think it will improve on accuracy, maybe just improve easiness to use. I think it's just more convenient, easy now a days, to use technology instead of paper. I mean it's just more convenient to send the results, to read, it's quicker, easier. I just see these benefits.

Maria expected that using mHealth to be easy and seamless especially since the screening instrument could be downloaded to the phone and accessed whenever needed. She elaborated,

I think it can be very helpful (the mobile device). Because if you know that there is a tool in your phone, that you can reach out whenever you feel there's a need, or whenever it is the time to do the regular check, then it can be better.

She did, however, add that if she completed the PPD screening by herself without the healthcare provider's supervision, it would feel as if she was just completing one of the online personality tests making it appear less formal or official.

I think if I did it by myself on the cell phone. It might [made] me feel like it's not that authority [official] as it is performed by a nurse. But if the initial introduction was performed by a nurse or it was introduced by the doctor, then I won't have any doubt with it. But on the other hand, I think there are many tests online that people want to search [for] and...and do to know themselves better.

Attitudes toward mHealth

This section explores participants' attitudes toward using mHealth for PPD screening. They were asked if adopting mHealth for PPD screening was a good idea and in what sense the adoption would benefit the PPD screening process. Even though she had never been screened for PPD before, Rania had a positive attitude about the screening and found that using a mobile device made the screening process more convenient. She also agreed that she would prefer to use a mobile device to screen for PPD, if the option were available.

I have positive opinion on this mobile technology and using it for screening. I just never done that and my first pregnancy was monitored in Croatia, in Europe. We didn't have that experience. And I actually don't know how it would work.

With her positive attitude toward technology and her confidence toward healthcare professionals, she believed that human factor could be minimized toward the screening results. She added,

I don't see the difference, whether I fulfil it online or on paper, or who reviews [it]. In the end, if the application is developed to review, I'm sure the people can get the same instructions to review... Then, I don't feel human factor can hurt the answers so much. I do have trust, if they have certain guidelines, they have to respect [the guidelines]. I do

know research can be biased by their personal opinion, but if they have certain instruction how to go through the answers, then of course [no problem in using mHealth].

Regarding concerns about safety and privacy, Rania insisted that she trusted that mHealth was safe. She said that she used mHealth application and she never doubted the safety and privacy of her data because she believed in online security.

I don't think so [concern about privacy and security], because you can protect these forms very good now online -- We pay bills online We do everything online nowadays. I don't think it is such a threat for us, to reveal our health information online. I also have my mHealth application where I get all the tests results, how is that not compromised. I don't think that's a big deal for me. I believe in online security.

As she elaborated on her positive attitudes toward mHealth, she said that every technology that is being used by healthcare providers should be developed with privacy and security solution in mind, including having a disclaimer for human rights protection or if something bad happens and the health information gets leaked. She also believed that a violation of privacy may also occur in the offline world, where someone might accidentally read a patient's file or see the patient getting to the doctor's office. She was firm that she was not too concerned about getting her information on the mobile device.

I really don't have concerns; I believe the system will be well developed before putting it into service. So, if something happens, there should be some policy, how to protect human rights, in case information is uncovered. It should be something like consequences if someone actually finds my information. It has to be like some disclaimer, you cannot misuse it and it shouldn't affect anything in the person's life, job, career, whatever. And by having this form that protects you, I still believe it shouldn't be a problem. There are

humans that do- hide these things [feelings]. I'm different - I know there are people who want to hide how they feel and they want to be super private. But also, when they go to the doctor office privately, without the certain application, someone can reveal their file by accident, so what, then? It's the same question. Or, someone can see them going to the office and then what, then? It's always that possibility that your information can be revealed somehow. I'm not concerned too much.

Tammy was not opposed to using mHealth for PPD screening. She, however, thought that the use of mHealth should only be practiced in the earliest stage [of the pregnancy]. Moving forward, according to her, the healthcare provider should talk to the patient to get more information.

(Translation) So, I think we also can use the mobile device to do the survey, but that's just for like the very earliest stage. Very early stage. If we want to make a final statement of the research [survey] or anything like that, you should talk to [the patient] to get more precise answers.

Participants in the focus group discussion were mostly feeling positive about the use of mHealth for PPD screening among perinatal mothers. They brought up many good points, such as accuracy, efficiency, and convenience. One of them also mentioned that adopting mHealth is better for the environment. For example, Ananya believed that adopting mHealth will assist people understand their situation and decide whether or not to seek aid.

I think it's a really good help because there are [sic] the question started more general and then more specific, so you know what kind, what degree of depression you are going through, right? And that'll help you to seek help, like if you have [a] low [mild] depression, that's good, but if you have [a] bad [severe] depression, you can choose to seek help.

For Aiesya, the mHealth appeared to be more effective for her and gave more accurate results. She said, “I think it will be, apparently, more effective, more accurate.” Rachel then added that even though she thought that the mobile device would be more convenient, it would still make her nervous. “The mobile phone, I mean more convenient. [But] make me feel nervous (due to language challenge).”

Her confidence in research made Fauzia believe that she would trust PPD screening results using mHealth if they indicated that she would need further help. She mentioned,

Yeah, because it's happening in the real research. It happened a lot...[inaudible] but it is easy for the researcher also, and also for other researchers...but not 100 percent reliable...the reliability.

For Maria, the mobile device will make accessing the screening effortless because it would always be available and handy whenever the patient wants to check their condition. She was also positive that healthcare services would move toward utilizing and leveraging mHealth application as technology, such as cell phones, became more prevalent in daily life. She expressed,

I think it can be VERY [emphasis] helpful (the mobile device). Because if you know that there is a tool in your phone that you can reach out whenever you feel there's a need or whenever it is the time to do the regular check, then it can be better. I think since nowadays the cell phone is more and more involved in everyday life. I do think it definitely should, should, should go that way. So, it's, it's like definitely can help better...[sic]

Indah believed that having a mobile device could make someone more willing in responding to the screening questions compared to when the questions were asked directly.

But, again, having... having a mobile device can make you more open, maybe if there are things that you... that you don't feel comfortable to talk about directly, but you actually

want to let it out. Like you don't want to talk... You know? Yeah. But there's a way to, to express it.

Facilitating conditions

Next, participants shared the organizational and technical infrastructure that they believe exist to support the use of mHealth for PPD screening. Among the subthemes raised by the participants under this topic include: 1) technical support that they could turn to with device problems; 2) expert support from which they seek clarification about the screening instrument; and 3) the way the screening instrument is presented on the device. As someone who support the use of mHealth for PPD screening, Rania brought up that she will need someone to help if she has a technical issue or if she has trouble to understand the question. She suggested,

If I come across with some problem that the application doesn't work or if that I cannot fulfill something or submit, I will just need this technical help in dealing with it- Or understanding the questions, you should always have someone to help clarify if something is unclear. Other than that, I don't see it should be a problem to fulfill that. I would need that, like I told you, the application should have someone to help you online to clarify the questions. Whichever questions, for example this one wouldn't be clear, I would just click and hope there is someone who can clarify. Like online support, an application with online support should work.

In the focus group discussion, Ananya expressed concern about the length of the PPD screening questions. Based on her experience participating in a study about depression, filling out a 20-page form of depression screening questions should be avoided. She said,

One thing is that you know I been to like depression study, if it is a paper form, they have like 20 pages or something... it's too long... and uh maybe like as short as possible because like you know...short and simple.

Aiesya then suggested that the language used in the screening should be kept simple. As a non-native English speaker, she does not want to have to check the dictionary to complete the PPD screening. "I think language should be simple. Like not complicated and I have to check the dictionary." Aiesya also suggested that the translator button be added for people who might require it. She continued further to suggest a few other features:

One more thing just came to my mind because we haven't talk about it, it's um translator button. That if someone needs some kind of translation. There should be an option to go back and uncheck.

Ananya agreed that the back button is necessary just in case if the patient needs to change their response. She added,

Yeah, I think if it is like ...computer, there should be an option to go back and change because you know when you reach the next question, you just confuse that maybe I click the wrong answer and maybe I need to change it...

Reena has another thought about the user interface. She recommended putting multiple questions on one page as opposed to one question per page with the 'Next' button on each page. "Maybe if it's possible, if you put the questions in [one] big page but not in one and next? (Scroll vs Next button)," she added. Next, Rachel has her own set wish list of features that she thought would be helpful to her when using mHealth. She explained in detail,

The first one is, if it's possible, more language [options], more than just English. A second one is, um, I think it'll be better [if] they have the specific questions. I mean, if I do it on

paper, or on mobile perhaps I don't have someone to explain it fully [in detailed]. [What I meant by] fully, just like I said, if I went to the hospital, the nurse and the doctors can explain the questions. So, it's okay. Even though the question is hard, they could explain it. But if I have to do it myself, I think it's more difficult to read the specific questions. The third one is, I prefer they don't make more steps. I mean, sometimes they have a lot of questions and every question say I need to choose and then click to confirm. Yes, less things I need to do. I prefer to choose, choose, choose, then confirm.

Regarding the way the questions are presented, Ananya stated that, in addition to restricting the number of questions to 10 per page besides limiting it to 10 questions for every page, she would like to know how many more questions she still needs to answer to complete the screening. When asked if she meant a performance bar, she answered,

Yes, 10 questions in one page for me, and I think if you let [me] know how many questions are there. Sometimes, it's good to know.... Like there are 25 and you answered 10 questions. You don't know. How long will this go?

Fauzia believed that she only needed the link to the screening questions if she had to use mHealth to screen for PPD. She said, "Just the link." She even said that she would not need anyone to help her go through the questions.

Maria, who emphasized human interaction throughout the interview, suggested several things that could facilitate her usage of mHealth for PPD screening:

You mean the screening for depression? I hope it can be user friendly. An easy to read and understand, the apps is clear, not too much, not too many [questions] in one screen. So, one thing at a time, one step up to another step. And you can go back if you think they're wrong... you can go maybe go forward as you like. And make it like good-looking. Yeah,

the design... Yeah, yeah interface and for me if it's if we can really make these questions or the introduction of the questions, kind of more like human that might be better. So, I think if this app can be having this really human interaction then might be helpful. [sic]

Recalling her experiences in completing the PPD screening, Indah weighed the pros and cons of using mHealth for PPD screening from her perspective. She shared that using mHealth might give her an advantage in terms of privacy. She was concerned, though, that she might not be able to answer some of the questions during the screening. Therefore, she thought a function to enable her to ask questions would be necessary.

Maybe I can see two impacts maybe from filling it on the app. So, first thing, it gives me more privacy. So, if I have a problem, maybe I would be... I would feel less intimidated to share it, or I would feel less shy or less ashamed about it. I would just go; I would just type that one. But then the other thing is when there's no interaction, I might not really know what to... what they expect. Whereas, if I'm okay, I usually asked [to the healthcare staff] - what do you mean [with] this? [sic] I would ask more questions about a question. And that is not something you can do with it if it's [screening] on one of that (mobile device). Yes, maybe that (having healthcare provider around when completing the screening) or if there's a way to ask question on the app, of course.

Self-efficacy

This section explores participants' perceptions of their ability to complete PPD screening using mHealth. Even though some of them did not mention specifically that they were able to complete the screening using mHealth, they were mostly confident in their ability to complete it. For example, Rina said she would not need any help to complete the screening using mHealth.

Besides that, Tammy also thought that she would be able to complete the screening without any help. However, since she had never been screened for PPD before, she was unsure how she would respond to the questions. Consequently, she may be skeptical of the survey results. She mentioned:

(Translation) I won't need any support [sic]. The question [issue] is that I might not trust that result. Well, I don't know the actual answer right now, but it's just the hunch. Just a feeling. Because I hadn't done that test before. Oh, I don't know how regulated that procedure is.

Rania also felt that she would not have any problem in completing the depression survey using a mobile device. Unless she required technical or comprehension assistance. Other than that, she believed she could manage it. As she put it in her own words,

If I come up with some problem that the application doesn't work or if that I cannot fulfill something or submit, I will just need this technical help in dealing with it- Or understanding the questions, you should always have someone to help clarify if something is unclear. Other than that, I don't see it should be a problem to fulfill that.

Finally, Maggie did not think that she had any problems using mHealth, especially if it could easily be accessed via phone. However, she mentioned that she would not feel like the screening was official in comparison to the one completed under the supervision of a healthcare staff member such as a nurse.

Social influence

This section explored how participants perceived if they have the social support they need to use mHealth for PPD screening. Most participants did not perceive that they were going to need any social support to influence their decision to use mHealth for PPD screening. However, if they need it, they believe they will get that support from their healthcare provider or important people

in their life. Since all of the participants were quite familiar with mobile technology, they felt like the support that they needed was more in terms of technical and expert support to answer their questions regarding the technology or the PPD screening instrument, questions, or results. As Rania puts it, she worked a lot on computers, so that made her familiar with technology, so she needed no extra support to encourage her to adopt the mHealth for PPD screening.

It's just so common for me to use it, I just don't need social support. I live with a computer, that's my work too, so I am always surrounded by computers and by technology. For me, that's very common, and I do not need any encouragement to use it.

Tammy also thought that she would be able to use the mHealth without any support or encouragement, but since she had never done any PPD screening before, she doubted that she would trust the screening results. She expressed,

(Translation) Won't need any support but the question is that she might not trust that result. Well, she doesn't know the actual answer right now, but it's just the hunch. Just a feeling. Because she hadn't done that test before. Oh, she doesn't know how regulated that procedure is.

In the focus group discussion, all the participants did not agree that they needed any social support from anyone to use the mHealth. Ananya said that she did not need any support to make use of mHealth; instead, she said she might seek support if she needed help with the words in the screening (translation or comprehension). She said,

“Oh, I'm living with my husband, so he's the only one for me and I don't need any help for depression screening. Yeah. But if you don't have... the words, like if you don't know English that perfectly.. THAT, I think I need help.” Reena also agreed that she will not need any support to use mHealth. “I don't think I need any support,” she shared.

Support or an introduction by a healthcare provider would be something that would make Maria feel more confident about using mHealth for PPD screening. She mentioned before that she still preferred to have her healthcare providers perform the screening because they were authorized to do so.

I think if I did it by myself on the cell phone, it might make me feel like it's not that authority as it is performed by a nurse. But if the initial introduction was performed by a nurse, nurse and it was introduced by the doctor, then I won't have any doubt with it... I think if it's a serious screening, then maybe from doctor.

Indah thought that the decision to use mHealth for PPD screening was solely her decision. She was firm when she said she did not need anyone to convince her about the usage of mHealth. She did not eliminate the possibility of asking for more information from her family or people she knew but ultimately, she will make that decision. As she explained,

What will influence my decision? I don't know. Maybe if my families agree, but I don't think so. I mean, it's my decision anyway. In the end. Yeah. It's my pregnancy. It's my decision. I don't think anything can influence that. If I want to seek help... for help, I will look for help. I don't think that affects me. Okay. I mean if I feel like I will... I want to use it...maybe I will ask [the family]. I will ask them if they ever used it or what they think about it, but I will still have my own opinion.

Anxiety

Overall, interviews and focus groups reveal that participants did not have anxiety about using mHealth to screen for PPD screening. This pattern emerged in almost every interview and focus group discussion. For example, when asked if she had or will experience anxiety when using

mHealth, Rania denied it. When asked if she was anxious about the privacy or security of the mHealth form, she added,

I don't think so, because you can protect these forms very good now online and I don't believe that-- We pay bills online, we do everything online now a days. I don't think it is such a threat for us, to reveal our health information online. I also have my mHealth application where I get all the tests results. How is that not compromised? I don't think that's a big deal for me. I believe in online security.

As a post-doc student at the nearby university, Rania was used to using a lot of online forms for many of her work and personal matters. Before she got pregnant, she used other apps to track her health record. According to her, without such confidence in online security, she would not be able to fully use the apps as they also track and keep her personal data.

Although some participants felt the security of information and privacy of information is compromised when screening using a device, Tammy did not think so. She mentioned that her source of anxiety would not be about security or confidentiality. Instead, she said she would feel anxious because it is not a one-on-one interaction, indicating that she prefers to talk with a person rather than complete the screening with a device.

(Translation) Well, [only] if you prefer to talk to people because I won't feel anxious [or] too nervous to talk to people with this kind of questions [situation].

Indah also thought that having a reference point or person would be nice in case she had any questions, but not necessarily a must because she did not have any anxiety about using the device.

No, not really [having anxiety]. I think just as I said before, it would be nice if I have follow-up questions about the questions, [it] would be nice to have a way [channel] to express them.

Regarding concerns about security and privacy, Indah mentioned that she might feel more skeptical to provide responses to the screening questions. She believed she would be more concerned about making sure the screening was anonymous and her personal data was not compromised.

Yeah, I see your point. That's why I'm thinking that if I had a different situation, I might be more skeptical to put things with my response. Mm, like, I have to make sure that like, the screening is done like, anonymously or like that my my personal data is not taken. Yeah, it's purely just the answers. And that's why I think if I had issues that I want to report in a privately like confidential issues, then yeah, I would think three times five times (to do it on mobile device).

Behavioral intention

In terms of behavioral intention, participants indicated whether they intended to use, planned to use, or actually used mHealth for PPD screening. In general, all of the participants were not hesitant to use the mHealth to screen for PPD. Despite that, they would value the chance to choose from a selection of screening method options. As she said repeatedly, Rania had no reservations about adopting mHealth for PPD screening. She liked that the mobile technology could make the screening process quicker and easier. She maintained that if there were options available, she would prefer to complete the PPD screening using a mobile device.

Yes, I think it's just more convenient, easy[-ier] nowadays, to use technology instead of paper. It's like if you are using paper you have to-- I mean [with technology] it's just more convenient to send the results, to read [results], it's quicker, easier. I just see these benefits.

All except one of the participants in the focus group discussion agreed that they would use mHealth for PPD screening, if the option were available. As Reena said, “Yes, in this modern [time], maybe it's time to get there (move to mobile device).”

Maria also believed that healthcare should switch to adopting mHealth when providing healthcare services for patients. She mentioned, “Oh, I think since nowadays the cell phone is more and more involved in everyday life. I do think it definitely should go that way [direction]. So, it's, it's like definitely can help better...Yeah, it should be integrated [in healthcare].”

Other themes

In addition to the themes that have been decided by the researchers, participants also discussed other themes regarding PPD screening and the stigma surrounding PPD. The subthemes in this section included: 1) comfort in sharing and seeking help for PPD; 2) early screening; 3) PPD screening for dads; and 4) honesty while answering screening questions.

Comfortable in sharing and seeking help

In this section, participants shared if they were comfortable sharing their concerns or feelings if they were in distress. Rania stated that she would be very comfortable sharing with someone if she believed she was distressed or needed to talk to someone. It was also due to her expressive personality that she feels comfortable discussing her problems with others. She elaborated:

Very comfortable, very comfortable (of sharing symptoms with others). I was always an open person, and if I have problems, I want to talk about it. And if someone else has problems, they will come and talk to me. But I don't know. I'm just that type of person that it's easier for me when I say, for example: if I don't feel good, I will say I don't feel good

or I am panicking or I will cry... but I will express my emotions. I'm just that type of person. And it makes it easier for me.

Whereas for Tammy, she shared that she might have experienced depression symptoms throughout the first three months of her pregnancy. She recalled isolating herself and being reluctant to share her condition with anyone due to her unwell physical condition and her fear that she might react negatively to others. She explained,

(Translation) Uh, well I might have [felt] a little bit depression in the first three months. And, in that case I do not want to share that with anybody. [Maybe] I just, want to put myself in a small corner. Because I don't feel very good about myself, so I don't want to meet anyone or tell them about it. Well, [in one] part [it] is because of the physical; feeling nauseous or something like that. I don't feel very good... The second thing is that you may be acting more negative to the [other] person or to the social [people in general] and then you don't want to express that kind of negative feelings to others.

Tammy also added that when she had a problem or things that she needed to share, she would want to share it with her husband. “(Translation) So [let me] just add to that though. So, I would only want to stay [at] home to share that with my husband. I only wanted to share any experience with him. Yeah. But other than to him, I may not want to share the experience,” she added.

Participants in the focus group discussion expressed varied responses in terms of their willingness to talk to other when they sensed that they were distressed. Ananya felt more comfortable dealing with her problem on her own since she did not have a go-to person to talk to when she had any problems, including when she felt stressed. She explained,

Whatever I had to tell, I just tell, have a discussion, I just like to give it a time to calm down, and then you know, both [she and the other party] don't get mad.

Reena mentioned sharing with her mom [in Indonesia] and her husband when she had any problems, including if she was in distress. Aiesya then added that whenever she had an argument with her husband, she would turn to her friend since her mom lived far away [in her country].

So, when we [referring to her husband] have heated discussion, especially when we have discussion, we talk to our friends. [Because] we know each other, [so I could say] oh, we have this problem. We're facing this and this. I don't talk much except when my mom comes for visit, but then she's also far away. So mostly friends.

Talking to a friend has also been Rachel's strategy when she needed to share her situation when in distressed. She preferred talking to her friends rather than her family because she thought they would never understand, and she did not want to worry them. She elaborated,

I don't want to talk to my parents. The first story (reason) is I don't think they [would] understand. [sic] And the second is I don't want them to just... to worry about me. I prefer to talk with my friends. Especially who has the same experience with me. Have the same... at the same age, similar age. And also, we all, we all give birth to a baby. Perhaps we also, we all feel the same emotions. [They] Who can understand me... Sometimes just to talk about what we want to; I mean complain together making me feel better. Because it's kind of make me think I'm not lonely [alone].

Fauzia, unlike the other participants, felt that she would not express her feelings with anyone if she was feeling stressed or depressed. She mentioned that no one would care about her and her feelings even though she was unsure of the reaction she would receive if she opened up to people in her social circle. To avoid this judgment, she avoided sharing problems with others.

I mostly think that whatever problems going on, you should be with them [the problem] to allow them to be going on. Once you're exposed to everyone, nobody cares about

[you]...you know, people [will] say [things] like she's every time like that or whatever. I think... It can be a reason. But I'm not sure what I feel is true or not, or bad.

She, however, mentioned talking to her sister sometimes as she has been a good listener. Her sister would always remind her that things would get better and she should feel better.

No, I don't try this often [talking to someone about her problem], but sometimes [I talk to] my sister. She's a good listener but she's like [saying]... you should do something better... but I talk to her. She used to tell that things will get better, whatever is that... She's supportive, but not hundred percent. She supports everyone...

When asked if she believed that things would get better and whether she felt assured/supported by her sister, she mentioned, "Yeah, because she's a Master's [degree] student and I [am] satisfied with that." She then proceeds with sharing that she used to talk to her friends and her husband about everything. "When I was in college, in school, I have a friend. My husband is my good friend. I used to say (tell) everything, [either] thinking or processing everything. I tell him everything. I was thinking that this would be like this. Things will be better. Yeah, he's a been good friend," she added.

Maria, on the other hand, was willing to share if she had any symptoms of distress or depression. She, like Rachel, preferred talking to her friends rather than her family. It had made things more complicated when her family, whom she described as the people who know her best, claimed that her perfectionism might be causing the depression she was suffering from. At critical periods when she was crushed by her family's perceptions upon disclosing her emotional distress, she decided to seek out her friends because she believed that they would be better listeners and could give helpful advice.

Oh, I think [sic]... I'm very willing to share. Yeah. So, it's weird that I didn't talk much about feelings to my family. I think they kind of know where I am. But if there's friends visit me, I have so many things to tell them. It's like... Oh, I'm going through this. Have you have been there before? A kind of a normal [thing]... I just want to seek for...for help, I think. And also, I make phone calls to friends that I think may be able to help me with all these situations, and they are very nice to me. They can listen to me and give me very kind suggestions and very helpful.

Indah did not discriminate when it came to who she shared her problems with. She said,

I would be comfortable to share that with my close friends. Close friends, close families.

Yeah. Or, or a professional. That would also be okay.

In regard to whether she was afraid that she might be judged when sharing her problems or symptoms of stress with others, she answered:

No, because I don't think that nobody's ever think about that, personally. I don't, I wouldn't mind if I feel something is something's wrong, I would like to share and I would like to solve it too.

Early screening

Participants in the focus group discussion also talked about early screening – where they conduct it prior to their prenatal or postpartum checkup appointments. According to Ananya, time constraints would make it a challenge for individuals to complete the questionnaire ahead of time if they were busy.

I think I'm not really that big fan of [an] in-person [screening], so yeah, I don't care about that. So, for the lazy people I think it's better if you do it on the spot [during checkups], if there's somebody that go with you through the questions. Yeah... But if you have to

discuss it...do it [in] one day, [because] maybe some people [are] too busy. And you couldn't find that time to complete the questionnaires.

Rachel preferred to do the screening before her checkups because she liked to know what to expect when she saw her healthcare provider. She felt that completing the screening ahead of time will give her enough time to think of what to say to her healthcare provider, if any.

Yeah, I mean, I mean I do it before [the checkup] and then we can talk about it. That makes me feel, uhmm... that means I know what we are talking about. For me it'll be much better (to know what to expect). And I can think, I can think about to look [up] what I'm talking about this week with you. Yeah, [if] in the face-to-face meeting, I just answer the questions and [then] you ask me, oh, so do I have any problem with this? I will need some time to think about it. [But] If I do it [the screening] before that, I have a long... enough time to think about it.

PPD screening for dads

Another topic that came out during the focus group discussion was how the participants felt that their husband was also under a lot of stress especially if the baby was their first child. Ananya mentioned,

Yeah, my husband was really supportive, you know, but sometimes we had a fight because of the baby, and all of the pressures. It's really overwhelming to have a baby. Right? And this is our first baby, so we want everything to be right. And I know he, I think he was under, you know, a lot of distress, like pressure because of the baby. Uh, I could tell that he was depressed, but, you know, I didn't know that there was like some kind of groups or screening for Dads as well. I'm really, really grateful, you know.

Aiesya agreed that screening fathers for PPD is as important as screening mothers.

Yeah I think I experienced the same, the husbands also have pressures. And I also thought... There must be some postpartum depression screening for husband...

Honesty with mHealth

Despite the availability of online screening method, Tammy still preferred to complete the screening via face-to-face interview. The direct interaction helps with more accurate screening and reliable results as the individual being interviewed is unable to provide false information during screening process, especially with the presence of a translator. Online screening, on the other hand, may actually encourage answer falsification. . In her own words,

It's more accurate and easier if you [someone] say it [verbally]. If there's a language barrier, we have a translator. You know, [with] just the apps, more simply [easier] for them if they don't want to be honest... If you've, connected with that nurse or the researcher face to face, the answer will be more reliable.

The device did not make much difference for Aiesya, but she would feel more conscious about her answer if she was asked face-to-face while the healthcare provider was reading from the screen. She preferred to complete the screening using paper without looking at the healthcare provider during the process. She stated,

I would say, whenever they asked [the screening questions] and I'm reading from the screen, sometimes I don't answer honestly because I am sitting face to face and she's [the healthcare provider] asking. I would be more conscious. But if someone gives me a paper to mark the number, [for example] how is your mood and everything... that, I think I can do [be] more honest because in that case I'm not conscious that the person is looking at my face while doing it.

Rachel added that she might be more honest when completing the screening on paper compared to when asked verbally in person due to the language barrier (referring to her previous answer). She said:

Uh I think I'll be more honest to answer the questions on paper. [With] the nurse would be sometimes, as I said, I can't understand... Not because I don't want to make mistake... because it's difficult.

Another participant, Indah, said that she would feel that completing the screening using mobile device would provide her with more privacy and therefore less intimidated to answer the questions.

...So, first thing, it gives me more privacy. So, if I have a problem, maybe I would feel less intimidated to share it, or I would feel less shy or less ashamed about it. I would just go; I would just type that one. But then the other thing is when there's no interaction, I might not really know what to... what they expect. Whereas...I usually ask, what do you mean like, like, [with] this? I would ask more questions about a question. And that is not something you can do...if it's on one of that [mobile device].

Earlier, when she was talking about the accuracy of PPD screening using a mobile device, she also mentioned that the accuracy of the screening results will be affected by the honesty of the person completing it. She said, "Maybe [the results would be accurate] ... if the respondents can be more honest by filling it on the mobile device." She also added that some people might feel intimidated answering questions in a face-to-face session. They might be more comfortable using mobile devices because they have more freedom to answer the screening questions without talking to a person.

Some people can feel intimidated when they are being asked face-to-face. So, they tend to not tell everything. But then... but if it's on a mobile device, they feel like oh, it's not a person. They can just say everything that they feel.

Additionally, she mentioned that she would be more skeptical about answering the screening questions if [she knew] she was depressed. That also applied to her honesty when answering the questions.

That's why I'm thinking that if I had a different situation, I might be more skeptical to put things with my response. Hmm, like, I have to make sure that the screening is done anonymously or that my personal data is not taken.

Overall, the participants reported different preferences in terms of the method of the screening. However, they generally agreed that the method used were not as important as their emotional and physical state while doing the screening and whether or not the healthcare personnel administered the screening. For mothers from non-western countries, there were concerns about privacy and language when completing the screening, which influenced how they answered the screening questions.

Summary of the qualitative part of the data analysis

This chapter presented findings from the interviews and focus group discussions for the research. The researchers conducted five interviews and two focus groups with a total of 11 women for this portion of the study. The participants included nine foreign-born women who were either pregnant or postpartum at the time of the interview. In terms of the importance of screening, most participants did not know that there was a mandate from the state to screen all pregnant and postpartum mothers for depression. However, all of them agreed that it is important for pregnant

and postpartum moms to be screened for depression during checkups. Among the reasons brought up, the screening would help the moms to protect themselves and give the sense that the healthcare providers care about their wellbeing.

Based on the experiences of these mothers, sometimes the depression screening process were not made obvious, and the screening questions were frequently misinterpreted as a sign of concern or small talk by the healthcare providers. There were concerns about the screening timing, the standard screening practices by healthcare providers, and lack of knowledge about the screening, which made these mothers answer the screening questions inefficiently. Participants also recalled having issues with language barrier and cultural differences that affected the way they viewed, answered, and chose the method of depression screening.

In general, the participants were not opposed to using mHealth for depression screening but maintained that more options should be made available for the depression screening methods, including using paper and pencil and the verbal method. Although some of them thought that mHealth would produce a more accurate result, some still believe there are values in completing the screening using the traditional method since the needs and level of comfort with the depression screening questions and methods are different for them. They expressed different preferences based on, among others, their personality, practicality, time, and the time of the screening.

Regarding the UTAUT measure captured in the interviews and focus groups, participants are receptive toward mHealth for its benefits. They mentioned trustworthiness, accuracy, ease of use, and even benefits for the environment because mHealth reduced the use of papers. Since many of the participants are familiar with mobile devices, they did not express any anxiety in using mHealth for depression screening but mentioned technical and literacy support just in case they need one while completing the screening. As for social support, all of them believe they will get

the support they need but emphasized that they do not need anyone to tell or encourage them to choose mHealth to complete depression screening. There was no anxiety about using mHealth to complete depression screening despite the barriers. The participants also talked about other topics such as the need for early screening, whether they are comfortable sharing symptoms of depression, the needs for depression screening for fathers, and what affects their honesty when answering depression screening questions using mHealth. All participants expressed interest in using mHealth in completing depression screening even though many of them suggested a combination of mHealth application with a face-to-face method to increase the efficiency of the screening process and the credibility of the results.

While none of the participants were ever diagnosed with PPD, most of them are familiar with the term and have at least heard about it on the media. Participants are mostly open to seeking treatment if diagnosed with PPD and believed that the depression screening could prevent something worst happening to the mother and the child. Since the majority of the participants were foreign-born and had different experiences, they also discussed how people talked about and treated women with PPD differently in their home countries compared to the US. Themes such as the need to appear strong, social class, and shame were brought up in their responses. Based on their responses in the interviews and focus group discussions, participants had different ways of coping with stressful times during pregnancy and postpartum. They, however, did not hesitate to get help if the screening results revealed that they were experiencing symptoms of depression. Regardless of their cultural background, all women interviewed agreed that the stigma surrounding PPD exists and sometimes hinders mothers from getting help.

The results of the mixed-methods section of the study are provided in the next chapter. The study's quantitative and qualitative results, including their overlapping and contradictory facets,

are presented and discussed collectively using a joint matrix. Patterns such as confirmation and disconfirmation of the responses and results are also discussed.

CHAPTER 6: MIXED-METHODS ANALYSIS

This chapter presents the results of the mixed-methods data analysis. The overarching questions that guided the mixed data analysis in this study were:

1. What perceptions toward the use of mHealth for PPD screening are held by the sample of prenatal and postpartum low-income migrant women (PPLMW) in the study?
2. What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLMW at the clinics, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?
3. How, and in what ways, do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?
4. Among the participants, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?
5. How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?

In this chapter, the researcher presented the findings in the quantitative and qualitative sections of the data analysis and discussed the triangulation results. Using a joint matrix, the researcher provided a larger picture of the phenomenon being investigated based on the derived findings of the statistical analyses, the interviews, and the focus groups. Joint matrix is used to merge and juxtapose the data (Bazeley, 2018) to check for confirmation, disconfirmation, cross-validation, or corroboration on the theme or topic (Creswell, 2009). This way, additional insights about the data

could be revealed and analyzed together, while also providing a broader perspective about the data and how they influenced the study. In this study, the researcher used complementary sources to enhance reporting -- the quantifiable data from the survey were useful in areas where rates, percentages, and charts were necessary to show the frequencies of response. At the same time, the qualitative interviews and focus group discussions were useful in understanding the underlying reasons for the observed patterns as illustrated by Teye (2012, as cited in Bazeley, 2018).

Triangulation and Merging of the Data

Data for the current study were analyzed quantitatively and qualitatively and displayed side-by-side in a joint matrix as shown in Table 29. Arrays of qualitative and quantitative domains were derived from the constructs and themes used in the survey and interviews/focus groups. Boxplots and descriptive statistics for the average ratings of participants' answers for all factors in the survey are displayed in rows for quantitative arrays. As regards qualitative arrays, selected excerpts from the individual participants in interviews/focus groups are displayed in the columns. This is presented according to themes that fit best with responses. The remaining rows in the matrix included other themes that surfaced during interviews/focus groups, which were supported by the data from the quantitative portion of the study. Narratives were also used wherever appropriate for themes or data that are connected to each other but do not necessarily fall under the rating part or the joint matrix. Results from the quantitative findings were compared with results from the qualitative interviews/focus group analyses and were discussed together through narration. This process helped in identifying overlaps and different facets between the two sets of findings and giving a bigger picture of the data in answering the research questions.

Table 29

Visualization of Participants' Responses Through Joint Display Arraying Categories by Themes for the Current Study

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
Performance expectancy Mean item means = 3.550	Rania I believe so [in screening with mHealth], because if I would say I am feeling depressed, I somehow hope they [healthcare provider] would react. It's not that literally helpful as I believe the application [mHealth device] would be where I would be asked more questions to tell how I feel more precisely than just, "hey how are you doing." Rania I think it is the same accuracy if people are doing their job correctly, whether you write on paper and using a mobile device. I don't think it will improve on accuracy, maybe just improve easiness to use. Reena Maybe even more accurate with mobile, to prevent human error with mobile. It will help to realize what are you facing [depressed or not depressed or whether you need help]. Ananya I think it's a really good help because there are like the question started more general and then more specific, so you know what kind, what degree of depression you are going through, right? And that'll help you to seek help, like if you have low depression, that's good, but if you have [a] bad depression, you can choose to seek help. Aiesya Yeah, I think it will be, apparently more effective, more accurate. [But] I think maybe if you put more time when you answer the question, it might be more accurate. And an option to go back [to the previous page] just in case [you changed your mind]. Fauzia Yes, yes [believe mHealth would improve accuracy]. Because there's like some software [algorithm] they apply some stats on that. But also, there are drawbacks, limits of those software. I don't know how that works here. And there are [must be] some limitations on the items too... It should have some portions like 20% of the paperwork and 40% of computer work, or something like that I think...

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	Maria Yeah, the only thing is, that if [we] just do it by ourselves, maybe the accuracy of it. It is, for example, it's like you are forced to finish. So, it's not from your own willingness. Or you know, for some people, they don't think that this screening is that important, then they may just do it without much caring. So, the result may be not really representing their status. So that might be a downside of this.
Effort expectancy	Rania I think it's just more convenient, easy nowadays, to use technology instead of paper. I mean it's just more convenient to send the results, to read, it's quicker, easier. I just see these benefits.
Mean item means = 3.886	Maria I think it can be very helpful (the mobile device). Because if you know that there is a tool in your phone, that you can reach out whenever you feel there's a need, or whenever it is the time to do the regular check, then it can be better. Tammy It's more accurate and easier than if you say it [verbally]. If there's a language barrier, we have a translator., you know, just the apps more simple for them if they don't want to be honest still be just like the way you want it as a researcher {practitioner}, you want to. If you've, connect with that nurse or some the researcher face to face. It'll be more...the answer will be more reliable. Indah Maybe I can see two impact from filling it on the app. So, first thing, it gives me more privacy. So, if I have a problem, maybe I would be, I would feel less intimidated to share it, or I would feel less shy or less ashamed about it. I would just go; I would just type that one.... Some people can feel intimidated when they are being asked face to face. So, they tend to not tell everything. But then... but if it's on a mobile device, they feel like oh, it's not a person. They can just say everything that they feel.
Attitude toward technology (mHealth)	Rania I have positive opinion on this mobile technology and using it for screening. I just never done that and my first pregnancy was monitored in Croatia, in Europe. We didn't have that experience. And I
Mean item means = 3.700	actually don't know how it would work.

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	Rania I don't think it is such a threat for us, to reveal our health information online. I also have my mHealth application where I get all the tests results, how is that not compromised. I don't think that's a big deal for me. I believe in online security. Tammy So, I think we also can use the mobile device to do the survey, but that's just for like a very earliest stage. Very early stage. If we want to make a final statement of the research or anything like that, you should talk to [the patient to] get more precise answers. Even with test I might not trust the screening result. Maria I think it can be VERY helpful (the mobile device). Because if you know that there is a tool in your phone that you can reach out whenever you feel there's a need or whenever it is the time to do the regular check, then it can be better. I think since nowadays the cell phone is more and more involved in everyday life, I do think it definitely should go that way. So, it's, it's like definitely can help better... Indah But, again, having a mobile device can make you more open, maybe if there are things that you don't feel comfortable to talk about directly, but you actually want to let it out. Like you don't want to talk... You know? Yeah. But there's a way to express it.
Social influence	
Mean item means = 3.218	Rania It's just so common for me to use it, I just don't need social support. I live with a computer, that's my work too, so I am always surrounded by computers and by technology. For me, that's very common and I do not need any encouragement to use it. Ananya Oh, I'm living with my husband, so he's the only one for me and I don't need any help for depression screening. Yeah. But if you don't have... the words, like if you don't know English that perfectly... THAT, I think I need help Maria

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	I think if I did it by myself on the cell phone, it might make me feel like it's not that authority as it is performed by a nurse. But if the initial introduction was performed by a nurse, nurse and it was introduced by the doctor, then I won't have any doubt with it..... I think if it's a serious screening, then maybe [support] from Doctor. Indah Maybe I will ask. I will ask them if they ever used it or how they, what they think about it, but I will still have my own opinion.
Facilitating conditions	Rania If I come across with some problem that the application doesn't work or if that I cannot fulfill something or submit, I will just need this technical help in dealing with it- Or understanding the questions, you should always have someone to help clarify if something is unclear. Other than that, I don't see it should be a problem to fulfill that. I would need that, like I told you, the application should have someone to help you online to clarify the questions. Whichever questions, for example this one wouldn't be clear, I would just click and hope there is someone who can clarify. Like online support, an application with online support should work.
Mean item means = 3.865	Ananya One thing is that you know I been to depression study, if it is a paper form, they have like 20 pages or something... it's too long... and uh maybe like as short as possible because like you know...short and simple. Aiesya I think language should be simple. Like not complicated and I have to check the dictionary. One more thing just came to my mind because we haven't talk about it, it's um translator button. That if someone needs some kind of translation. There should be an option to go back and uncheck. Ananya Yeah, I think if it is like ...computer, there should be an option to go back and change because you know when you reach the next question, you just confuse that maybe I click the wrong answer and maybe I need to change it Reena Maybe if it's possible, if you put the questions in [a] big page but not in one and next? (Scroll vs Next button).

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	Rachel The first one is, if it's possible, more language [options], more than just English. A second one is, um, I think it'll be better [if] they have the specific questions. I mean, if I do it on paper, or on mobile perhaps I don't have someone to explain it fully [in detailed]. [What I meant by] fully, just like I said, if I went to the hospital, the nurse and the doctors can explain the questions. So, it's okay. Even though the question is hard, they could explain it. But if I have to do it myself, I think it's more difficult to read the specific questions. The third one is, I prefer they don't make more [too many] steps. I mean, sometimes they have a lot of questions and every question say I need to choose and then click to confirm. Yes, less things I need to do. I prefer to choose, choose, choose, then confirm. Ananya Yes, 10 questions in one page for me, and I think if you let [me] know how many questions are there. Sometimes, it's good to know.... Like there are 25 and you answered 10 questions. You don't know. How long will this go? Maria You mean the screening for depression? I hope it can be user-friendly. An easy to read and understand, the apps is clear, not too much, not too many [questions] in one screen. So, one thing at a time, one step up to another step. And you can go back if you think they're wrong... you can go maybe go forward as you like. And make it like good looking. Yeah, the design... Yeah, yeah interface and for me if it's if we can really make these questions or the introduction of the questions, kind of more like human that might be better. So, I think if this app can be having this really human interaction then might be helpful.
Self-efficacy Mean item means = 4.136	Rania If I come up with some problem that the application doesn't work or if that I cannot fulfill something or submit, I will just need this technical help in dealing with it- or understanding the questions, you should always have someone to help clarify if something is unclear. Other than that, I don't see it should be a problem to fulfill that. Tammy (Translation) I won't need any support [sic]. The question [issue] is that I might not trust that result. Well, I don't know the actual answer right now, but it's just the hunch. Just a feeling. Because I hadn't done that test before. Oh, I don't know how regulated that procedure is.

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
Anxiety Mean item means = 2.467	Reena I don't think I need any support.
	Rania I don't think so, because you can protect these forms very good now online, and I don't believe that- well, we pay bills online, we do everything online nowadays. I don't think it is such a threat for us, to reveal our health information online. I also have my mHealth application where I get all the tests results. How is that not compromised? I don't think that's a big deal for me. I believe in online security.
	Indah No, not really [having anxiety]. I think just as I said before, it would be nice if I have follow-up questions about the questions, [it] would be nice to have a way [channel] to express them.
	Indah ...That's why I'm thinking that if I had a different situation, I might be more skeptical to put things with my response. Mm, like, I have to make sure that like, the screening is done like, anonymously or like that my personal data is not taken. Yeah, it's purely just the answers. And that's why I think if I had issues that I want to report in a privately like confidential issues then yeah, I would think three times five times (to do it on mobile device).
Behavioral intention Mean item means = 3.797	Rachel The mobile phone, I mean more convenient. Not make me feel nervous.
	Rania Yes, I think it's just more convenient, easy now a days, to use technology instead of paper. It's like if you are using paper you have to-- I mean [with technology] it's just more convenient to send the results, to read, it's quicker, easier. I just see these benefits.
	Reena Yes, in this modern [time], maybe it's time to get there (move to mobile device).
	Maria

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
Stigma Awareness Mean item means = 2.641	Oh, I think since nowadays the cell phone is more and more involved in everyday life. I do think it definitely should go that way. So, it's, it's like definitely can help better... Yeah, it should be integrated [in healthcare]. Rania I think people more and more know about it and accept it. How doctors view it, I think they are busy. And most of the time, they are different people different doctors, some of them are more compassionate and others are more cold and some are interested and some of them are not. Personally, if someone would come [to me] and contact me saying 'I have some problems', I would try to help-would I judge? No. Media made sure of it, now, we kinda believe it is normal. Some women just experience it and I don't think it's such a big deal as it was maybe fifty years ago. People are more open and less concerned to admit they have some issues. Ananya My mom had depression [after giving birth] and you know, in Asia they don't really care about prenatal and postnatal depression. They don't even know about that and it was long ago. I think if you have prenatal depression, the family, they just ignore it, right? But here in the US I think they really care about that thing and because of that information all the families, you know, your husband is the one that support you and then they are more patient. I think he is more patient with me. Once you [the husband] know it, it's not the person, it's not the nature of the person, it's the hormones... people are more lenient. Indah Yeah, sometimes people judge. For example, like they would say, like you should be happy because you can have a kid or some people cannot have kid... they just judge. I mean, they have no idea what's going on. Yeah. I think that can happen. But I think mostly they feel bad. And I mean, if the people know the women [who] experienced depression then maybe they want to help. Maybe they should reach out to them and asking "Hey, would you like to talk about it and make you feel better?" Fauzia I don't think I know, nobody talks to me about that topic... people don't normally talk to me about that topic. When I go to the hospital, they asked me about that... [I know] the types of depression and all that. Back when I was working at the pharmacy, I know that this [depression] is very common and there are anti-depressants for pregnancy, for everyone, also the people who have this [depression]. This [medicine] helps control that [depression] and they are good. They're working, they're working

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	differently. My observation was a little bit different... [Before this] I know that people are using [medicine] in the pregnancy and but I didn't know that it was a normal practice [common]. Yeah, I don't know that it is very common here. Maria I think for our culture, the mother... So, if she's from the... how to say, rich city or rich family and maybe the woman... the social status for the women is very high, and she's very important to her original family and for her new family [in laws] ... So, then I do think that depression would matters to all the family members. But if she's from the poor city or poor family, then maybe the woman was not that important for the family, maybe the children, the kids, the newborn baby...will be the focus. So maybe the mother can be neglect(ed). And she maybe feels like a huge change from the pregnancy and after delivery... kind of like a tool [to carry and give birth to the baby]? [After she] finished her job that's it. So, the depression can be an issue because they have no social resources to really take care of them. Aiesya Same with us [in Pakistan], no concept of prenatal, postpartum depression in our culture, I've been taking it lightly. [Meanwhile] here, yeah, actually I have [PPD] when I was pregnant with MM [her first daughter] actually. Here [people] is more caring and people pay attention because there is awareness.
Stigma Agreement Mean item means = 2.144	Rania I wouldn't be embarrassed because I believe that it is something that you cannot actually affect [control]. You can think positive and do all these things [try to manage it], but if you really feel concerned [when PPD hits hard], it's out of your [control]. Like, if you get a cold you have to take medicine to heal it. If you feel bad [have PPD], it's something you cannot control. I think so. I just view it as a part of life and you have to get cured and think positive and go through it. I am familiar with like mood changes, depression. I mean I've heard about it on TV all the time. So, and I don't think it's so embarrassing if someone doesn't feel good for different reasons. I just wouldn't judge and I think people now judge much much less, than it would be before like 50-100 years ago. Tammy Okay. Uh, that depends on the depression. I mean, how far would it go? So very slightly depression [less depressed], it's like, okay, the family could accompany her [the depressed woman] to give her some comfort that maybe ease the situation. But as the depression goes far along, to very serious,

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	maybe the family need some help from the professionals. You [would] think that families are closed to the pregnant woman [or woman who] gives birth to children but some of [the] feelings or depression maybe come from the family. Tammy ...Sometimes, for example in China, maybe they live with the mother-in-law...they [the mother-in-law] live with the (depressed) mother. And I mean [also with] other family. [It] is just all the cultural things. Then they would kind of give some stress to the pregnant women. So then maybe that caused a little bit depression [to the mother]. Fauzia It [is] just your acceptance to the society that's the reason for depression, I think mostly.
Stigma Application Mean item means = 2.133	Rachel I mean, for example, for my parents or my husband's parents sometimes, they perhaps didn't know [about] prenatal depression, they may be [might] thought it was not a big deal. [They might say] 'Just you have to calm down or something. Think about you... you are the mother's baby, think of good things and you will be better', but they don't know. Rachel When I give birth to the first baby, I [was] just very sensitive. [My family] put the blame on me, they just talking about what I did, [said I was] not a good mother and then I feel very pressured, a lot of pressure. Just about three months after that I feel much better. I don't think I did a very good job last time, I can do a better job this time. Maria I should say that when I'm out of control, I do feel like kind of like loser. It's like, 'why I cannot do that? Why it's like that? Why I'm so unlucky' kind of thought but not...not that bad. Not that I want to give up my life or something. So maybe at that time I maybe need more support from my family, from my friends and their words really means to me. But if I'm in a normal situation... then maybe I can take care of myself much better. Not that I need it. I think the real problem is that the person themselves just kind of give up. So, if she gave up then others cannot help. Indah

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	Maybe [I would respect myself less]. Maybe... because I would maybe feel [that] if I feel depressed and maybe I would also feel like I shouldn't be depressed. So, I would respect myself less. Like knowing that I should be grateful, but I'm depressed. Maybe there will be some sort of dilemma in mind, my head. Well. I really believe that the people who are close to me, they will not judge and that they will support me mentally. Really... And then it wouldn't make things better if they judge. Fauzia Sometimes [I feel stressed], I think, but it's not real because, we're Muslims. When we meditate, if your belief is strong, you just know... it is something from the God, you are having this... a little bit mood swing. And if your environment at home is not good, you try to adjust on that... 'cause we are Asians, we always have one marriage and so, we try to stabilize [balanced] everything. It's not that hard.
Stigma Harm to self-esteem	Rania Maybe during that time, well, when I feel that- very bad or scared, - does it has to do with respect? I don't know. In my opinion, it has to do with self-confidence. But then, can that affect respect is a big question. I don't know what to say, maybe in the long run lower confidence can lead to lower self-respect.
Mean item means = 2.166	Ananya Not really, I never feel that way. As you said.... Sometimes you just feel that people are not helping you, like people around you. And your problem is not like getting solved and that makes me depressed but not like, I don't feel, you know, feel low(ly) of myself. Aiesya I didn't feel less about myself. Support was important but if I don't get that that's fine. Reena I think because I gave birth at young age when my friends are still going for internships and getting jobs, getting very good accomplishment, but I'm [cannot do it], I feel a bit left out. And I think I feel a little bit low self-esteem. [But I] Just give it some time and I was fine. Rachel When I give birth to the first baby, I [was] just very sensitive. [My family] put the blame on me, they just talking about what I did, [said I was] not a good mother and then I feel very pressured, a lot of

Table 29 (cont.)

Themes and quantitative ratings	Qualitative responses from interviews/ focus groups
	pressure. Just about three months after that I feel much better. I don't think I did a very good job last time, I can do a better job this time.
	Maria I should say that when I'm out of control, I do feel like kind of like loser. It's like, 'why I cannot do that? Why it's like that? Why I'm so unlucky' kind of thought but not...not that bad. Not that I want to give up my life or something. So maybe at that time I maybe need more support from my family, from my friends... and their words really means (something) to me. But if I'm in a normal situation... then maybe I can take care of myself much better. Not that I need it. I think the real problem is that the person themselves just kind of give up. So, if she gave up then others cannot help.
	Indah Maybe [I would respect myself less]. Maybe because I would maybe feel [that] I feel depressed when I would also feel like I shouldn't be depressed. So, I would respect myself less. Like knowing that I should be grateful, but I'm depressed. Maybe there will be some sort of dilemma in mind, my head. Well. I really believe that the people who are close to me they will not judge and that they will support me mentally. Really... And then it wouldn't make things better if they judge.

Narratives of participants' responses based on joint matrix results - UTAUT

Based on the results of the joint matrix, the researcher presented the narrative of participants' responses. The narratives were presented by answering the research questions that attempted to be answered through mixed-methods data, which are RQ2, RQ3, and RQ5.

In RQ2, the researcher seeks to answer the following question: *What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLIW at the clinics, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?* Based on the joint matrix, the researcher provided a narrative for each factor in UTAUT discussed during the interview and focus groups to show their connections with the online survey results. The narrative elaborated the results from the quantitative and qualitative data to compose a more coherent picture (Bazeley, 2018) of the study findings.

For clarification, in interpreting the results in the online survey, the researcher treated the 'neither agree nor disagree' responses as valid responses. Baka et al. (2012) pointed out two main strands of midpoint response and respondents who select the middle alternative: non-attitudes (empty attitudes) and one of attitudes (undecided or middle position). Based on the mode and the mean of the item responses, the researcher interpreted the responses with the qualitative data to construct a more coherent picture of the results. The researcher weaved findings from the online survey, interviews, and focus group discussion to explain the agreement or disagreement and supporting statements by the participants for each factor in the UTAUT in the context of mHealth acceptance for depression screening among perinatal mothers.

Performance expectancy. Performance expectancy in this study was defined as the degree to which a patient believes that using mHealth will help to identify symptoms for PPD during PPD screening. In other words, the accuracy and trustworthiness of the results generated from the

screening also come into the picture when they are using the mHealth to complete the depression screening. The interviews and FG findings for performance expectancy enhanced participants' perceptions as captured in the online survey. The mean item means and modes from the survey results showed participants are leaning toward agreeing with the items on the performance expectancy scale ($\mu=3.550$). Additionally, even though participants' responses in the interviews and focus group discussions were mixed between the pros and cons of using mHealth to screen for depression during perinatal checkups, most of them believed that using mHealth yielded more benefits. They mentioned ease of use, effectiveness, the ability to explore patients' situation in a more in-depth look, and prevention of human errors as the benefits of using mHealth over the traditional paper and pencil or face-to-face methods. For example, Rania said that using mHealth would help capture her feeling more accurately, especially if each inquiry on the device includes follow-up questions. Another participant, Aiesya, also mentioned that using mHealth would be more effective and accurate, especially if the patients put more thoughts into their answers. However, Rachel thought that using mHealth would be difficult for her as she struggles with the language and needs a translator or a clinical staff to present and help clarify the questions for her.

In terms of participants' responses to the specific questions on this scale, the online survey showed that participants were mostly leaning toward agreeing that mHealth would be useful in completing the depression survey ($\bar{x}=3.62$, $SD=1.03$). Regarding the benefit, Rania mentioned in the interview that the ease of use and convenience of using mHealth made her prefer the mHealth. Online survey participants were leaning toward agreeing that mHealth was more effective than other methods ($\bar{x}=3.60$, $SD=.96$), increased their awareness of depression symptoms ($\bar{x}=3.40$, $SD=1.14$), increased the chance of detecting depression symptoms ($\bar{x}=3.60$, $SD=1.02$), and increased the chance of getting help immediately ($\bar{x}=3.54$, $SD=1.06$). For example, Reena's

statement showed that she believed mHealth was more accurate with the elimination of human errors. She and Ananya also mentioned highlighting symptoms and awareness of the needs to seek help as another reason mHealth would be preferable.

Effort expectancy. Effort expectancy in this study was defined as the degree of ease of use associated with mHealth, so patients will be comfortable providing information for PPD screening. In the online survey, the mean item means recorded for this scale was 3.866, indicating that most participants agreed that effort expectancy could be a factor influencing their decision to utilize mHealth to screen for depression during the perinatal checkup. Similarly, participants in the interviews and FG stated that their willingness to put forth effort when using mHealth would impact their decision to use mHealth to screen for depression. They do not expect that using mHealth will require too much effort. Participants in the interview mentioned some reasons for their reaction. As an example, Rania thought that using mHealth would be easier, quicker, and more convenient. She mentioned benefits such as convenience in sending the results, good readability, quicker completion time, and ease of use. The online survey participants echoed the same reaction where they also leaned toward agreeing that it is easier to complete depression screening using mobile devices ($\bar{x}=3.60$, $SD=1.01$) and more of them even believed it was easier to complete depression screening than other methods ($\bar{x}=3.90$, $SD=.91$). For instance, Maria believed it would be convenient to complete the depression screening with readily available devices and could be accessed anywhere, like a smartphone.

Honesty is another element that was asked under the effort expectancy theme. The online survey responses showed that participants leaned toward agreeing that it is easier to be honest when completing depression screening using mobile devices ($\bar{x}=3.64$, $SD=1.16$). Participants in the interviews and focus groups have their own mixed responses. The survey results were enhanced

by some participants who also mentioned that it is easier to be honest when completing depression screening questions via mHealth, like Indah and Aiesya. However, some participants also think it is easier not to be honest when using a mobile device to screen for depression, like Tammy and Maria. According to them, the lack of authority supervision and the tendency to provide a desirable answer are among the reasons one would not be honest when using mHealth. Other than that, other participants felt that there would be no differences in honesty when completing the depression screening using mHealth or any other methods.

Attitude toward technology. Responses from the participants in interviews and focus groups supported that most participants have positive attitudes about mHealth for depression screening. Attitude, in the study, was defined as the degree of positive or negative feelings about using mHealth for PPD screening. Their responses enhanced the online survey responses where participants were leaning toward agreeing that using mHealth was a good idea ($\bar{x}=3.70$, $SD=.95$) and that they would like to complete the depression survey using mHealth ($\bar{x}=3.68$, $SD=1.02$). During the interview and focus groups, some participants mentioned that completing the depression survey using mHealth is not much different from doing it on paper or face-to-face, so they were not opposed to using it. The online survey revealed that the lowest mean score for the attitude factor was for items 2 and 3, which was about whether completing a depression survey using mHealth would be interesting ($\bar{x}=3.38$, $SD=1.07$) and engaging ($\bar{x}=3.45$, $SD=.93$). These themes were never brought up among the participants in the qualitative data. Instead, most of them have positive attitudes toward mHealth due to its convenience, security, and ease of use. One of the participants, Indah, also mentioned how mHealth could encourage patients to be more open in answering questions that they do not want to discuss openly or are uncomfortable mentioning, either verbally or in writing, in front of their healthcare practitioner.

Social influence. Generally, based on the online survey, participants neither agreed nor disagreed that social influence would affect their decision to use mHealth for depression screening ($\mu=3.218$). However, the scale's individual items showed that most participants disagreed that those who influence their behavior would think they should use mHealth to complete the depression survey ($\bar{x}=2.96$, $SD=1.02$). Even for the second item, participants were leaning toward disagreeing that people who are important to them would think they should use mobile devices to complete the depression survey ($\bar{x}=3.13$, $SD=1.04$). Additionally, the interviews and focus groups participants do not think they would need any encouragement or support to decide to use mHealth for depression screening. In this case, most participants are referring to their other half or immediate family members who lived with them, like their parents. Because most of the participants are non-native English speakers and the screening items are in English, language and comprehension were the only reasons given by the participants that they might seek support (when using mHealth) from either their spouse or their healthcare practitioners. In terms of social influence from their healthcare practitioner, the online survey revealed that most participants were leaning toward agreeing that their healthcare providers would help facilitate ($\bar{x}=3.36$, $SD=.94$) and support ($\bar{x}=3.43$, $SD=1.04$) the use of mHealth to complete the depression survey. The mode of the responses in this scale showed that participants mostly responded '4=Agree' when it comes to the influence of healthcare providers in using mHealth for depression screening. For example, in her interview, Maria mentioned how the presence of healthcare providers—either the physician or the nurse, while completing the screening would give the sense of 'authority' that the patients would trust more.

Facilitating condition. Facilitating condition in this study was defined as the degree to which the individual believes that an organizational and technical infrastructure exists to support

the use of mHealth for PPD screening. The mean items mean for this factor showed that the participants were leaning toward agreeing that the facilitating condition could influence their decision to use mHealth to screen for depression ($\mu=3.865$). This scale has been the favorite among the participants in the interview and the focus groups to discuss. However, they mostly talk about the features on the mHealth that will be helpful for them when completing the depression screening. Among conditions that they thought would be desirable are the appearance and organization of the questions, the graphic user interface, technical support, and language and question clarification assistance. The participants have no doubt that they could easily use mHealth but assistance and technical support would be preferable than none. In the online survey, participants agreed that they have the necessary resources to use the mobile device to complete the depression survey ($\bar{x}=4.13$, $SD=.92$). Most participants in the online survey also strongly agree that it would be easy for them to become skilled in completing the depression survey using a mobile device ($\bar{x}=4.19$, $SD=.97$). However, in terms of the assistance available for them when completing the depression screening using the device, most participants have chosen “neither agree nor disagree” (mode=3) probably due to lack of information on the kind of assistance that they could expect.

Self-efficacy. Self-efficacy in this research refers to an individual's belief in his or her capacity or ability to use mHealth to accomplish PPD screening. The questions mainly focused on the conditions in which participants thought they would be able to complete the screening, including the built-in facility for assistance. The responses in the online survey showed participants overwhelmingly agreed (mode = 5) that they could complete the depression survey using a mobile device if there was no one to assist or tell them what to do as they complete it ($\bar{x}=4.26$, $SD=.83$). The interview and focus group discussions also revealed the same pattern. Most

of the participants believe they live in an age where everything turns to technology, so it is almost natural to use mHealth just like any other handheld device such as smartphones or tablets. Participants believed they could complete the screening by simply following the link given, or if they had the device and the link. The online survey revealed that participants agreed that they could complete the survey using mobile devices if they could call someone for help if necessary ($\bar{x}=4.02$, $SD=1.02$), if they had sufficient time to finish it ($\bar{x}=4.22$, $SD=.786$), and if they were given a built-in facility for assistance (e.g., Help button) ($\bar{x}=4.04$, $SD=.942$). The theme built-in facility has also been discussed in the facilitating condition, where participants believed some features would be helpful for them in completing the PPD screening using mHealth. For examples, dictionary, help button for questions clarification, follow up questions embedded in the app, translation feature, user-friendly interface, or live chat assistance.

Anxiety. This factor was defined as the degree to which an individual is anxious or his/her emotional reactions when it comes to using mHealth for PPD screening. As expected, most of the participants do not agree that using mHealth for PPD screening would give them anxiety. The mean item mean for this scale was 2.467, which means the responses in the online survey learn toward not agreeing. The modes for the items on this scale were 2 and 3. Responses from the participants in the interviews and focus groups also showed the same pattern. None of the participants interviewed agreed that they either feel apprehensive about using the mobile device to complete the depression survey (online survey: $\bar{x}=2.87$, $SD=1.47$) or think that it is scary to think that the depression survey will generate inaccurate results because of the mobile devices they used (online survey: $\bar{x}=2.50$, $SD=1.13$).

Even though most of the participants' responses reflected the pattern in the online survey results, more information was discovered based on the interviews and focus groups. Indah, for

example, thought that she might be more concerned about the information she entered if she was actually depressed, for fear of being judged. Other participants quoted that they were not anxious about using mobile devices to complete depression screening and believed in online security as doing online surveys and transactions has been a big part of their everyday lives. The responses were also reflected in the online survey, where most of the participants do not agree that they are hesitant to use mobile devices to complete the depression survey for fear of making mistakes that will generate inaccurate results ($\bar{x}=2.39$, $SD=1.15$). The online survey also revealed that the participants do not think that using the mobile device to complete the depression survey would be intimidating for them ($\bar{x}=2.11$, $SD=1.06$).

Behavioral intention toward using mHealth. The dependent variable in this study, behavioral intention, is defined as the degree of a patient's intention to use mHealth to screen for PPD. This scale contains three items that asks whether the participants intend, predict, and plan to use the mobile device to screen for depression for the remainder of their pregnancy and after giving birth. According to the online survey results, this scale has the mean item means of 3.797 and all items recorded modes of 4, indicating that participants were leaning toward agreeing that they intend to use mHealth to screen for PPD during and after pregnancy.

The participants in the interviews and focus groups also agreed that the way to move forward is to use and integrate mHealth in perinatal care specifically in screening for PPD among mothers. However, some participants also mentioned that they might be quite hesitant if, after being screened using mHealth, they did not get to have a face-to-face session with their healthcare providers. Many of the participants quoted the ease of use, efficiency in terms of time and resources, and convenience as the reasons for their intention to use mHealth in completing the PPD screening. Overall, they believed that perinatal healthcare would eventually evolve toward

incorporating more technologies in the delivery of perinatal services, even though some patients might be skeptical about it.

Narratives of participants' responses based on joint matrix results – SSMIS-SF scale

In this section, the researcher elaborated on the results from the online survey and the interviews and focus groups findings. The researcher interpreted the quantitative responses together with the qualitative data to construct a more coherent picture of the results to see if the stigma was relevant in the context of mHealth acceptance for depression screening among mothers in the study.

Stigma awareness. This scale asked if the participants were aware of public perceptions of people suffering mental illness. Participants in the interviews and focus groups were mostly aware that PPD is highly stigmatized in society. However, they think that nowadays the public is becoming more accepting of mothers suffering from PPD. Today's media and social media have also made it rather common to hear about PPD. For instance, there are more movies about PPD now than they were in the past, which portray more stories about the struggles of those who suffer from the syndrome. Those shows sometimes become a learning trigger for mothers to learn more about PPD. Additionally, most of the interviewed participants believed that PPD is becoming more talked about and people are more open to discussing it, especially in the US. The responses from the online survey show most participants disagreed with the public's perception that people with mental illness are to blame for their problems (item 1: $\bar{x}=2.80$, $SD=1.17$). The performance of the other items (item 3, item 4, and item 5) on the scale reflected the same pattern (did not agree to the statements), but for item 2 - *people with mental illness are unpredictable*- participants' responses were leaning toward agreeing ($\bar{x}=3.16$, $SD=1.22$).

In terms of the way the public treated or reacted toward women who suffer from PPD, there were differences highlighted by these moms based on their experiences. Initially, these participants believed that women and mothers in the US have more say in their birth and postpartum plans and have more autonomy to decide for themselves than women from Asian countries, like China, Nepal, and Pakistan. Additionally, participants from Asia like Ananya, Aiesya, and Maria, also agreed that the public are more judgmental and less compassionate towards mothers with PPD compared to in the US. Sharing her sentiment, Ananya mentioned during her interview,

“My mom had depression [after giving birth] and you know, in Asia they don’t really care about prenatal and postnatal depression. They don’t even know about that and it was long ago. I think if you have prenatal depression, the family, they just ignore it, right?”

Other participants discovered that they, too, had a similar experience. Some also quoted saying that PPD was not discussed (or enough) in their culture, and therefore, they were unaware of the illness until they moved to the US. This subject was also discussed in an interview with Rachel, who recalled her in-laws condemning her for not being a ‘good’ mother, hence leading her to believe that the problem was her own fault. Additionally, there were participants who talked about how they were told to be grateful having children rather than being depressed and therefore shunned the possibility of talking about PPD).

Stigma agreement. For this scale, participants rated their perceptions on how much they agreed with statements regarding people with mental illnesses. For the online survey, this scale recorded mean item means of 2.144, which reflected the participants mostly did not agree with the items on the scale. Responses for item 1 and item 3 recorded the lowest mean score, reflecting participants’ strong disagreement with the statements that say people with mental illness are to

blame for their problems ($\bar{x}=1.79$, $SD=.94$) and people with mental illness will not recover or improve their health ($\bar{x}=1.91$, $SD=.81$). In terms of PPD, Rania, for example, believed that women with PPD were not to blame for their illness, and quoted that it was something over which they had no control. In her own words,

“I wouldn’t be embarrassed because I believe that it (depression) is something that you cannot actually affect [control]. You can think positive and do all these things [try to manage it], but if you really feel concerned [when PPD hits hard], it’s out of your [control]. Like, if you get a cold you have to take medicine to heal it. If you feel bad [have PPD], it’s something you cannot control.”

Participants in the online survey expressed disagreement with the statements that people with mental illness are dangerous ($\bar{x}=2.00$, $SD=1.02$), unable to take care of themselves ($\bar{x}=2.35$, $SD=1.07$), or unpredictable ($\bar{x}=2.67$, $SD=1.2$). It somehow reflects the openness of these participants toward people with mental health issues without trying to be judgmental about how they are living their lives. In more than one occasion, participants in the interviews and focus groups also mentioned that they think people are less judgmental towards moms with PPD, especially in recent years. For instance, Rania mentioned during her interview:

“I am familiar with like mood changes, depression. I mean I’ve heard about it on TV all the time. So, and I don’t think it’s so embarrassing if someone doesn’t feel good for different reasons. I just wouldn’t judge and I think people now judge much much less than it would be before... like 50-100 years ago.”

Despite the belief that people are becoming more open and supportive of women with PPD, several participants in the interviews and focus groups also mentioned other factors that could get mothers

depressed or stressed out, such as pressure to meet the expectations of the family and pressure of getting approval from society.

Stigma application. On this scale, participants rated how they might apply the stigma to themselves. Just like in the other scales, this scale also recorded that, participants were mostly did not agree and some strongly disagreed with the items. Most participants strongly disagreed that they will not recover or improve their health if they have mental illness ($\bar{x}=1.93$, $SD=.87$) or that they are dangerous if they have a mental illness ($\bar{x}=1.79$, $SD=.84$). Other than that, participants' responses for the other items also shows that they disagree that they are unable to take care of themselves ($\bar{x}=2.38$, $SD=1.04$), are to blame for their problems ($\bar{x}=2.17$, $SD=1.17$), or unpredictable ($\bar{x}=2.40$, $SD=1.06$) if they have a mental illness.

Responses from the participants in the interviews and focus groups, however, were mixed. Some did not feel that they somehow adhered to the the stigma, but some others somehow felt that they were falling into the trap of meeting the expectations of society or family that might lead to stress. For example, Rania believed that some days could be harder than the others, but she didn't apply it to herself and mentioned she would just go through it.

“Not really, I never feel that way. As you said.... Sometimes you just feel that people are not helping you, like people around you. And your problems is not like getting solved and that makes me depressed but not like, you know, feel low(ly) of myself.”

Maria, on the other hand, felt like a failure when she could not accomplish a task, such as breastfeeding her son.

“I should say that when I'm out of control, I do feel like kind of like loser. It's like, 'why I cannot do that? Why it's like that? Why I'm so unlucky' kind of thought but

not...not that bad. Not that I want to give up my life or something. So maybe at that time I maybe need more support from my family, from my friends and their words really means to me. But if I'm in a normal situation... then maybe I can take care of myself much better. Not that I need it. I think the real problem is that the person themselves just kind of give up. So, if she gave up then others cannot help.”

Those were the days she would think that she did not try hard enough or luck was not on her side. Despite that, she never thought of harming herself and believed she receive supports from her family and friends. On another note, Rachel implied that she applied the self-stigma of PPD to herself during her first birth but she used the second pregnancy as an opportunity to improve her emotional management, as she mentioned:

“When I give birth to the first baby, I [was] just very sensitive. [My family] put the blame on me, they just talking about what I did, [said I was] not a good mother and then I feel very pressured, a lot of pressure. Just about three months after that I feel much better. I don't think I did a very good job last time; I can do a better job this time.”

Stigma harm to self-esteem. This scale reflects how participants experience harm - such as low self-esteem - when it comes to internalizing the stigma toward people with mental illness. Participants were asked if they might respect themselves less if they had a mental illness. Generally, participants mainly disagreed with the items on the scale ($M = 2.166$). The item that recorded the lowest mean was item 2 – *If I have mental illness, I might respect myself less because I will not recover or improve my health* ($\bar{x}=1.93$, $SD=.87$). All other items recorded item means ranging from 2.02 to 2.34, which indicated most participants did not agree with the statements or items.

In this context, the findings in the interviews and focus groups showed that the participants had varied feelings about the effect of the stigma associated with PPD on their self-esteem. Rania thought that her knowledge or awareness of the stigma of PPD might hurt her self-confidence but not affecting her self-respect as much, as she thought 'respect' would be a more significant issue. She, however, mentioned that lower self-confidence might lead to lower self-esteem in the long run.

“Maybe during that time (when she feels low), well, when I feel that- very bad or scared. Does it has to do with respect? I don't know. In my opinion, it has to do with self-confidence. But then, 'can that affect respect' is a big question. I don't know what to say, maybe in the long run lower confidence can lead to lower self-respect.”

Ananya firmly mentioned that the stigma of PPD was not affecting her self-esteem or self-respect. She never felt low(ly) of herself despite sometimes feeling people were not helping, which could lead to stress. However, she never felt that she should feel low or respect herself less. Her view was shared by Aiesya and she also believed that support was important, but she was fine even she did not get it. That does not make her feel less about herself. Reena, on the other hand, was more concerned about the fact that she gave birth at a young age hence did not get to advance in her career, that it made her feel a little low in her self-esteem since she felt a little left out.

Pressure from family members made Rachel experienced low self-esteem during her first birth. She felt like a failure as her family kept telling her that she was not being a good mother. However, she believed the second birth would give her a chance to try again (to be a better mother). Moreover, another participant, Maria, said she would feel like a loser if she felt like she did not meet the standard that she had set for herself and therefore, needed more support from her family.

However, she never thought of harming herself and giving up. In fact, she believed if things went her way she could take better care of herself. Along that line, Indah also felt that she might respect herself less if she felt depressed. Especially when she thought that she was not supposed to be depressed. She mentioned being grateful rather than depressed and thought that her family will not judge her for that and will always support her. All in all, based on the stigma factor, participants shared how their awareness and (dis)agreement to the stigma of PPD made them more aware of their mental health during pregnancy and after giving birth. Their knowledge of PPD and how they perceived PPD as more openly discussed in the US made them more comfortable sharing any signs of stress or depression during that period with their providers or close connections like family and friends. The awareness also made them empathize more with moms who suffered from PPD. Overall, participants did not think that the stigma about PPD made them want to harm themselves or less respect themselves or others. They also believed that they have and would continue to have support from people who matter to them if they are in distress.

CHAPTER 7: DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

This study sought to investigate the acceptance of mHealth and how stigma toward mental health plays a role in the acceptance of mHealth for PPD screening among women born outside of the U.S., recruited in Champaign County. A mixed-methods design was employed in the current study. Via convergent parallel mixed-methods design, this study intends to understand the acceptance of mHealth for PPD screening among low-income migrant women (also defined as ‘foreign-born’ in this study) in Champaign County. It also examined the role of stigma related to mHealth acceptance among the sample. The proposed research also aims to explain how these women embrace mHealth for PPD screening and how it could inform practices pertaining to PPD screening and mHealth adoption with this group by using UTAUT as an investigation tool. This chapter discusses the findings based on the topics pertaining to the experience of depression screening among migrant women recruited in this study. The researcher then summarizes the study and findings once more before presenting the implications and recommendations of the research.

Discussion of Findings

This section incorporates the findings presented in Chapters 4, 5, and 6 in accordance with previous literature and reflections from the interviews and focus group. The discussion of the findings focuses on improving depression screening experiences for foreign-born mothers and on factors that influenced the acceptance of mHealth for PPD screening among the mothers in the sample:

The importance of early screening for expecting and postpartum migrant mothers.

Participants in the current study have a positive attitude towards perinatal depression screening and its importance to perinatal women; hence, they believe that early screening is important.

Consistently, scholars suggest that many health practitioners prefer depression screening to take place during pregnancy (Brealey et al., 2010), even as early as eight weeks postpartum (Poole et al., 2006). From the healthcare provider's perspective, informing mothers that they are being screened in earlier visits will normalize the screening process and make it more acceptable (Brown & Bacigalupo, 2006; Poole & Mason, 2008). Realistically, screening alone does not improve treatment entry or outcome, but studies show that screening for perinatal depression significantly improves detection (Miller et al., 2009) and positively affects service use (Hsieh et al., 2021). More importantly, early depression screening is crucial in tackling the high prevalence of PPD in immigrant women, as the number is nearly twice that of nonimmigrant women living in Western societies (Neiman et al., 2010). The findings in the current study also underscored the importance of early depression screening for perinatal mothers from the low-income migrant women group. Expecting and postpartum migrant moms interviewed valued early screening for depression, mainly so they could seek help and manage their life during pregnancy or postpartum. Despite never being clinically diagnosed with depression, most women in the current study are aware that pregnancy and the period could be challenging and may lead to PPD. Breedlove and Fryzelka (2011) posited that incorporating depression screening early in pregnancy can increase the likelihood that women experiencing symptoms of depression will be identified early. Especially for migrant women, early identification is important as they are exposed to many factors that contribute to PPD. A review on associated factors for perinatal mental health disorders among migrant women from low-middle income countries (LMIC) in developed countries shows that factors for perinatal depression among migrant women include economic, psychosocial, obstetric, migration, and health system factors (Fellmeth et al., 2017), which are also experienced by some participants. Participants' awareness of the risk of PPD highlighted the exposure they had to PPD

even when they had not experienced it personally. They also acknowledged that they are exposed to the risk factors that could lead to depression, mainly lacking family and social support and maternal anxiety. In this context, studies associating migrant status with antenatal and postnatal depression in high-income countries show mixed results (Anderson et al., 2017). However, lack of social support, maternal anxiety, and life stress, which were all captured in the interviews, are well documented as among the risk factors that lead to PPD (American College of Obstetricians and Gynecologists [ACOG] Committee of Obstetric Practice, 2018; Anderson et al., 2017). Additionally, Anderson et al. (2017) also found lower social support and lower marital support as risk factors for depression symptoms in several studies among migrant women (Anderson et al., 2017). Early identification and appropriate psychotherapeutic interventions significantly reduce the risk of adverse effects of depression for the mother, infant, and family in the general population (Breedlove & Fryzelka, 2011). Moreover, with the COVID-19 pandemic, maternal depression and anxiety rates are increasing, signaling the strong need for heightened assessment and treatment of maternal mental health (Davenport et al., 2020). Therefore, the current study highlights two main reasons why early depression screening, preferably during the earlier term of pregnancy, is important, especially for migrant women, as described by the women in the current study.

Mothers and healthcare providers could come up with action plan. According to the mothers in the current study, early depression screening during pregnancy will help them seek help and plan treatment around their pregnancy, birth, and postpartum plans, especially when it is their first pregnancy in the U.S. For example, one of the participants who had been in the States for less than six months while carrying her first pregnancy emphasized that the screening would help her plan ahead if she might indeed get depressed. Her concern is valid because although research on PPD among migrant women is still growing, previous studies limning that asylum seekers,

refugees, and those who have recently migrated may be at risk for lack of early detection and treatment of PPD (Affonso et al., 2000; Dennis et al., 2017, Stewart, 2008). Early identification, screening, prevention, and treatment are important to improve overall outcomes for the mother and baby and reduce the risk of mortality and morbidity, as per the suggestion of Neiman et al. (2010). Since studies have also shown that episodes of postnatal depression are usually preceded by antenatal depression (Austin et al., 2008; Feinberg et al., 2006), depression screening during pregnancy offers a window of opportunity to detect any risk of PPD among migrant mothers and discuss further action with them.

In addition, exposure to information on PPD from the media also made the participants in the current study eager to take care of themselves. Martin and colleagues (2013) found that women seek out information during pregnancy as a way to prepare themselves mentally and physically before giving birth. Information seeking during pregnancy is also common for women for several reasons, including being curious about pregnancy as a novel experience, wishing to avoid poor health outcomes, and wanting to achieve maternity-related goals (Merrell, 2016). Indeed, participants in the study quoted hearing, watching, and learning a lot about PPD and cases of PPD from media such as TV shows, social media, and the news from the Internet. This information influenced the way they took care of themselves during pregnancy. Some of them even ‘expected’ that they would experience depression symptoms during pregnancy because they heard so much about it. As Breedlove and Fryzelka (2011) suggested, early depression screening could facilitate discussion or disclosure of therapeutic regimens, including current or past depression management. Therefore, while being screened during a prenatal checkup, mothers could ask further questions about their screening results and the information they obtained about PPD with their providers.

Subsequently, they could enquire about further action plans for their mental health treatment if the depression score indicates that they need assistance.

Depression screening is not only important for mothers but will also strategically help healthcare providers who are working with them. For healthcare providers, early screening would generally help in suggesting a treatment plan or care plan for mothers. It will also assist them in making referrals to available mental health treatment for the patients, if necessary. ACOG (2018) recommended that pregnant women be screened at least once during the perinatal period for depression and anxiety symptoms. They also suggested that initiation of treatment or referral to mental health care providers offers maximum benefits, despite evidence showing that screening for depression alone can have clinical benefits (ACOG, 2018). Any concerns could be discussed together to make sure the rest of the pregnancy goes smoothly. Depression screening during pregnancy is also important for healthcare providers to prioritize resources to follow up and treat women with the highest risk of getting PPD, such as those with a history of depression, psychiatric illness, and fetal anomaly, as this method would be more effective than screening low-risk pregnant mothers many times (Knights et al., 2016). Breedlove and Fryzelka (2011) highlighted that untreated depression in pregnancy would negatively impact perinatal outcomes, quality of life, relationship with the infant-child, and healthy family transitions. Also, it is an undeniable fact that depression during pregnancy was acknowledged to be the strongest predictor of PPD (Werner et al., 2015; Illiadou et al., 2019). Hence, early depression screening would enable the health provider and these mothers to be aware of any mood or behavioral changes that could be an alarming sign of depression during pregnancy and postpartum period.

Lack of social support made foreign-born mothers prone to getting PPD. Foreign-born mothers are at a higher risk of getting PPD because of a lack of social support due to being away

from families. Research on the association of social support and PPD among immigrant women is well-documented (Alhasanat-Khalil et al., 2018). Indeed, lack of social support continues to be cited as a risk factor for PPD among immigrant women and has predicted an even higher PPD risk among immigrant women. Past studies on perinatal depression among migrant women constantly found that social support could be a stress factor among migrant women. For example, an Australian study shows that immigrant mothers less proficient in English did have a higher prevalence of depression and were more likely to report wanting more practical and emotional support than their Australian-born counterparts (Bandyopadhyay et al., 2010). The same study also found that immigrant mothers were more likely to have no ‘time out’ from baby care and to report feeling lonely and isolated after childbirth, which made them vulnerable to getting depressed. Additionally, Dennis and his colleagues also found that at 12 and 52 weeks postpartum, most types of depression symptomatology were more common among recent and non-recent immigrants in Canada (Dennis et al., 2018). Therefore, support is very important for expecting and postpartum mothers during this crucial phase.

Understandably, foreign-born mothers in the current study mainly relied on their partners for support during those periods. They quoted their husband (since all of them are married) as the closest person who could provide support during those stressful times during pregnancy and after giving birth, since they lack social support due to being away from family or friends in their home country. However, since many of these partners are also first-time parents, they might ignore symptoms of depression, lack information about PPD, and might not have the necessary skills to help their spouses cope with stress during pregnancy and after giving birth. Further, they may also be subject to mental health issues since paternal depression is not unheard of. Paternal depression also has harmful effects on the parent, spouse, and child. Scholars suggest that paternal depression

during a child's early years may convey developmental and psychological risks to the child (Paulson, 2010) and may have a detrimental effect on the parenting behavior of the father (Wilson & Durbin, 2010). Consequently, this will affect the child's and father's well-being and nourishment. Therefore, early depression screening would help detect the earliest signs of PPD or paternal depression among these parents. In this case, mHealth has shown a positive impact on mental health when used in screening for depression among pregnant and postpartum mothers in different settings, including for prevention, screening, and treatment of perinatal mental illness (Hussain-Shamsy et al., 2020). Therefore, to screen for depression among perinatal mothers using mHealth, the next section will discuss why mHealth should be combined with a face-to-face session with a healthcare provider.

mHealth as an option among various depression screening modes for perinatal checkups should not be used in place of in-person consultation. In general, the current study found that migrant women were equally positive and comfortable with PPD screening using mHealth or paper-based screenings, albeit many of them preferred a combination of mHealth and face-to-face follow-ups with their medical or health provider. This finding echoed that of Kingston et al. (2017), where pregnant women were found to be fine with web-based or pencil and paper-based screening if it worked with the clinic setting. Most importantly, perinatal women screened for depression would want to have an honest conversation with their providers and would want their voices to be heard through open-ended questions, as per Hsieh et al. (2021) found. Indeed, the migrant mothers in the current study expressed openness to discussing depression symptoms with their providers during the interview. There was, however, little opportunity for them to communicate or discuss their responses to the depression test. This is a lost opportunity for the healthcare provider to delve deeper into diagnosing signs of depression in these mothers. Especially when, despite potential

linguistic and cultural challenges, they trusted and relied heavily on their healthcare providers due to a lack of social support. Kingston et al. (2017) suggested that it is important to reduce vulnerability throughout the screening process by reducing women's concerns, which could be achieved by explaining the rationale of screening and the implications of the results on them. This step is important to build trust and reduce anxiety among the women, as they might have perceived risk during the screening process. In the current study, trust in their healthcare providers might explain why these moms would still favor a face-to-face consultation in addition to mHealth. While research shows that immigrants avoid healthcare for several reasons, including language barriers, lack of knowledge of the health system, or lack of information pertaining to care access (Tobin et al., 2014), besides established cultural beliefs about health and healthcare (Maneze et al., 2015), the participants in the current study indicate otherwise. They expressed that they heavily depended on their healthcare providers for pregnancy and postpartum advice, including depression screening. This dependency explains their preference for an in-person session over mHealth. In contrast with research which found racial/ethnic minorities and foreign-born mothers were less likely to consult doctors or think they needed consultation for their emotional problems (Huang et al., 2006), the current study found that these mothers are positive about seeking help if they are diagnosed with depression during the antenatal period using mHealth. Several reasons might explain this phenomenon. To begin with, their status as a migrant in this country could affect their trust in and acceptance of the screening process. The respondents in the current study are mostly *regular migrant women*. This means that they choose to migrate voluntarily, through the legal channel with the correct documentation (Kilner, 2014), or are legally admitted or legally authorized to reside (Ramirez Perez, 2013). Hence, they are less concerned with legal issues or law violation reports. This situation also indicates that there is a certain amount of planning and

preparation involved before migrating to the host country. Unlike the *irregular migrants* -- those who are not legally admitted to the host country or have failed to renew their immigration license (Ramirez Perez, 2013), have overstayed their visa, or victims of human trafficking (Kilner, 2014), or have been forced to leave their home country (e.g., refugees or asylum seekers), the respondents in the current study are mostly economic migrants and transient migrants who moved to the US voluntarily. Therefore, the relocation and changes were already expected which explains their readiness to live and give birth in a foreign country. In some cases, their status might not represent the larger sample of their home country's population, which is usually represented in research on immigrants/migrants, and therefore, the available evidence is not usually applicable to them.

Further, migrant mothers in the study were mostly highly educated, so they had more trust and were more than ready to use the healthcare system in the US. Evidently, the information on the Internet, which are easily accessible, has led to a change in how women seek access to healthcare, with an increasing number of people obtaining health information or using mHealth. More knowledge of healthcare systems fostered their faith in the systems, as suggested by Samkangee-Zeeb and colleagues (2020). In their study on the migration-related factors in EU countries, Samkangee-Zeeb et al. found that being a first-generation migrant, poor local language proficiency, older age, and a lower level of education were all associated with lower use of internet-based information, which led to low trust in physicians. Indeed, socioeconomic status has been documented to influence health information seeking behavior across different groups. Past research has shown that socio-economic status, as measured by educational levels and occupational positions, positively impacts the health of mothers and their children through improved work and economic conditions, psychosocial resources, and healthy lifestyle choices (Stanek et al., 2020). Likewise, evidence on the use of the internet for health information

repeatedly shows that lower use of digital health resources is always associated with lower socioeconomic status, age, and being male. This, however, is not the case for the women in the current study since most of them possess at least a bachelor's degree and are relatively younger. A German study found that those from middle and higher social classes are more likely to seek health information online and women are more likely to seek health information on the Internet than men (Nölke, 2015), which might explain the current study sample's behavior better. In this context, many women or/and their partners in the current study obtained a postgraduate degree (albeit some did not work professionally), worked professionally, or were associated with higher education institutions in the US. So, despite some limitations in terms of language, they could understand English and be able to navigate basic health information on the Internet or rely on their partner to translate the material. This information navigation skill positively affects their pregnancy readiness and preparation. They could also conveniently research the resources they need in terms of healthcare needs. Their level of education and their partner's support alleviated the knowledge and language barriers, and as a result, they are more comfortable talking with their healthcare providers. Additionally, unique to the current study, participants living in students' housing also cited relying on the housing, campus, and local community resources. A stable internet connection and the available resources provided by the graduate housing office and the community made it easier for them to get more information about pregnancy and childbirth. They appreciate online support groups and research groups around campus that actively recruit pregnant and postpartum mothers in the community, which exposes them to more information and opportunities to connect with other mothers. Finally, previous experience in using technology for health-related information seeking also helped them to further research the pregnancy and birth resources available around them, which prepared them to talk to their healthcare providers. Yet,

the same could not be said about asylum seekers, refugees, or those who migrated by force, since research continuously shows that these groups often experience adjusting difficulties that lead to poor mental health, including cultural integration in host countries and financial difficulties, in addition to dealing with pre-migration traumas (Liem et al., 2021). Despite having a higher level of education, forced migration might have an impact on their mental readiness to start a new life in a foreign country. Evidence suggests that among groups with multiple socioeconomic vulnerabilities and complex health needs, such as immigrants and refugees, barriers to effective mental health screening include a lack of knowledge of the healthcare system, language and communication barriers, and stigma associated with mental illness and the use of certain services (Ferrari et al., 2016). However, this is not the focus of this dissertation, so it will not be discussed further here.

Additionally, participants in the current study preferred to use mHealth in conjunction with an in-person consultation as they recalled a number of challenges when using mHealth for depression screening. These challenges include literacy issues, language challenges, and privacy concerns. Additionally, there exists a gap in knowledge that limits their ability to respond to screening questions, which could be addressed better if someone or built-in assistance was present to help them. All these issues become barriers when they are using mHealth for depression screening. However, despite these challenges, migrant women in the study agreed that mHealth has the potential to help address barriers to accessing care, partly for its ubiquitous nature, portability, and convenience compared to using internet services on desktop computers and laptops, consistent with a study by Hussain-Shamsy et al. (2020). In this case, mHealth should not be viewed as a threat to human interaction but rather as an opportunity to improve communication between patients and healthcare providers. Mainly because these women found using mHealth

more practical and feasible when attending their checkups. Research on the feasibility of mHealth for depression screening in perinatal care settings is promising but still growing. In a UK study, tablet computers were deemed suitable to be used for depression screening for antenatal mothers in the waiting area of an antenatal clinic (Marcano-Belisario et al., 2017). A mobile tracking app (MTA) and an alert mobile application (app) were also shown to improve service delivery and patient engagement in patients with perinatal depression symptoms in a study with a predominantly low-income and race/ethnic minority sample (Hantsoo et al., 2018). These pieces of evidence show that mHealth has been used in screening for depression among pregnant and postpartum mothers in different settings, including for prevention, screening, and treatment of perinatal mental illness, and has shown a positive impact on mental health (Hussain-Shamsy et al., 2020). However, careful consideration should be given in ensuring the impact of using mHealth on clinical workflows and technology-related issues such as connectivity, privacy and security, and responsibility for the device (Marcano-Belisario et al., 2017, Pineros-Leano et al., 2015).

Also, while face-to-face consultation gives mothers or expecting mothers the opportunities to discuss anything they deem necessary based on their responses to the depression screening, mHealth could be a great addition to prepare mothers for their clinical visit. In its committee opinion, ACOG (2018) recommended that a full assessment of mood and emotional well-being be completed during the comprehensive postpartum, especially for patients screened for depression and anxiety during pregnancy. This is important to mitigate the risk of getting a more severe PPD. For migrant mothers in the study, this also means completing the depression screening using mHealth and bringing the responses and results to the table during their perinatal checkup. Nonetheless, during a perinatal checkup, the healthcare provider might spend more time eliciting signs and symptoms to find a diagnosis rather than explaining them. Less time spent on explaining

patients' conditions might leave patients confused and overwhelmed (Sherwin et al., 2013). Completing a self-assessment at home and bringing it to the checkup will give more time for mothers/expecting mothers to discuss depression symptoms with their healthcare practitioners during the perinatal visit. Today's patients expect to engage more with their treatment as a consumer rather than just a passive receiver of service. In the context of maternal health, this means mothers want more agency in making critical decisions, getting help when required, and being able to dictate and realize their own consumer experience (Gingiss, 2019). Yet, some participants mentioned that they did not even realize that they were screened for depression; hence, they were not ready with any questions afterwards. In this context, gathering data before a consultation could trigger meaningful discussions during the consultation that patients may have trouble raising directly (Sherwin et al., 2013). Participants in the current study have expressed interest in discussing more about the results of the depression screening. This is not surprising given that women preferred to talk rather than complete a standardized questionnaire and were critical of the lack of discourse following a pen and paper assessment in general (Brealey et al., 2010). Other studies that backed this up found that women appreciated feedback upon completing the questionnaire as they felt listened to and found it helpful to talk freely with the health professionals (Poole et al., 2006; Shakespeare et al., 2003). Certainly, mHealth saves time, reduces errors and costs, and, according to some participants, will give them extra time to prepare to discuss their symptoms with their provider. However, it should not replace the importance of in-person meetings with healthcare providers for further action plans. The next point will explore how transparency about screening is important to encourage migrant mothers to talk about their symptoms.

Health providers should be more transparent and culturally sensitive when screening mothers for depression. In discussing transparency during PPD screening with mHealth, the current study found that perinatal migrant women emphasized the importance of being aware that they were being screened for depression during the checkup. Consistent with this finding, research shows that women would like to know in advance if they are about to complete a postnatal depression screening survey (Poole et al., 2006; Shakespeare et al., 2003). Kingston and colleagues (2017) also suggest that it is important to explain the rationale for screening and how the results would reduce the vulnerable feelings of women who were screened for depression. A recent article by Hsieh et al. (2021) indeed found that patients view perinatal screening as ineffective when providers did not explain the purpose or use of the screening tool, did not tell patients anything about the results, or failed to provide any follow-up consultations relating to patient depression scores. Participants in the current study cited that they wanted to feel formally screened rather than only having small talk with their provider for a few reasons. One of the reasons is that they would want to come prepared. In this case, they could get ready with questions or information from their own research to discuss with their provider. Evidence suggests that lack of preparation might make women anxious and reluctant to answer depression screening questions honestly (Brealey et al., 2010). Brealey and his colleagues also suggested that in order for women to answer the questions honestly, they need to feel at ease about the screening procedures. This was validated by several participants in the current study.

Honesty in answering the screening questions would help improve the screening of symptoms. Through honest explanation (or confession, in some cases), health practitioners could evaluate the overall well-being of the mothers, especially pertaining to their mental health. This careful observation is important because, in some cases, the migrant mothers in the current study

said they were unsure about discussing PPD for fear of being labeled as ungrateful or bad mothers, which is common among migrant women (Schmied et al., 2017). Hence, they are hesitant to discuss their true feelings. Cultural stigma has been a consistent theme throughout the interviews in the current study. Participants talked about how people in their culture shun mothers from talking about PPD by denying it and labeling the mothers as spoiled or weak if they complain. Consistent with this finding, in a Swedish study, non-native-speaking immigrant mothers mentioned hesitation in sharing and discussing their moods because feeling shame at not being grateful enough for their new life (having a child or more children) (Skoog et al., 2019). Similarly, a meta-ethnographic study on the experiences of migrant women in dealing with postnatal depression found that many migrant postpartum women do not seek help even when they are in distress because, for them, being a ‘good’ mother and wife is culturally expected (Schmied et al., 2017). According to the studies cited in Schmied et al.'s review, motherhood is celebrated in many cultures where the migrants originated from, which also means higher expectations for the mothers. Thus, when the mothers were ‘unfit’ to perform the traditional roles as defined by the culture, it was easy for them to feel unworthy of their family and feel like they had failed as a mother. It is very important for healthcare practitioners to consider this well-documented factor when screening migrant moms for depression, besides knowing the right time to screen them. Other than that, the timing and method of screening for depression for perinatal mothers are crucial to ensure mothers can be screened effectively. During pregnancy, for example, some women may experience fear or anxiety. Whereas some also struggle during the postpartum period with pain, breastfeeding, or other issues, as mentioned by one of the participants. Screening them during this period might yield a misleading screening result. Other than that, a good interpersonal relationship

between the mothers and their healthcare practitioners would make them more open to discussing their feelings, as some studies suggested (Brealey et al., 2010).

Ultimately, depression screening should be an opportunity for healthcare providers to monitor any symptoms of depression in their patients. Especially because the nature of the screening questions made these mothers feel the providers were caring when they asked questions pertaining to their well-being. The current study found this to be true among the participants. They mentioned feeling cared for when their healthcare provider asked about their day. Previous research indeed found that women felt listened to when asked questions from depression screening instruments (Brealey et al., 2010) and felt that they were cared for when invited to participate in screening for PPD (Skoog et al., 2019), which increased the likelihood of honesty and disclosure (Shakespeare et al., 2003). Due to the lack of social support in the new country, these mothers reported feeling supported and cared for as a parent and as a person when the nurse asked them the screening questions. Although sometimes they were unclear about the objective of PPD screening, it left them with positive experiences. The next section will look at the role of health providers in encouraging migrant mothers to seek help for PPD.

Stigma does not stop migrant mothers from using mHealth for PPD screening but how their health provider treats them might do. In addressing the third research question, the current study found that migrant women felt that they were not influenced by the stigma surrounding mental health or PPD when completing the depression screening, whether through the face-to-face method or using mHealth. This result is consistent throughout the interview and findings in the survey. However, healthcare providers' attitudes and behaviors during clinical encounters could determine their willingness to discuss their mood or symptoms further. The role of clinical staff is also important as the current study found that many of these patients would need to discuss the

screening results. Mental health comes with its own stigma, which often becomes a barrier to care seeking (Thorsteinsson et al., 2018). Interestingly, the migrant mothers in the current study were positive about depression screening and seeking help if needed because they believe that the healthcare system in the US is less stigmatizing to those with PPD. As such, they relied heavily on their healthcare professionals' advice, such as physicians and nurses. This might happen due to the lack of social support from being away from family and friends in their country. Scholars such as Fitzgerald et al. (1998) postulated that for many migrant women, the separation from family and peers leads to 'breaks in knowledge'. The loss of these knowledge resources, which help prepare the mother for the processes of pregnancy, childbirth, and parenting, creates what Liem (1999, p.157) calls a "vacuum of knowledge" (DeSouza, 2006). The vacuum of knowledge needs to be filled, and this role most often falls heavily on health professionals (DeSouza, 2005), which explains their dependency on their healthcare practitioners. The trust and dependency shown by the research participants to their health practitioner is consistent with the finding from a systematic review that shows healthcare professional's attitudes could potentially influence how women and their partners and families perceive and experience maternal healthcare (Mannava et al., 2015). Barkensjö et al. (2018) also found that healthcare professionals' behaviors and attitudes could influence these women's trust in the clinician. They researched undocumented migrants and EU citizens without residency permits who were pregnant and/or giving birth in Sweden and discovered that women felt empowered, acknowledged, and encouraged, leading them to trust clinicians when healthcare professionals displayed empathic concern and listening behaviors. This theme aligns with the findings in the current study, which underscore the importance of positive clinical experience among migrant mothers. The positive experience also fosters their trust in

healthcare providers and diminishes fears relating to seeking healthcare services, as mentioned by Barkensjö et al. (2018).

Additionally, in terms of getting help, foreign-born moms in the current study were positive about reaching out or being referred to mental health experts if the results of the depression screening showed that they needed one and were not influenced by the stigma. This attitude stems from the belief that PPD is not a taboo within American society. Despite the fact that some of the participants had different experiences with pregnancy or childbirth in their countries, they regard the healthcare system in the US as more welcoming, less discriminatory towards women who have/might have PPD, and more open to discussing and treating PPD.

Migrant women's experiences are valuable to inform the development of mHealth for PPD screening and their flourishing. The current study found that the end-users, i.e., migrant perinatal mothers, should be involved in designing and developing mHealth devices, apps, or systems for migrant or foreign-born perinatal women's PPD screening. This finding reaffirmed the call from Dr. Michelle Longmire, CEO and co-founder of mHealth app design company Medable, who articulates that the key to successful mHealth tools or application design lies in knowing how and why users will want to use them (Wicklund, 2017, para 7). Olf (2015), in discussing mHealth's future challenges, quoted that end-users should be at the center of the development phase onward. In line with this, the current study maintains that migrant perinatal women's experiences should be considered when designing and developing mHealth tools, applications, or devices for depression screening. As they have faced layers of barriers that could hinder them from using mHealth, engaging them would ensure the screening method meets the language, literacy, cultural, and motivational needs of the population. In the current study, for example, these mothers excitedly shared their preferences on the mHealth interface, functions, or

navigation of the tools developed for depression screening that would be useful to them, and the barriers that might prevent them from using the mHealth. Their enthusiasm shows that they could pinpoint their needs and functions that would work for them in the mHealth depression screening tool. Facilitating conditions such as online or embedded technical or expert assistance, help button function, more language options to support those who lack English commands, and page navigation that works best for them were mentioned numerous times during the cross interviews/focus groups. For example, participants brought up page navigation, i.e., the preference between scrolling versus paging layout, which has also been studied by Marcano-Belisario et al. (2017) among pregnant women in England. They found a significant relationship between survey layout and EDPS scoring thresholds, which warrants further exploration. Even though the survey part of the current study did not reveal any significant association between the factors in UTAUT with the acceptance of mHealth, the interviews exposed how these participants were observant when it comes to using mHealth for depression screening. These participants were unanimously positive about using mHealth for depression screening despite being aware that they might face hurdles such as language and comprehension issues. Additionally, they were confident that they could manage using mHealth for depression screening and believed that it carried more benefits than risks.

Designing something that the user would use is critical, as a 2016 report from Accenture revealed that only 2% of patients at the nation's top hospitals are using hospital apps built for patients (Wicklund, 2016, para 1). This fact should serve as a wake-up call to healthcare providers and mHealth developers to not assume that they know what patients need or what is important. Even though the growth in use and sophistication of mHealth devices or apps for mental health presents opportunities, there are also challenges regarding design (Barry et al., 2017). For example,

in the context of mHealth for mental health, the current COVID-19 pandemic presents the opportunities for a digital mental health revolution to reduce the mental health burden of COVID-19 among underserved populations, such as low-income or ethnic minority populations, as they are disproportionately affected by the pandemic, as Figueroa and Aguilera (2020) argued. In this regard, mHealth should be strengthened to support an increase in mental health service demands during and after the pandemic era. As opposed to telehealth or text messages, mHealth could allow patients to facilitate early identification of mental health disorders and support self-management. This makes it even more important for mHealth developers to design an mHealth technology that can meet the needs of various populations, including migrant women. Perinatal migrant women, for instance, are now facing another layer of challenges due to the pandemic, which could impact their mental health. This situation changed the whole landscape of maternal mental health care, where mHealth would now be used more widely not only as a depression screening tool, but also as a medium of communication and treatment. When doing self-screening became more normalized for these women, the question of the reliability and validity of the screening method came into the picture. Those who developed the screening tools might not be familiar with the struggles that migrant women face. Furthermore, in the other end, these migrant women also lack support when completing the screening by themselves. Therefore, designing this technology should be done more carefully.

In the current study, participants unanimously agreed that using mHealth for depression screening would be easy, especially when using smartphones. Moving forward, public health clinics could start by adopting mHealth to screen for depression among pregnant and postpartum clients as mobile device ownership is high even among the low-income population (Pew Internet, 2021). Smartphones would be an ideal device for depression screening as studies have shown their

effectiveness for mental health screening, monitoring, and treatment support (Bakker et al., 2016). Although the number of participants who have used mHealth (43.6%) in the current study was slightly lower than those who have not used it (56.4%), most of them own or connect to the internet using smartphones (72.7%). This most likely explains their familiarity with mobile applications; therefore, making them more optimistic about using mHealth for PPD screening. Some participants in the interview also mentioned that it is easy for them to use mobile devices for depression screening as they are familiar with smartphone functions. The familiarity reflects the trend of smartphone ownership in the U.S. in 2021, where 85% of women said they own a smartphone, while 53% of the U.S. population owns a tablet computer (Pew Research Center, 2021). Consistently, Marcano-Belisario et al. (2017) found that iPads or Apple tablet computers were deemed feasible to be used for depression screening for antenatal mothers in the waiting area of an antenatal clinic, in part due to familiarity. They discovered that the mothers-to-be in their study faced minimal difficulties in terms of user interface or page navigation due to their familiarity with smartphones and tablet technology. In another study, Porte et al. (2018) also found that smartphone mood screening and supportive text messaging were technically feasible for pregnant and postpartum women. Hence, it is safe to say that perinatal women undergoing depression screening would not face too many difficulties completing the screening using mHealth.

A technology such as mHealth, if developed with care, has the potential to help its users thrive. In this context, mHealth that could accurately detect symptoms of depression among migrant women could increase the chance of these women flourishing. For many migrant women, flourishing is rather challenging when there are obstacles to achieving well-being. As VanderWeele (2017) coined out, a state of human well-being could be achieved when the

following domains are satisfied: 1) happiness and life satisfaction; 2) physical and mental health; 3) meaning and purpose; and 5) close social relationships (p. 8148). For those living with depression, especially the migrant population, these five domains are often at risk of being unsatisfactorily fulfilled. Migrating to another country might have affected their well-being as they are separated from the people, culture, and things they are familiar with. Integrating their experiences into the development of technology aimed at serving them could restore their voices in the technology and empower them to manifest their needs. Definitely, mHealth provides immediate and tangible benefits, which could contribute to human flourishing (see Ling, 2015, pp.35). In caring for migrant perinatal women, mHealth could liberate these women by reducing the spatial, temporal, physical, and structural boundaries they could face when interacting with their healthcare providers. The depression screening process itself has been shown to boost positive feelings (being cared for) among these women. Migrant women with language barriers, in particular, would benefit from mHealth with proper support (i.e., translation buttons or help). The technology that was developed correctly since the beginning would increase the chance of accurately screening migrant women for depression and increase their chance of getting help immediately. Ideally, when their needs are taken care of, migrant women could flourish and become highly functioning members of society.

Summary of the study

The purpose of this study was to understand the acceptance of mHealth for PPD screening among low-income immigrant and foreign-born women. The theoretical framework for this study was grounded in the unified theory of use and acceptance of technology (UTAUT) by Venkatesh et al. (2003). UTAUT aims to explain user intentions for information systems (IS) and subsequent

usage behavior by considering a variety of independent variables in different environmental settings. Through a mixed-method research approach, this study explored participants' perceptions of using mHealth for depression screening during perinatal checkups and how stigma might influence their acceptance of mHealth for that purpose. The key questions explored in this study were: (1) *What perceptions toward the use of mHealth for PPD screening are held by prenatal and postpartum low-income immigrant women (PPLIW) who arrive at clinics?*; (2) *What factors influence the acceptance of mHealth applications for prenatal and postpartum depression (PPD) screening among PPLIW at the clinics, based on the modified Unified Theory of Acceptance and Use of Technology (UTAUT)?*; (3) *How, and in what ways, do participants' perceptions of stigmas that surround mental illness influence their acceptance rates and responses toward mHealth applications for PPD screening?*; (4) *Among PPLIW at the clinics, to what extent does mHealth affect the relationship between one's intention of being screened for PPD and seeking help for PPD?*; and (5) *How, and in what ways, does acceptance of mHealth for PPD screening, as it is viewed from patients' perspectives, inform the implementation of mHealth at the respective organizations?*

The research study was a convergent parallel design mixed-method study (Creswell, 2009). Through online surveys and a series of interviews and focus groups, this study sought to expand the understanding of acceptance of mHealth in the realm of depression screening among perinatal women. Eleven participants volunteered to participate in the interviews and focus group in the data collection portion. All participants completed the survey and were recruited based on the following criteria: 1) pregnant or postpartum women who have had maternity checkups in Champaign County; 2) classified as migrant or foreign-born; and 3) have used or are currently using maternity services at Champaign County healthcare centers serving the low-income community. A co-coder,

an advanced graduate student at the same university, was hired to ensure the reliability of the interviews and focus group coding process. Each participant was also asked if they wanted their transcriptions to be emailed to them to allow for member checking. Emails were sent to the participants if there was information that needed clarification. Quantitative data were analyzed using ordinal logistic regression with the help of SPSS version 27.0. Qualitative data were processed using Atlas.ti and thematically analyzed using a directed content analysis strategy (Hsieh & Shannon, 2005). Data were presented by juxtaposing them on a joint matrix and narratives were provided to show a more coherent picture of the phenomenon studied.

Summary of findings

The survey shows that, of all the UTAUT factors, only social influence was associated with participants' acceptance to mHealth for depression screening during maternal checkups. However, this association is only at the medium level, and with the small sample size, the conclusion should be carefully considered. In the interviews and focus group, participants confirmed that social influence could influence their use of mHealth, especially from their practitioner or people close to them, such as family members. However, the decision to use mHealth would ultimately come from themselves. Other than that, participants have positive attitudes about using mHealth for depression screening during maternal checkups. They believe that mHealth is more convenient, user-friendly, environmentally friendly, better at safeguarding their privacy, yields a more accurate result, and is more secure. Additionally, despite being aware of its existence, stigma was not affecting participants' behavioral intention of using mHealth for PPD screening in the current study. . Instead, participants were more inclined to use mHealth if they had a positive experience with their providers, mainly due to their trust and reliance on them. Participants' experience of

using mHealth was also associated with their behavioral intention to use mHealth to complete PPD screening. This pattern was partly due to their familiarity with smartphones or tablet computers, so they believed that using mHealth for PPD screening would be easy for them. Finally, age was not found to determine participants' behavioral intention when using mHealth for PPD screening. This fact was revealed both in the survey and interviews. The interviews and focus group revealed that the foreign-born participants mostly believed American society is more open to discussing PPD and more accepting of women with PPD. Despite not disclosing whether they have ever been diagnosed with PPD, they spoke from their personal experiences with individuals close to them or from the media.

Implications and recommendations

The findings of this study contributed to a broader and deeper understanding of the screening for depression among migrant and foreign-born women. This section highlights implications and recommendations for research and practice in the areas of mHealth acceptance and application.

Implications for theory

The current study could not confirm if UTAUT (Venkatesh et al., 2003) could help predict acceptance of mHealth for depression screening among perinatal migrant women. Despite being cited as the most predictive theory in the technology acceptance literature (Khechine et al., 2016), there is insufficient evidence to prove that the theory could predict the acceptance of mHealth among migrant women in the current study. The results did not show any strong correlations between the UTAUT factors and the acceptance of mHealth for depression screening among this group. However, the attempt to use UTAUT to measure acceptance of mHealth for depression screening among migrant women should not be rejected blindly. There were other factors in the

current study that could influence the results of the research. One reason for this could be the small sample size in the study, particularly in the quantitative section. A small sample size, in general, could affect the reliability of overall results and conclusions drawn from a study as it leads to a higher variability, which may induce biases. In this study, though, this factor was uncontrollable since the participants completed the survey voluntarily and were randomly recruited among the population members. The researcher also exhausted all recruiting methods but to no avail. Despite that, the survey results were supplemented by the qualitative results generated from the interviews and focus groups since the current study is a mixed-method study. This step helps in determining the significance of the data. With a larger sample size, the potential of UTAUT to explain user acceptance of mHealth among migrant women could be better explored.

Despite the fact that the current study could not confirm the association of stigma about mental health with the acceptance of mHealth, it is worth investigating this factor in the context of mHealth for PPD screening. Perhaps the closest research that demonstrates the association between stigma and mental health with technology acceptance has been done by Lamela et al. (2020) with internet-based psychological intervention (IPI). However, they only focused on the stigma towards depression and not on mental health in general. Lamela and colleagues' research revealed that higher personal stigma is associated with lower acceptance of internet-based psychological intervention (IPI). Their take is that barriers to seeking professional psychological help (such as stigma) should be considered in understanding e-mental health intervention acceptance (Lamela et al., 2020). Their study warranted further investigation on the assumptions that mental health stigma could influence the acceptance of technology meant for screening or treating mental illnesses such as depression. As the current study has revealed that the participants were clearly motivated or demotivated by the stigma surrounding mental health when deciding to use mHealth,

stigma could be tested as the primary variable and not only as a moderator in the UTAUT model. With a proper sample size and instrument, the role of stigma in mHealth acceptance could be better explored and could advance the UTAUT. This advancement should assist other mHealth researchers and developers in developing a better model when researching acceptance for new mHealth intended to screen for mental health in diverse populations.

Following that, this study also discovered evidence that trust plays a significant role in determining whether migrant perinatal women will use mHealth to screen for depression during perinatal checkups. Participants discussed trust in mHealth technology and trust in their healthcare provider, both of which could be explored further. A recent study has shown that trust positively influences perceived ease of use and perceived usefulness, which leads to acceptance of mHealth (Rajak & Shaw, 2021). The study extended the Technology Acceptance Model (TAM) and was supported by earlier studies (for example, see Deng et al., 2018, Cho et al. (2007), and Wu and Chen (2005)). Besides that, scholars also found that multiple dimensions of patient's trust in physicians (Iott et al., 2020) can facilitate disclosure (Mechanic & Meyer, 2000) and the use of health IT (Kisekka & Giboney, 2018). As the use of mHealth involves exchanging sensitive health or financial information, patients are often guided by their trust, either on the technology or healthcare providers to decide whether to use or continue using these technologies (for example, see Yang, et al., 2021). However, more research is still needed to investigate the role of trust in mHealth acceptance for PPD screening and maternal mental health issues, specifically for the underserved population. As mentioned before, the layers of challenges faced by this group could encourage or discourage their use of any mHealth technology.

Implications for practice

The current study sheds light on the efforts that could be made to assist perinatal migrant women who are transitioning or navigating pregnancy and postpartum in a new host country. Among the practical implications of the current study are the following:

1. Strengthen inter-agencies collaboration. More effort should be put into encouraging collaborations between local government agencies, private, and non-profit agencies to supply information for pregnant and postpartum migrant women. Since participants mentioned relying on helpful resources that they found around campus housing and the community, the housing office could be one of the great resource centers for these migrant women. In this case, these agencies could provide culturally competent health information resources to strengthen access by vulnerable populations, such as migrant and foreign-born women. As an example, the Family Graduate Housing at the campus where the research was conducted has been doing a great job in collaborating with local agencies to support families who recently moved to the neighborhood. This partnership benefits the residents and the agencies as they could improve their services to cater to the population's needs. More programs aimed at helping pregnant and postpartum students, scholars, or their spouses thrive should be implemented. This partnership model could become something that other campuses could follow. Especially if the campus has a growing rate of non-traditional students (who typically do not enroll in college immediately after graduating from high school and attend classes part-time) or international students and scholars, connecting them with local resources such as services or support groups for perinatal mothers who are new in town could help them adjust and cope better. The effort will give them extra social and emotional support, which they lack because they are away from their family.

2. Patient-centered research and technology development. This study also highlights the importance of engaging patients in research and technology development meant for them. To develop culturally competent and sensitive services, research is needed to explain attitudes towards maternal mental health and the needs of women from diverse migrant communities. In the current study, this effort should promote patient-centered research and technology development/selection efforts involving perinatal migrant women. In terms of research, the IDEA Women's Health Coalition (now known as perinatalconnects) is a great example of how academic researchers and practitioners could engage patients in their work. IDEA has been actively recruiting women from diverse backgrounds to serve on their board of directors in order to inform their research projects. They also invite local practitioners such as doctors, nurses, midwives, and doulas to be a part of their research as input from these groups is crucial in guiding their research. Past projects have even seen patients involved in the formulation of research questions as well as the design of the study. This partnership was carried on until the research was completed. This way, patients' concerns and the most concerning issues could be tackled in the research agenda. Besides that, workshops or conferences benefiting patients, scholars, or practitioners across the country were organized as means of knowledge sharing. However, finance is a critical component in making this a reality. More research funding agencies or agencies that work on improving health, mental health, and health access for migrants should provide more opportunities for researchers and/or practitioners interested in conducting patient-centered research program. Sufficient funding ensures an excellent research program could be conducted as engaging patients and community members in a research program is not inexpensive. Evidence yielded from the research should then be embraced by policymakers and service providers to develop policies and services that address this group's needs effectively.

As per the technology design or selection, patients' input should be considered as they would be the end-users of the technology. The technology's acceptability among patients and providers, feasibility, and impact on the overall operation of healthcare facilities should all be carefully considered. A user-friendly technology should be the aim of mHealth development, in this case for migrant perinatal women. Indeed, these migrants face layers of challenges in settling down in the new host country, but they are also full of resources that could inform technology development intended to serve them. Their culture, experiences, language, navigational, and privacy concerns should be considered. The development of mHealth for PPD screenings among migrant women should consider the following:

- i. Inviting migrant women to focus group discussing the development of mHealth intended for them at its earliest stage.
- ii. Including a built-in translation or dictionary function in the mHealth. This function would help non-native English speakers when answering questions and increase the accuracy of the answers. The translation should be improved regularly so the message travels across languages smoothly.
- iii. Providing human support assistance to improve users' experience with cutting-edge mHealth technologies. For example, a 'live chat' function could be provided in the tool for individuals who prefer synchronous interaction.
- iv. Applying artificial intelligence (AI) to help screen women for depression. Although the research about it is still embryonic, the area of possibilities is growing (it might be endless). According to an article in Forbes (Kesari, 2021), this area might be something that could be explored by mHealth developers, especially because it increases screening efficiency and helps patients get prompt help.

- v. Encouragement by healthcare providers could also influence mHealth acceptance among migrant perinatal women since these women trust their healthcare providers to help them decide on their health care needs. Therefore, healthcare providers should realize this fact and be prepared to suggest or recommend the use of mHealth or integrate mHealth into their consultation with patients.

3. Making PPD screening more transparent. Depression screening among perinatal women should be more transparent to normalize its practice. Subsequently, the screening would be less stigmatized among the women being screened. In most cases in the current study, patients appreciate it if they know they are being screened for depression. Evidence also showed that patients felt cared for when asked questions in the depression screening instrument. It is also important to communicate with the woman in her preferred language since they might not be able to explain their symptoms efficiently using a foreign language. Since translations also travel with culture, during a consultation, healthcare professionals should clarify with the woman about her understanding of any information she has been told to ensure she has understood it correctly. The researcher in the current study found that migrant mothers would want to know when they are screened for depression as it helps them prepare for consultation with their healthcare provider. Unsurprisingly, these moms have many questions pertaining to mental health care and depression symptoms during pregnancy and postpartum periods. Ultimately, screening of the spouse could make depression screening for pregnant or postpartum women less stigmatized. Spouses could also be screened for depression symptoms so both mother and spouse could seek help if necessary. Consequently, their spouse could also prepare questions and offer support whenever needed. A prepared patient will also make the in-person consultation with a healthcare professional more meaningful and focused, especially if the healthcare professionals are appropriately trained.

4. Training for healthcare professionals. Certainly, proper training is essential to healthcare providers and practitioners screening migrant mothers. As research found that healthcare professionals experience screening migrant mothers as challenging (Teng et al., 2007), training would help the healthcare providers or practitioners better support migrant and foreign-born women who come for checkups. The Child Health Services nurse in South Australia, for example, is instructed to use a translated, validated scale and be aware of the various cut-off points between different languages when screening a non-Swedish-speaking immigrant woman (Wickberg, 2016). Evidence from the current study shows that proper training in communication and consultancy skills with patients from diverse backgrounds is needed. Elements such as cultural sensitivity and competence are crucial to be included in the training curriculum. Understanding cultural differences and attitudes towards maternal mental health illnesses in diverse migrant communities is a crucial component of delivering services that address both the practical and cultural needs of perinatal migrant women (see National Perinatal Mental Health Project, 2010). Researchers also called for appropriate training for health professionals in more comprehensive psychosocial assessment to maximize usefulness while minimizing potential harms (Millgrom & Gemmill, 2014). The followings are considerations for the development of a training program for healthcare professionals working with women from diverse backgrounds:

- i. Training should cover topics such as transcultural sensitivity and competence to increase the efficiency of the screening. These topics should be included in the curriculum for nurses and medical practitioners since their earliest training (nursing school/ medical school).
- ii. In terms of cultural competence, practitioners could be trained on the specific health needs of women who are recent migrants or immigrants from diverse backgrounds

and the specific social, religious, and psychological needs of women in these groups. Migrant groups are heterogeneous; however, research and practice usually lump them together under the general label such as migrant, immigrant, or foreign-born. For example, the experience of forced immigrants like refugees and asylum seekers might not be the same as that of those who migrated voluntarily.

- iii. Soft skills training, such as communication, patience, and compassion, which are critical competencies for healthcare professionals treating refugees and migrants. Evidently, linguistic and cultural barriers exacerbate the lack of compassion in care, especially where healthcare information and psychological support are necessary and appropriate supporting frameworks are missing. In this case, healthcare practitioners should be trained to show compassion despite language barriers that exist between the women they were trying to help and themselves.
- iv. Healthcare professionals and nurses should also get training on the mHealth technology used to screen for depression among diverse women. More importantly, if the technology will be used by patients, they should be trained to help patients use the technology during the screening process.
- v. Training for healthcare professionals should also include knowledge of standard policy and practice when screening patients. Obviously, clear policies and guidelines are needed to assist health providers in better screening migrant mothers. These policies and guidelines could become a reference when healthcare professionals screen migrant women. These guidelines are also important to maintain professionalism and a code of conduct when screening migrant women. It

could include, for example, guides on how to ask culturally sensitive questions or practical recommendations for healthcare professionals screening migrant women.

5. Healthcare professionals' awareness of policies and resources for migrant women.

Healthcare professionals should also be aware of the most recent government policies on access and entitlement to care for migrant women. Also, being resourceful about local resources applied to these women would help them thrive. For instance, some of these migrant women might have financial issues, be uninsured or underinsured; hence this could affect their health care. Immigration policies could also incite fears among migrants, whether they are legal or illegal migrants and might affect their participation in health programs or seeking services like mental health services. Especially during the pandemic, health and financial needs among migrant groups might also upsurge while their health coverage declines. Understanding how migrant women navigate the healthcare system can be beneficial in helping them plan for their health care. As mentioned earlier, inter-agency collaboration could be utilized to locate resources for these women. In that case, collaboration with social workers is essential when treating these patients so the healthcare professionals are aware of the limitations or challenges faced by these patients.

6. Increasing screening efficiency by hiring interpreters and cultural brokers.

Additionally, healthcare professionals could train and work with translators or interpreters to increase screening accuracy. These translators or interpreters should not be family members, legal guardians, or partners of the women to reduce biases. In this regard, the Department of Health Government of Western Australia (2006) cautioned on the mother's literacy level, the quality of the interpreter's work, and also the misinterpretation of questions, resulting in scores that do not reflect the mother's actual condition and should therefore be taken into consideration. These three elements should become the basis of healthcare professionals' training curriculum so they could

effectively help migrant women who come for checkups. Certainly, hiring translators or interpreters alone is insufficient for screening efficiency. Instead, healthcare providers should consider hiring a ‘cultural broker’ to understand different cultures when treating an ethnically and culturally diverse patient population. As the HCP Live (2009) outlined, “Cultural brokers can be an effective resource for physicians and other healthcare professionals who treat an ethnically and culturally diverse patient population. They act as liaisons, guides, mediators, and facilitators, enhancing communication between physicians and their patients”. A cultural broker could reduce misinterpretation and miscommunication and provide insights that could elucidate things that healthcare professionals might miss when helping migrant women.

Directions for future research

This section discusses the implications of the current study for research implementation and further research agendas. In terms of research implementation, researchers interested in conducting maternal mental health research with migrant women populations should devise new methods of reaching out to various groups of migrant and foreign-born women. In the current study, the researcher used many approaches to recruit participants, including posting posters at the health centers and shops where the migrant women frequented, getting connected with migrant women where they socialize, such as at the barber shop, contacting local agencies working with different migrants’ groups, outreach tabling during programs, through personal connections, and by snowballing. However, personal connections and the snowballing method are the most effective ways of getting them on board. This trend implies that building trust is crucial in working with the migrant population. Trust applies to the women themselves and the agencies that work with them. Indeed, despite the support of organizations that work with this group, recruiting women who are immigrants or have migrant backgrounds proved to be extremely difficult. Chances are that the sample in the current study might include highly trusting women with a positive outlook on

research and the medical community. Moreover, approaching the migrant women and conducting interviews where they are most comfortable is also very crucial. It is suggested that researchers conducting interviews or focus groups with perinatal migrant women bring resources that are useful for these women. Based on the researcher's experience, these women assumed that the researcher could connect them to local resources and tended to ask many questions regarding the resources that they could utilize in the community. Additionally, the current study shows that there are values in diversifying data collection strategies. The qualitative section of this study obviously has supplemented and explained the findings from the quantitative study very well. Future research should attempt to conduct more focus group discussions as it yields useful information for this type of research. Further, the challenge in conducting research with this group also lies in the ability of researchers to make the research terms more understandable for participants without medical or academic backgrounds and for migrant women who come from different cultures and linguistics experiences. In this case, hiring a cultural broker or working with an 'insider' could be beneficial.

In terms of research agenda, future research could focus on conducting a sequential study with more focus on specific migrant group communities (e.g., Asian migrants, South Asian migrants, Hispanic migrants, European migrants, etc.) and specific group of 'migrants' such as the refugee, economic migrants, undocumented immigrants et cetera. This research found that these migrant women might share many similar experiences with PPD stigma, including how they perceived and coped with depression during the prenatal and postpartum periods but might be different in terms of dealing with PPD in the specific culture. Moreover, are voluntary migrants with higher level of education made their experience equivalent to that local women who faced fewer challenges in terms of language, comprehension, trust to the healthcare system and so forth?

Attention could also be given to measuring mHealth acceptance based on their socio-economic background and how that differs between migrant groups, as the current study was unable to verify that due to the homogeneity of the sample and the small sample size. As mentioned in the introduction section, the original telos of this research is to research acceptance among low-income immigrant women. However, more migrant and foreign-born women who are not necessarily immigrants were recruited. Indeed, their participation and input have been valuable. Even so, there is still a need to approach the actual low-income immigrant women as literature has repeatedly shown that this group faces different challenges that may affect the way they seek health information, mHealth acceptance, and seek services, particularly mental health services. Differentiating between women diagnosed with PPD or depression and those who are not could also be a valuable route to explore in terms of the mHealth acceptance study. It is also suggested that future researchers integrate the measure for flourishing, such as the measure for psychological well-being suggested by Diener et al. (2009), to evaluate the impact of technology on these women's flourishing. Many studies have been conducted to link different apps with flourishing. However, very little has focused on mental health apps or the development of technology specifically for minority populations, such as migrant populations. Finally, future research could explore training curriculum that could be used to train healthcare professionals working with migrant women. Healthcare professionals should be issued with a checklist of competency and skills to better screen migrant women. This checklist should be developed carefully with experts from public health, psychological experts, communication experts, cultural brokers, and representatives from the target groups, with the aim to increase efficiency and accuracy when screening migrant women.

Limitations of the Study

The current study has its own limitations, which are important to justify to the readers and could inform and enhance the quality of future research. First, data collection in this study was conducted among women who had their perinatal care in a specific county chosen for this research only. Populations represented by clients from this county may be different from those who had their perinatal care in other states. Perinatal health care practices may also be different from other health care institutions in different counties or states. Thus, generalization and interpretation of the same population in other places should be done with caution.

Second, since the sampling design is purposive random sampling, selection bias might be present. Although participants were randomly selected, they were all migrant or foreign-born women and were recruited from one county only. Therefore, their level of practical understanding regarding technologies might not reflect those held by a broader audience of migrant women who were screened for PPD using mHealth from other counties or states, or with different levels of education or income. The samples were also homogenous in a way that they were typically well-educated and living with a partner, and none of them suffered from depression as per the report.

Next, this study collected data from women who were born outside the U.S. While many are migrants and hold citizenship of other countries, some of them are foreign-born women who also hold U.S. permanent residency. For the purpose of this study, both groups were treated as ‘migrants or foreign-born’. The researcher recognized the importance of viewing acculturation and immigration as a multifaceted process. As the result, the length of stay in the United States (as determined by an online survey response) was used as the primary method of distinguishing between those who had more or less exposure to mainstream U.S. culture and service systems.

Further, the interview and focus group discussions were conducted based on the self-developed interview questions. Although these interview questions were guided by a well-established theory, the UTAUT theory, and developed based on thorough reviews by research professors and doctoral-level experts in qualitative research and the UTAUT theory, the data yielded through interviews and focus group discussions in this study might not fully account for the acceptance to mHealth for PPD screening as per suggested by the UTAUT theory. Thus, caution is also recommended in interpreting the findings of the study.

Finally, since the survey and focus groups were self-reported, interpretations of the survey and focus groups' results will be based solely on participants' responses. They may exaggerate their responses or under-report their experiences. In particular, with migrant populations and the current political climate, there might be a tendency for participants to not accurately report certain feelings, opinions, or information that they deem as risky, due to their (or other family members') status in this country or for fear of being judged or stigmatized because of their status or where they came from. In this case, the researcher has provided the participants with the privacy and confidentiality clause, which they signed during the interviews. Under this provision, the participants would have greater confidence and trust that any sensitive information they might have shared during the research will not be disclosed to any others. Besides that, the researcher also provided a welcoming ambience during the interviews and focus groups to ensure they were comfortable while being interviewed.

REFERENCES

- Abdrahim, N. A. (2017). Exploring the self-regulatory beliefs and actions of adult undergraduate students learning in online credit courses in a land-grant university [Doctoral dissertation, North Carolina State University]. NC State University Libraries Database.
- acog.org. 2021. *Screening for perinatal depression*. [online] Available at: <<https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/11/screening-for-perinatal-depression>> [Accessed 17 February 2021].
- Affonso, D. D., De, A. K., Horowitz, J. A., & Mayberry, L. J. (2000). An international study exploring levels of postpartum depressive symptomatology. *Journal of Psychosomatic Research*, 49(3), 207-216.
- Agar, M. & Macdonald, J. (1995). Focus groups and ethnography, *Human Organisation*. (54)(1), 78 – 86.
- Aguilera, A., & López, S. (2008). Community determinants of Latinos' use of mental health services. *Psychiatric Services*, 59(4), 408-413.
- AlAwadhi, S. & Morris, A. (2008). The use of UTAUT model in the adoption of e-government services in Kuwait. *Proceedings of the 41st Annual Hawaii International Conference on System Sciences*, Waikoloa, HI.
- Alhasanat, D., & Fry-McComish, J. (2015). Postpartum depression among immigrant and Arabic women: Literature review. *Journal of Immigrant and Minority Health*, 17(6), 1882–1894. <http://doi.org/10.1007/s10903-015-0165-5>

- Alhasanat-Khalil, D., Fry-McComish, J., Dayton, C., Benkert, R., Yarandi, H., & Giurgescu, C. (2018). Acculturative stress and lack of social support predict postpartum depression among US immigrant women of Arabic descent. *Archives of psychiatric nursing*, 32(4), 530-535.
- Ali, E., Chew, L., & Yap, K. (2016). Evolution and current status of mHealth research: A systematic review. *BMJ Innov*, 2(1), 33-40. <http://dx.doi.org/10.1136/bmjinnov-2015-000096>
- Ali, O., Milstein, G., & Marzuk, P. (2005). The imam's role in meeting the counseling needs of Muslim communities in the United States. *PS*, 56(2), 202-205. <http://dx.doi.org/10.1176/appi.ps.56.2.202>
- Allison, J. J., Wall, T. C., Spettell, C. M., Calhoun, J., Fargason, C. A., Kobylinski, R. W., ... & Kiefe, C. (2000). The art and science of chart review. *Joint Commission Journal on Quality and Patient Safety*, 26(3), 115-136.
- Aloud, N. & Rathur, A. (2009). Factors affecting attitudes toward seeking and using formal mental health and psychological services among Arab Muslim populations. *Journal of Muslim Mental Health*, 4(2), 79-103. <http://dx.doi.org/10.1080/15564900802487675>
- AlQudah, A. A., Al-Emran, M., & Shaalan, K. (2021). Technology Acceptance in Healthcare: A Systematic Review. *Applied Sciences*, 11(22), 10537.
- Al-Shafi, S., & Weerakkody, V. (2010). Factors affecting e-government adoption in the state of Qatar. *European and Mediterranean Conference on Information Systems* (pp. 1–23).
- American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, D.C.: Author.

- Amick, B. C. (3rd) & Gimeno, D. (2008). Measuring work outcomes with a focus on health-related work productivity loss. In: Wittink, H., Carr, D., (eds.). (2008). *Evidence outcome and quality of life in pain treatment: a handbook for pain treatment professionals*. Edinburgh (UK): Elsevier.
- Amick, B. C. (3rd), & Lavis, J. (1999). *Labour markets and health: a framework and set of applications*. Institute for Work & Health= Institut de recherche sur le travail et la santé.
- Amri, S. & Bemak, F. (2013). Mental health help-seeking behaviors of Muslim immigrants in the United States: Overcoming social stigma and cultural mistrust. *Journal of Muslim Mental Health*, 7(1). <http://dx.doi.org/10.3998/jmmh.10381607.0007.104>
- Anderson, F. M., Hatch, S. L., Comacchio, C., & Howard, L. M. (2017). Prevalence and risk of mental disorders in the perinatal period among migrant women: A systematic review and meta-analysis. *Archives of women's mental health*, 20(3), 449-462.
- Anderson-Lewis, C., Darville, G., Mercado, R. E., Howell, S., & Di Maggio, S. (2018). mHealth technology use and implications in historically underserved and minority populations in the United States: systematic literature review. *JMIR mHealth and uHealth*, 6(6), e8383.
- Arango, J., & Baldwin-Edwards, M. (Eds.). (2014). *Immigrants and the Informal Economy in Southern Europe*. Routledge.
- Babbie, E. (1990). *Survey research methods* (2nd ed.). Belmont, CA: Wadsworth.
- Baka, A., Figgou, L., & Triga, V. (2012). 'Neither agree, nor disagree': A critical analysis of the middle answer category in voting advice applications. *International Journal of Electronic Governance*, 5(3-4), 244-263.

- Baker-Ericzén, M. J., Connelly, C. D., Hazen, A. L., Dueñas, C., Landsverk, J. A., & Horwitz, S. M. (2012). A collaborative care telemedicine intervention to overcome treatment barriers for Latina women with depression during the perinatal period. *Families, Systems, & Health, 30*(3), 224–240. <https://doi.org/10.1037/a0028750>
- Bakker, D., Kazantzis, N., Rickwood, D., & Rickard, N. (2016). Mental health smartphone apps: review and evidence-based recommendations for future developments. *JMIR mental health, 3*(1).
- Bandyopadhyay, M., Small, R., Watson, L. F., & Brown, S. (2010). Life with a new baby: How do immigrant and Australian-born women's experiences compare? *Australian and New Zealand journal of public health, 34*(4), 412-421.
- Barkensjö, M., Greenbrook, J. T., Rosenlundh, J., Ascher, H., & Elden, H. (2018). The need for trust and safety inducing encounters: a qualitative exploration of women's experiences of seeking perinatal care when living as undocumented migrants in Sweden. *BMC pregnancy and childbirth, 18*(1), 1-17.
- Barney, L. J., Griffiths, K. M., Jorm, A. F., & Christensen, H. (2006). Stigma about depression and its impact on help-seeking intentions. *Australian & New Zealand Journal of Psychiatry, 40*(1), 51-54.
- Barry, M., Doherty, K., Marcano Belisario, J., Car, J., Morrison, C., & Doherty, G. (2017, May). mHealth for maternal mental health: everyday wisdom in ethical design. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 2708-2756).
- Bashshur, R., Shannon, G., Krupinski, E., & Grigsby, J. (2011). The taxonomy of telemedicine. *Telemedicine and e-Health, 17*(6), 484

- Batalova, J. & Zong, J. (2016, November 11). *Language diversity and English proficiency in the United States*. Retrieved from: <https://www.migrationpolicy.org/article/language-diversity-and-english-proficiency-united-states>.
- Beaton, D. E., Dyer, S., Boonen, A., Verstappen, S. M., Escorpizo, R., Lacaille, D. V., & Leggett, S. (2016). OMERACT filter evidence supporting the measurement of at-work productivity loss as an outcome measure in rheumatology research. *The Journal of Rheumatology*, 141077.
- Beatty, P. C., & Willis, G. B. (2007). Research synthesis: The practice of cognitive interviewing. *Public Opinion Quarterly*, 71(2), 287-311.
- Becker, H. S. (1970). Problems of inference and proof in participant observation. *Qualitative methodology: Firsthand involvement with the social world*, 189-201.
- Beck, C. T. (2001). Predictors of postpartum depression. *Nursing Research*, 50(5), 275–285. <http://doi.org/10.1097/00006199-200109000-00004>
- Beck, C. T. (2006). Postpartum Depression: It isn't just the blues. *The American Journal of Nursing*, 106(5), 40-50.
- Benson Marshall, M., Cox, A., & Birdi, B. (2020) The role of information in the migration experience of young Polish women in the UK. *Journal of Documentation*, 76 (4). pp. 849-868.
- Bhugra, D. (2004). Migration and mental health. *Acta Psychiatrica Scandinavica*. <http://doi.org/10.1046/j.0001-690X.2003.00246.x>
- BinDhim, N. F., Alanazi, E. M., Aljadhey, H., Basyouni, M. H., Kowalski, S. R., Pont, L. G., Shaman, A. M., Trevena, L., & Alhawassi, T. M. (2016). Does a mobile phone depression-screening app motivate mobile phone users with high depressive symptoms to

- seek a health care professional's help? *Journal of medical Internet research*, 18(6), e156.
<https://doi.org/10.2196/jmir.5726>
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: a tool to enhance trustworthiness or merely a nod to validation? *Qualitative Health Research*, 26(13), 1802–1811. <https://doi.org/10.1177/1049732316654870>
- Bitsch, J. Á., Ramos, R., Ix, T., Ferrer-Cheng, P. G., & Wehrle, K. (2015, May). Psychologist in a pocket: towards depression screening on mobile phones. *In pHealth* (pp. 153-159).
- Bonari L., Pinto N., Ahn E., et al. (2004) Perinatal risks of untreated depression during pregnancy. *Canadian Journal of Psychiatry* 49, 726–734
- Bouwman, C., Krol, M., Severens, H., Koopmanschap, M., Brouwer, W., & Hakkaart-van Roijen, L. (2015). The iMTA productivity cost questionnaire: A standardized instrument for measuring and valuing health-related productivity losses. *Value in Health*, 18(6), 753-758.
- Boyes, A., Newell, S., & Girgis, A. (2002). Rapid assessment of psychosocial wellbeing: Are computers the way forward in a clinical setting? *Quality of Life Research*, 11(1), 27-35.
- Braun, R., Catalani, C., Wimbush, J., & Israelski, D. (2013). Community health workers and mobile technology: A systematic review of the literature. *PloS one*, 8(6), e65772.
- Bravo, C., O'Donoghue, C., Kaplan, C. P., Luce, J., & Ozanne, E. (2014). Can mHealth improve risk assessment in underserved populations? Acceptability of a breast health questionnaire app in ethnically diverse, older, low-income women. *Journal of Health Disparities Research and Practice*, 7(4).

- Brealey, S. D., Hewitt, C., Green, J. M., Morrell, J., & Gilbody, S. (2010). Screening for postnatal depression—is it acceptable to women and healthcare professionals? A systematic review and meta-synthesis. *Journal of reproductive and infant psychology*, 28(4), 328-344.
- Breedlove, G., & Fryzelka, D. (2011). Depression screening during pregnancy. *Journal of midwifery & women's health*, 56(1), 18-25.
- Brett, K. (2008). Prevalence of self-reported postpartum depressive symptoms --- 17 States, 2004—2005. *Center for Disease Control and Prevention*. Retrieved from:
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5714a1.htm>
- Briggs, V. M. (1999, July-August). Immigration policy and human resource development. [Electronic version]. *hrSpectrum*, pp. 1, 4.
<http://digitalcommons.ilr.cornell.edu/articles/218/>
- Brinkman, S. & Kvale, S. (2018). *Doing Interviews*. The SAGE Qualitative Research Kit (Ed.: Uwe Flick). SAGE Publishing
- Broadhead, J., & Abas, M. (1998). Life events, difficulties and depression among women in an urban setting in Zimbabwe. *Psychological Medicine*, 28, 29–38.
- Broom, M. A., Ladley, A. S., Rhyne, E. A., & Halloran, D. R. (2015). Feasibility and perception of using text messages as an adjunct therapy for low-income, minority mothers with postpartum depression. *JMIR mental health*, 2(1).
- Brown, A., & Stepler, R. (2016). Statistical Portrait of the Foreign-Born Population in the United States. Retrieved August 19, 2016, from
<http://www.pewhispanic.org/2016/04/19/statistical-portrait-of-the-foreign-born-population-in-the-united-states/>

- Brown, H., & Bacigalupo, R. (2006). Health visitors and postnatal depression: Identification and practice. *Community Practitioner*, 79(2), 49–52.
- Burns, C. (1989). Individual interviews. In S. Robson & A. Foster (Eds.), *Qualitative research in action* (pp. 47–57). London: Hodder and Stoughton.
- Burns, M. K. (2014). How to establish interrater reliability. *Nursing2019*, 44(10), 56-58.
- Bush, J., Barlow, D. E., Echols, J., Wilkerson, J., & Bellevin, K. (2017). Impact of a mobile health application on user engagement and pregnancy outcomes among Wyoming Medicaid members. *Telemedicine and e-Health*, 23(11), 891-898.
- Byomire, G., & Maiga, G. (2015, May). A model for mobile phone adoption in maternal healthcare. In *IST-Africa Conference, 2015* (pp. 1-8). IEEE.
- Byrant FB, Yarnold PR, Michelson E. Statistical Methodology: VIII. Using Confirmatory Factor Analysis (CFA) in Emergency Medicine Research. *Academic Emergency Medicine*. 1999;6(1):54-66
- Campbell, D. T. & Fiske, D. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological bulletin*, 56, 81-105.
- Campbell, J. L., Quincy, C., Osserman, J., & Pedersen, O. K. (2013). Coding in-depth semistructured interviews: Problems of unitization and intercoder reliability and agreement. *Sociological Methods & Research*, 42(3), 294-320.
- Carling, J., 2022. meaningofmigrants.org. [online] *What is the meaning of migrants?* Available at: <<https://meaningofmigrants.org/>> [Accessed 29 April 2022].
- Castles S, Miller MJ. The age of migration: international population movements in the modern world. 2nd ed. London: Houndmills MacMillan Press Ltd; 1998.

- Champaign County, IL*. (2016). Data USA. Retrieved 21 December 2017, from <https://datausa.io/profile/geo/champaign-county-il/#demographics>
- Champaign County, IL*. (2017). UDS Mapper. Retrieved from: <https://www.udsmapper.org/mapESA.cfm>
- Cheema, J. R. (2014). A review of missing data handling methods in education research. *Review of Educational Research*, 84(4), 487-508.
- Chen, J., & Vargas-Bustamante, A. (2011). Estimating the effects of immigration status on mental health care utilizations in the United States. *Journal of Immigrant and Minority Health*, (13) 671–680.
- Chen, J., Cross, W. M., Plummer, V., Lam, L., & Tang, S. (2019). A systematic review of prevalence and risk factors of postpartum depression in Chinese immigrant women. *Women and Birth*, 32(6), 487-492.
- Cho, D. Y., Kwon, H. J., & Lee, H. Y. (2007, January). Analysis of trust in internet and mobile commerce adoption. In *2007 40th Annual Hawaii International Conference on System Sciences (HICSS'07)* (pp. 50-50). IEEE.
- Ciftci, A., Jones, N., & Corrigan, P. W. (2013). Mental health stigma in the Muslim community. *Journal of Muslim Mental Health*, 7(1).
- Citizen Path (February, 2016). Top 5 countries with most immigrants. Retrieved from: <https://citizenpath.com/countries-with-the-most-immigrants/>
- Clair, M. (2018). *Stigma* [Unpublished article]. Harvard University.
- Cohen, S., Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98, 310-357.

- Cole, C. (2009). Screening for postpartum depression. *The Journal for Nurse Practitioners*, 5(6), 460-461.
- Collins, P. Y., Patel, V., Joestl, S. S., March, D., Insel, T. R., Daar, A. S., ... & Glass, R. I. (2011). Grand challenges in global mental health. *Nature*, 475(7354), 27-30.
- Cooper, C.L. (2008). Mental health and well-being at work: the disposal workforce. *International Journal of Public Health*. 53(5):225–6.
- Corrigan, P., Markowitz, F. E., Watson, A., Rowan, D., & Kubiak, M. A. (2003). An attribution model of public discrimination towards persons with mental illness. *Journal of health and Social Behavior*, 162-179.
- Cortez, N. The Mobile Health Revolution? *SSRN Electronic Journal*.
<http://dx.doi.org/10.2139/ssrn.2284448>
- Cox, S. J., & Holden, J. D. (2009). Presentation and outcome of clinical poor performance in one health district over a 5-year period: 2002–2007. *Br J Gen Pract*, 59(562), 344-348.
- Coyne, J. C., Thompson, R., Palmer, S. C., Kagee, A., & Maunsell, E. (2000). Should we screen for depression? Caveats and potential pitfalls. *Applied and Preventive Psychology*, 9(2), 101-121.
- Creswell, J. W. (1999). Mixed methods research: Introduction and application. In G.J. Cizek (Ed.), *Handbook of educational policy* (pp. 455-472). San Diego, CA: Academic Press.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. 3rd ed. Thousand Oaks, CA: SAGE.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches*. 4th ed. Thousand Oaks, CA: SAGE.

- Creswell, J. W. & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: SAGE.
- Creswell, J. W. & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research*. 2nd ed. Thousand Oaks, CA: SAGE.
- Crocker, J., & Major, B. (1989). Social stigma and self-esteem: The self-protective properties of stigma. *Psychological review*, 96(4), 608.
- Curtis, L., Edwards, C., Fraser, K. L., Gudelsky, S., Holmquist, J., Thornton, K., & Sweetser, K. D. (2010). Adoption of social media for public relations by nonprofit organizations. *Public Relations Review*, 36(1), 90-92.
- Cutcliffe, J. R. (2003). Reconsidering reflexivity: Introducing the case for intellectual entrepreneurship. *Qualitative health research*, 13(1), 136-148.
- Dagher, R. K., McGovern, P. M., Dowd, B. E., & Gjerdengen, D. K. (2012). Postpartum depression and health services expenditures among employed women. *Journal of Occupational and Environmental Medicine*, 54(2), 210-215.
- Davenport, M. H., Meyer, S., Meah, V. L., Strynadka, M. C., & Khurana, R. (2020). Moms are not OK: COVID-19 and maternal mental health. *Frontiers in global women's health*, 1, 1.
- Davis, K., Collins, S. R., Doty, M. M., Ho, A., & Holmgren, A. L. (2005). Health and productivity among US workers. *Issue Brief (Commonwealth Fund)*, 856(856), 1-10.
- Deave, T., Heron, J., Evans, J., & Emond, A. (2008). The Impact of Maternal Depression in Pregnancy on Early Child Development. *Obstetrical & Gynecological Survey*, 63(10), 626-628. <http://dx.doi.org/10.1097/01.ogx.00000327783.74571.a5>
- DeCoster, J. (1998). *Overview of factor analysis*. Retrieved from: <http://www.stat-help.com/notes.html>

- Demographics of Mobile Device Ownership and Adoption in the United States. (2022). Retrieved 15 September 2021, from <https://www.pewresearch.org/internet/fact-sheet/mobile/#who-owns-cellphones-and-smartphones>
- Deng, Z., Hong, Z., Ren, C., Zhang, W., & Xiang, F. (2018). What predicts patients' adoption intention toward mHealth services in China: empirical study. *JMIR mHealth and uHealth*, 6(8), e9316.
- Dennis, C. L., & Chung-Lee, L. (2006). Postpartum depression help-seeking barriers and maternal treatment preferences: A qualitative systematic review. *Birth*, 33(4), 323-331.
- Dennis, C. L., Brown, H. K., Wanigaratne, S., Fung, K., Vigod, S. N., Grigoriadis, S., ... & Brennenstuhl, S. (2018). Prevalence, incidence, and persistence of postpartum depression, anxiety, and comorbidity among Chinese immigrant and nonimmigrant women: a longitudinal cohort study. *The Canadian Journal of Psychiatry*, 63(1), 44-53.
- Depression and Other Common Mental Disorders: Global Health Estimates*. Geneva: World Health Organization; 2017.
- Depression*. (2016). National Institute of Mental Health. Retrieved August 19, 2016, from <https://www.nimh.nih.gov/health/topics/depression/index.shtml>
- Derr, A. (2016). Mental Health Service Use Among Immigrants in the United States: A Systematic Review. *Psychiatric Services*, 67(3), 265-274. <http://dx.doi.org/10.1176/appi.ps.201500004>
- Desilver, D. (2017, March 16). *Immigrants don't make up a majority of workers in any U.S. industry*. Retrieved from: <http://www.pewresearch.org/fact-tank/2017/03/16/immigrants-dont-make-up-a-majority-of-workers-in-any-u-s-industry/>

- DeSouza, R. (2005). Transforming possibilities of care: Goan migrant motherhood in New Zealand. *Contemporary Nurse*, 20(1), 87 - 101.
- DeSouza, R. (2006). Becoming informed health care consumers: Asian migrant mothers in New Zealand. In S. Tse, M.E. Hoque, K. Rasanathan, M. Chatterji, R. Wee, S. Garg, & Y. Ratnasabapathy (Eds.), *Prevention, protection and promotion. Proceedings of the Second International Asian Health and Wellbeing Conference, November 11, 13-14*, (pp. 196-207). Auckland, New Zealand: University of Auckland
- Deutscher, I. (1969). Looking backward: Case studies on the progress of methodology in sociological research. *The American Sociologist*, 35-41.
- Dhanda, A., & Narayan, T. (2007). Mental health and human rights. *Lancet*, 370, 1197–1198.
- DiCicco-Bloom B. & Crabtree B.F. (2006) The qualitative research interview. *Medical Education*, 40 (4), 314 – 321. doi:10.1111/j.1365-2929.2006.02418.x
- Diener, E., Wirtz, D., Biswas-Diener, R., Tov, W., Kim-Prieto, C., Choi, D. W., & Oishi, S. (2009). New measures of well-being. In *Assessing well-being* (pp. 247-266). Springer, Dordrecht.
- Dos Santos, B., & Sussman, L. (2000). Improving the return on IT investment: the productivity paradox. *International Journal of Information Management*, 20(6), 429-440.
- Drummond, H. E., Ghosh, S., Ferguson, A., Brackenridge, D., & Tiplady, B. (1995). Electronic quality of life questionnaires: a comparison of pen-based electronic questionnaires with conventional paper in a gastrointestinal study. *Quality of life research*, 4(1), 21-26.
- Dutta, M. J., Kaur-Gill, S., Tan, N., & Lam, C. (2018). mHealth, health, and mobility: a culture-centered interrogation. *mHealth innovation in Asia*, 91-107.

- Dwivedi Y.K., Rana N.P., Chen H., Williams M.D. (2011) A Meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT). In: Nüttgens M., Gadatsch A., Kautz K., Schirmer I., Blinn N. (eds) Governance and Sustainability in Information Systems. Managing the Transfer and Diffusion of IT. TDIT 2011. *IFIP Advances in Information and Communication Technology*, vol 366. Springer, Berlin, Heidelberg.
- Dwivedi, Y. K., Shareef, M. A., Simintiras, A. C., Lal, B., & Weerakkody, V. (2016). A generalised adoption model for services: a cross-country comparison of mobile health (m-health). *Gov. Inform. Q.* 33, 174–187. doi: 10.1016/j.giq.2015.06.003
- Eckhardt, A., Laumer, S., & Weitzel, T. (2009). Who influences whom? Analyzing workplace referents' social influence on IT adoption and non-adoption. *Journal of Information Technology*, 24(1), 11-24.
- Edge, D. (2011). *National perinatal mental health project report perinatal mental health of black and minority ethnic women: a review of current provision in England, Scotland, and Wales*. National Mental Health Development Unit. <http://www.nmhdu.org.uk/silo/files/national-perinatal-mental-health-project-report-.pdf>
- Edhborg, M., Seimyr, L., Lundh, W., & Widstrom, A. (2000). Fussy child–difficult parenthood? Comparisons between families with a “depressed” mother and non-depressed mother 2 months postpartum. *Journal of Reproductive and Infant Psychology*, 18, 226–238.
- Eisenman, D. (2003). Mental health and health-related quality of life among adult Latino primary care patients living in the United States with previous exposure to political violence. *JAMA*, 290(5), 627. <http://dx.doi.org/10.1001/jama.290.5.627>

- Ellahham, S. (2021). Communication in health care: impact of language and accent on health care safety, quality, and patient experience. *American Journal of Medical Quality*, 36(5), 355-364.
- Evans, W., Abrams, L., Poropatich, R., Nielsen, P., & Wallace, J. (2012). Mobile health evaluation methods: the Text4baby case study. *Journal of Health Communication*, 17(sup1), 22-29. <http://dx.doi.org/10.1080/10810730.2011.649157>
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272.
- Fahy, P. 2001. Addressing some common problems in transcript analysis. *The International Review of Research in Open and Distance Learning 1*.
(<http://www.irrodl.org/index/php/irrodl/article/view/321>).
- Falah-Hassani, K., Shiri, R., Vigod, S., & Dennis, C.-L. (2015). Prevalence of postpartum depression among immigrant women: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 70, 67–82. <http://doi.org/10.1016/j.jpsychires.2015.08.010>
- Fann, J. R., Berry, D. L., Wolpin, S., Austin-Seymour, M., Bush, N., Halpenny, B., ... & McCorkle, R. (2009). Depression screening using the Patient Health Questionnaire-9 administered on a touch screen computer. *Psycho-Oncology*, 18(1), 14-22.
- Fellmeth, G., Fazel, M., & Plugge, E. (2017). Migration and perinatal mental health in women from low-and middle-income countries: a systematic review and meta-analysis. *BJOG: An International Journal of Obstetrics & Gynaecology*, 124(5), 742-752.

- Fernández-Gutiérrez, M., Bas-Sarmiento, P., & Poza-Méndez, M. (2019). Effect of an mHealth intervention to improve health literacy in immigrant populations: a quasi-experimental study. *CIN: Computers, Informatics, Nursing*, 37(3), 142-150.
- Ferrari, M., Ahmad, F., Shakya, Y., Ledwos, C., & McKenzie, K. (2016). Computer-assisted client assessment survey for mental health: patient and health provider perspectives. *BMC Health Services Research*, 16(1), 1-15.
- Fertility*. (2013). United States Department of Labor. Retrieved August 19, 2016, from <https://www.dol.gov/wb/stats/Fertility.htm>
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage.
- Figueroa, C. A., & Aguilera, A. (2020). The need for a mental health technology revolution in the COVID-19 pandemic. *Frontiers in Psychiatry*, 11, 523.
- Fitzgerald, M., Ing, V., Heang Ya, T., Heang Hay, S., Yang, T., Duong, H., et al. (1998). *Hear our voices: trauma, birthing and mental health among Cambodian women*. Paramatta: Ausmed
- Flores, G. (2006). Language barriers to health care in the United States. *New England Journal of Medicine*, 355(3), 229-231.
- Flores, G., Laws, M. B., Mayo, S. J., Zuckerman, B., Abreu, M., Medina, L., & Hardt, E. J. (2003). Errors in medical interpretation and their potential clinical consequences in pediatric encounters. *Pediatrics*, 111(1), 6-14.
- Forbat, L., & Henderson, J. (2005). Theoretical and practical reflections on sharing transcripts with participants. *Qualitative Health Research*, 15(8), 1114-1128.

- Foreman, D., & Henshaw, C. (2002). Objectivity and subjectivity in postnatally depressed mothers' perceptions of their infants. *Child Psychiatry and Human Development*, 32, 263–275.
- Franklin, S. B., Gibson, D. J., Robertson, P. A., Pohlmann, J. T., & Fralish, J. S. (1995). Parallel analysis: a method for determining significant principal components. *Journal of Vegetation Science*, 6(1), 99-106.
- Free, C., Phillips, G., Watson, L., Galli, L., Felix, L., Edwards, P., ... & Haines, A. (2013). The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. *PLoS Med*, 10(1), e1001363.
- Fung, K. & Dennis, C. (2010). Postpartum depression among immigrant women. *Current Opinion in Psychiatry*, 23(4), 342-348. <http://dx.doi.org/10.1097/yco.0b013e32833ad721>
- Funnell, E. L., Spadaro, B., Martin-Key, N., Metcalfe, T., & Bahn, S. (2022). mHealth solutions for mental health screening and diagnosis: a review of app user perspectives using sentiment and thematic analysis. *Frontiers in psychiatry*, 13.
- Gadamer, H. G. (1989). *Truth and method* (2nd rev.). (J. Weinsheimer & D. G. Marshall, Ed.) trans. New York: Crossroad, 1989.
- Gall, M. D., Gall, J. P. & Borg, W. R. (2007). *Educational research: An introduction (8th ed.)*. Boston, MA: Pearson.
- Garrison, D. R., Cleveland-Innes, M., Koole, M., & Kappelman, J. (2006). Revisiting methodological issues in transcript analysis: Negotiated coding and reliability. *The Internet and Higher Education*, 9(1), 1-8.
- Gautie, J., & Schmitt, J., (eds.) (2009). *Low wage work in the wealthy world*. New York (NY): Russell Sage Foundation.

- Gaynes, B.N., Gavin, N., Meltzer-Brody S, et al. Perinatal Depression: Prevalence, Screening Accuracy, and Screening Outcomes: Summary. 2005 Feb. In: *AHRQ Evidence Report Summaries*. Rockville (MD): Agency for Healthcare Research and Quality (US); 1998-2005. 119. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK11838/>
- Ghaffari, A. & Çiftçi, A. (2010). Religiosity and self-esteem of Muslim immigrants to the United States: The Moderating Role of Perceived Discrimination. *International Journal for The Psychology Of Religion*, 20(1), 14-25. <http://dx.doi.org/10.1080/10508610903418038>
- Gibbs, G.R. (2007). *Thematic Coding and Categorizing, Analyzing Qualitative Data*. SAGE Publications Ltd., London.
- Gill P., Stewart K., Treasure E. & Chadwick B. (2008) Methods of data collection in qualitative research: interviews and focus groups. *British Dental Journal*, 204 (6), 291 – 295.
doi:10.1038/ bdj.2008.192
- Gingiss, D. (2019, July 12). *Why treating patients as consumers can improve the healthcare experience*. Forbes. <https://www.forbes.com/sites/dangingiss/2019/07/09/why-treating-patients-as-consumers-can-improve-the-healthcare-experience/?sh=37f174cb63a1>.
- Gjerdingen, D. K., & Yawn, B. P. (2006). Postpartum Depression Screening: Importance, Methods, Barriers, and Recommendations for Practice. *The Journal of the American Board of Family Medicine*, 20(3), 280–288. <http://doi.org/10.3122/jabfm.2007.03.060171>
- Gleason A. W. (2015). mHealth — Opportunities for Transforming Global Health Care and Barriers to Adoption, *Journal of Electronic Resources in Medical Libraries*, 12:2, 114-125. doi: 10.1080/15424065.2015.1035565
- Goffman, Erving. 1963. *Stigma: Notes on the Management of Spoiled Identity*. New York: Simon & Schuster.

- Gordon, M., Henderson, R., Holmes, J. H., Wolters, M. K., & Bennett, I. M. (2016). Participatory design of eHealth solutions for women from vulnerable populations with perinatal depression. *Journal of the American Medical Informatics Association*.
<http://doi.org/10.1093/jamia/ocv109>
- Green, F. (2004). Work intensification, discretion, and the decline in well-being at work. *Eastern Economics Journal*. 30(4):615–25.
- Guest, G., Namey, E., Taylor, J., Eley, N., & McKenna, K. (2017). Comparing focus groups and individual interviews: findings from a randomized study. *International Journal of Social Research Methodology*, 1-16.
- Hair Jr, J. F., Anderson, R. E., Tatham, R. L., & William, C. (1995). Black (1995), Multivariate data analysis with readings. *New Jersey: Prentice Hall*.
- Hair Jr., J.F., Black, W.C., Babin, B.J. & Anderson, R.E. (2009) *Multivariate Data Analysis*. 7th Edition, Prentice Hall, Upper Saddle River, 761.
- Halbesleben, J., Harvey, J., & Bolino, M.C. (2009). A conservation of resources view of the relationship between work engagement and work interference with family. *Journal of Applied Psychology*. 94(6):1452–65.
- Hanson, C., West, J., Neiger, B., Thackeray, R., Barnes, M., & McIntyre, E. (2011). Use and acceptance of social media among health educators. *American Journal of Health Education*, 42(4), 197-204.
- Harvey, L. (2015). Beyond member-checking: A dialogic approach to the research interview. *International Journal of Research & Method in Education*, 38, 23–38.
- Hassan, E., Austin, C., Celia, C., Disley, E., Hunt, P., Marjanovic, S., ... & Van Stolk, C. (2009). Health and wellbeing at work in the United Kingdom. *Cambridge, England: Rand Europe*.

- Haßdenteufel, K., Lingenfelder, K., Schwarze, C. E., Feisst, M., Brusniak, K., Matthies, L. M., ... & Wallwiener, S. (2021). Evaluation of Repeated Web-Based Screening for Predicting Postpartum Depression: Prospective Cohort Study. *JMIR mental health*, 8(12), e26665.
- Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational research methods*, 7(2), 191-205.
- Healthcare Information and Management System Society [HIMSS] (2015). *Report of the 2015 HIMSS Mobile Technology Survey*. Retrieved from: <http://www.himss.org/2015-himss-mobile-technology-survey-executive-summary?ItemNumber=41510>
- Healthcare Information and Management System Society [HIMSS] (2015). *Mobile Technology Upgrades Continue to Impact Healthcare Engagement*. Retrieved from: <http://www.himss.org/news/mobile-technology-upgrades-continue-impact-healthcare-engagement-0>
- Heneghan, A. M., Silver, E. J., Bauman, L. J., & Stein, R. E. (2000). Do pediatricians recognize mothers with depressive symptoms?. *Pediatrics*, 106(6), 1367-1373.
- Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published research: Common errors and some comment on improved practice. *Educational and Psychological measurement*, 66(3), 393-416.
- Hermann, A., Fitelson, E. M., & Bergink, V. (2021). Meeting maternal mental health needs during the COVID-19 pandemic. *JAMA psychiatry*, 78(2), 123-124.
- Hodson, R. 1999. *Analyzing documentary accounts*. Thousand Oaks, CA: Sage.

- Hogarty K, Hines C, Kromrey J, Ferron J, Mumford K. The Quality of Factor Solutions in Exploratory Factor Analysis: The Influence of Sample Size, Communality, and Overdetermination. *Educational and Psychological Measurement*. 2005;65(2):202-26.
- Holopainen, D. (2002). The experience of seeking help for postnatal depression. *Australian Journal of Advanced Nursing, The*, 19(3), 39.
- Holstein, J., & Gubrium, J. (1995). *The active interview*. Thousand Oaks, CA: Sage.
- Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, 30(2), 179-185.
- Horowitz, J. A., Damato, E., Solon, L., Von Metzsch, G., & Gill, V. (1995). Postpartum depression: issues in clinical assessment. *Journal of perinatology: official journal of the California Perinatal Association*, 15(4), 268.
- Howard J. The future of work [Internet]. Slides presented at *Safety and Health Issues in an Ageing Workforce panel discussion*; 2009 2 July; Washington DC (USA): United States Department of Labor. Available from: http://www.osha.gov/dcsp/smallbusiness/aging_workforce.html.
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288.
<https://doi.org/10.1177/1049732305276687>
- Hsieh, W. J., Sbrilli, M. D., Huang, W. D., Hoang, T. M., Meline, B., Laurent, H. K., & Tabb, K. M. (2021). Patients' Perceptions of Perinatal Depression Screening: A Qualitative Study: Study examines perinatal depression screening. *Health Affairs*, 40(10), 1612-1617.

- Hu, T. W., Snowden, L. R., Jerrell, J. M., & Nguyen, T. D. (1991). Ethnic populations in public mental health: services choice and level of use. *American Journal of Public Health, 81*(11), 1429-1434.
- Huang, Z. J., Wong, F. Y., Ronzio, C. R., & Stella, M. Y. (2007). Depressive symptomatology and mental health help-seeking patterns of US-and foreign-born mothers. *Maternal and child health journal, 11*(3), 257-267.
- Hurley, A. E., Scandura, T. A., Schriesheim, C. A., Brannick, M. T., Seers, A., Vandenberg, R. J., & Williams, L. J. (1997). Exploratory and confirmatory factor analysis: Guidelines, issues, and alternatives. *Journal of organizational behavior, 667-683*.
- Iliadou, M., Papadakaki, M., Sioti, E., Giaxi, P., Leontitsi, E., Petelos, E., ... & Vivilaki, V. G. (2019). Addressing mental health issues among migrant and refugee pregnant women: A call for action. *European Journal of Midwifery, 3*.
- Ilmarinen, J., Tuomi, K., & Seitsamo, J. (2005, June). New dimensions of work ability. In *International congress series* (Vol. 1280, pp. 3-7). Elsevier.
- Immigrant Population Hits Record 42.1 Million in Second Quarter of 2015*. (n.d.). Center for Immigration Studies. Retrieved August 19, 2016, from <http://cis.org/Immigrant-Population-Hits-Record-Second-Quarter-2015>
- INA: ACT 101 - Definitions* | U.S. Citizenship and Immigration Services [USCIS]. (n.d.). Department of Homeland Security. Retrieved August 19, 2016, from <https://www.uscis.gov/ilink/docView/SLB/HTML/SLB/0-0-0-1/0-0-0-29/0-0-0-101.html#0-0-0-164>
- International Organization for Migration. 2022. *Key Migration Terms*. [online] Available at: <https://www.iom.int/key-migration-terms> [Accessed 29 April 2022].

- InterQ (2015, August 19). Focus groups versus in-depth interviews. Retrieved from: interq-research.com/focus-groups-versus-in-depth-interviews
- Iott, B. E., Campos-Castillo, C., & Anthony, D. L. (2019). Trust and privacy: how patient trust in providers is related to privacy behaviors and attitudes. In AMIA Annual Symposium Proceedings (Vol. 2019, p. 487). American Medical Informatics Association.
- Istepanian, R., Laxminarayan, S., & Pattichis, C. (2006). *M-health*. New York, NY: Springer.
- Ivankova, N. V., & Kawamura, Y. (2010). Emerging trends in the utilization of integrated designs in the social, behavioral, and health sciences. *Sage handbook of mixed methods in social and behavioral research*, 2, 581-611.
- Ivankova, N. V., & Kawamura, Y. (2010). Emerging trends in the utilization of integrated designs in the social, behavioral, and health sciences. *Sage handbook of mixed methods in social and behavioral research*, 2, 581-611.
- Jackson, J.S., Neighbors, H.W., Torres, M., Martin, L., Williams, D., & Baser, R. (2007). Use of mental health services and subjective satisfaction with treatment among Black Caribbean immigrants: Results from the national survey of American life. *American Journal of Public Health*, 97(1), 60–67. Retrieved from <http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2006.088500>
- Jareethum, R., Titapant, V., Tienthai, C., Vibonchart, S., Chuenwattana, P., & Chatchainoppakhun, J. (2008). Satisfaction of healthy pregnant women receiving short message service via mobile phone for prenatal support: A randomized controlled trial. *Journal Medical Association Thai*, 91(4), 458–463.
- Jellinek, M., Patel, B. P., & Froehle, M. C. (2002). Bright futures in practice: Mental health. *Arlington, VA: National Center for Education in Maternal and Child Health*.

- Jiménez-Serrano, S., Tortajada, S., & García-Gómez, J. (2015). A Mobile Health Application to Predict Postpartum Depression Based on Machine Learning. *Telemedicine And E-Health*, 21(7), 567-574. <http://dx.doi.org/10.1089/tmj.2014.0113>
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112-133.
- Kaewkungwal, J., Singhasivanon, P., Khamsiriwatchara, A., Sawang, S., Meankaew, P., & Wechsart, A. (2010). Application of smart phone in "Better Border Healthcare Program": A module for mother and child care. *BMC Med Inform Decis Mak*, 10(1), 69. <http://dx.doi.org/10.1186/1472-6947-10-69>
- Kahn, J. G., Yang, J. S., & Kahn, J. S. (2010). 'Mobile' health needs and opportunities in developing countries. *Health Affairs*, 29(2), 252-258.
- Kandula, N., Kersey, M., & Lurie, N. (2004). Assuring the health of immigrants: What the leading health indicators tell us. *Annual Review of Public Health*, 25(1), 357-376. <http://dx.doi.org/10.1146/annurev.publhealth.25.101802.123107>
- Kesari, G. (2021). AI Can Now Detect Depression from Your Voice, And It's Twice as Accurate as Human Practitioners. Retrieved 18 October 2021, from <https://www.forbes.com/sites/ganeskesari/2021/05/24/ai-can-now-detect-depression-from-just-your-voice/?sh=4f4bab0f4c8d>
- Keyes C. L. M. (2009). Toward a science of mental health. In S. J. Lopez & C. R. Snyder (Eds.). *Oxford handbook of positive psychology* (pp. 89-95). New York: Oxford University Press.
- Keyes, C. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43, 207-222.

- Keyes, C. (2003). Complete mental health: An agenda for the 21st century. In C. L. M. Keyes & J. Haidt (Eds.), *Flourishing: Positive psychology and the life well-lived* (pp. 293-312). Washington, DC: American Psychological Association.
- Keyes, C. (2004). The nexus of cardiovascular disease and depression revisited: The complete mental health perspective and the moderating role of age and gender. *Aging and Mental Health*, 8, 266-274.
- Keyes, C. (2005a). Chronic physical conditions and aging: Is mental health a potential protective factor? *Ageing International*, 30, 88-104.
- Keyes, C. (2005b). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, 73, 539-548.
- Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43, 207-222.
- Keyes, C. L. M. (2003). Complete mental health: An agenda for the 21st century. In C. L. M. Keyes & J. Haidt (Eds.), *Flourishing: Positive psychology and the life well-lived* (pp. 293-312). Washington, DC: American Psychological Association.
- Keyes, C. L. M. (2004). The nexus of cardiovascular disease and depression revisited: The complete mental health perspective and the moderating role of age and gender. *Aging and Mental Health*, 8, 266-274.
- Keyes, C. L. M. (2005a). Chronic physical conditions and aging: Is mental health a potential protective factor? *Ageing International*, 30, 88-104.
- Keyes, C. L. M. (2005b). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, 73, 539-548.

- Keyes, C., & Haidt, J. (2010). Flourishing. In I. B. Weiner & W. E. Craighead (Eds.), *Corsini encyclopedia of psychology*. John Wiley & Sons.
- <https://onlinelibrary.wiley.com/doi/10.1002/9780470479216.corpsy0363>
- Khechine, H., Lakhal, S., & Ndjambou, P. (2016) A meta-analysis of the UTAUT model: Eleven years later. *Canadian Journal of Administrative Science*, 33: 138–152. doi: 10.1002/cjas.1381.
- Kidd, P., & Parshall, M. (2000). Getting the focus and the group: Enhancing analytical rigor in focus group research. *Qualitative Health Research*, 10, 293–308.
- Kijsanayotin, B., Pannarunothai, S., & Speedie, S. M. (2009). Factors influencing health information technology adoption in Thailand's community health centers: Applying the UTAUT model. *International journal of medical informatics*, 78(6), 404-416.
- Kilner, H. (2014). Hostile health care: Why charging migrants will harm the most vulnerable. *British Journal of General Practice*, 64(626), e590-e592.
- Kim, S., Lee, K. H., Hwang, H., & Yoo, S. (2015). Analysis of the factors influencing healthcare professionals' adoption of mobile electronic medical record (EMR) using the unified theory of acceptance and use of technology (UTAUT) in a tertiary hospital. *BMC medical informatics and decision making*, 16(1), 12.
- King, W. R. (2007). IT strategy and innovation: Productivity and IS. *Information Systems Management*, 24(3), 265-266.
- Kingston, D., Austin, M. P., van Zanten, S. V., Harvalik, P., Giallo, R., McDonald, S. D., ... & Biringer, A. (2017). Pregnant women's views on the feasibility and acceptability of web-based mental health e-screening versus paper-based screening: a randomized controlled trial. *Journal of medical Internet research*, 19(4), e6866.

- Kirwan, M., Vandelanotte, C., Fenning, A., & Duncan, M. J. (2013). Diabetes self-management smartphone application for adults with type 1 diabetes: randomized controlled trial. *Journal of Medical Internet Research*, 15(11), e235.
- Kitzinger, J. (1994). The methodology of focus groups: The importance of interaction between research participants. *Sociology of Health & Illness*, 16, 103–121.
- Knights, J. E., Salvatore, M. L., Simpkins, G., Hunter, K., & Khandelwal, M. (2016). In search of best practice for postpartum depression screening: is once enough? *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 206, 99-104.
- Koivimäki, T., Ristola, A., & Kesti, M. (2008). The perceptions towards mobile services: An empirical analysis of the role of use facilitators. *Personal & Ubiquitous Computing*, 12(1), 67–75.
- Kola, L., Abiona, D., Adefolarin, A. O., & Ben-Zeev, D. (2021). Mobile phone use and acceptability for the delivery of mental health information among perinatal adolescents in Nigeria: survey study. *JMIR Mental Health*, 8(1), e20314.
- Konschak, C., Levin, D., & Morris, W. (2013). *mHealth*. Virginia Beach, VA: Convergent publishing.
- Kowalski, R. M., Morgan, M., & Taylor, K. (2017). Stigma of mental and physical illness and the use of mobile technology. *The Journal of Social Psychology*, 157(5), 602-610.
- Kozinszky, Z., & Dudas, R. B. (2015). Validation studies of the Edinburgh Postnatal Depression Scale for the antenatal period. *Journal of Affective Disorders*, 176, 95-105.
- Krippendorff, K. (2004). Measuring the reliability of qualitative text analysis data. *Quality & quantity*, 38(6), 787-800.

- Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9. *Journal of general internal medicine*, 16(9), 606-613.
- Krogstad, J. M., Passel, J. S. & Cohn, D. (2017, April 27). Five facts about illegal immigration in the US. Retrieved from: <http://www.pewresearch.org/fact-tank/2017/04/27/5-facts-about-illegal-immigration-in-the-u-s/>.
- Kuoppala, J., Lamminpää, A., Liira, J., & Vainio, H. (2008). Leadership, job wellbeing, and health effects—a systematic review and a meta-analysis. *Journal of occupational and environmental medicine*, 50(8), 904-915.
- Kurz, B., Malcolm, B., & Cournoyer, D. (2005). In the shadow of race: Immigrant status and mental health. *Affilia*, 20(4), 434-447.
- Lamela, D., Cabral, J., Coelho, S., & Jongenelen, I. (2020). Personal stigma, determinants of intention to use technology, and acceptance of internet-based psychological interventions for depression. *International Journal of Medical Informatics*, 136, 104076.
- La Porte, L. M., Kim, J. J., Adams, M. G., Zagorsky, B. M., Gibbons, R., & Silver, R. K. (2020). Feasibility of perinatal mood screening and text messaging on patients' personal smartphones. *Archives of Women's Mental Health*, 23(2), 181-188.
- Labor force, female (% of total labor force)*. (n.d.). The World Bank. Retrieved August 19, 2016, from <http://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>
- Lambert, S. D., & Loiselle, C. G. (2008). Combining individual interviews and focus groups to enhance data richness. *Journal of Advanced Nursing*, 62(2), 228-237.
- LaMontagne, A., Martin, A., Page, K., Reavley, N., Noblet, A., & Milner, A. et al. (2014). Workplace mental health: developing an integrated intervention approach. *BMC Psychiatry*, 14(1). <http://dx.doi.org/10.1186/1471-244x-14-131>

- Lancaster, C., Gold, K., Flynn, H., Yoo, H., Marcus, S., & Davis, M. (2010). Risk factors for depressive symptoms during pregnancy: a systematic review. *American Journal of Obstetrics and Gynecology*, 202(1), 5-14. doi: 10.1016/j.ajog.2009.09.007
- Lavrakas, P. J. (2008). *Encyclopedia of survey research methods* Thousand Oaks, CA: SAGE Publications Ltd. doi: 10.4135/9781412963947
- Layard, R. (2010). Measuring subjective well-being. *Science*. 327(5965):534–55.
- Le Meyer, O., Zane, N., Cho, Y., & Takeuchi, D. (2009). Use of specialty mental health services by Asian Americans with psychiatric disorders. *Journal Of Consulting And Clinical Psychology*, 77(5), 1000-1005. <http://dx.doi.org/10.1037/a0017065>
- Ledesma Ortega, C. C., & Reio Jr, T. G. (2016). Interventions for Women With Postpartum Depression Symptoms: An Integrative Literature Review for Human Resource Development. *Human Resource Development Review*, 15(2), 131-150.
- Lee, J. & Rho, M. (2013). Perception of influencing factors on acceptance of mobile health monitoring service: A Comparison between users and non-users. *Healthc Inform Res*, 19(3), 167. <http://dx.doi.org/10.4258/hir.2013.19.3.167>
- Lee, S. & Matejkowski J. (2012) Mental health service utilization among noncitizens in the United States: findings from the National Latino and Asian American Study. *Administration and Policy in Mental Health and Mental Health Services Research* (39), 406–418.
- Leech, N., Barrett, K., & Morgan, G.A. (2004). *SPSS for Intermediate Statistics: Use and Interpretation*, Second Edition (2nd ed.). Routledge.
- Liem, A., Natari, R. B., Jimmy, & Hall, B. J. (2021). Digital health applications in mental health care for immigrants and refugees: A rapid review. *Telemedicine and e-Health*, 27(1), 3-16.

- Lincoln, YS. & Guba, EG. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage Publications.
- Ling, R. (2014). Eudaimonia: Mobile Communication and Social Flourishing. In Wang, H. (Ed.). *Communication and The Good Life*. New York, United States of America: Peter Lang Verlag.
- Lombard, M., Snyder-Duch, J. & Bracken, C. (2017). Intercoder reliability. In M. Allen (Ed.), *The sage encyclopedia of communication research methods* (Vol. 2, pp. 722-724). Thousand Oaks, CA: SAGE Publications, Inc doi: 10.4135/9781483381411.n252
- Long, T., & Johnson, M. (2000). Rigour, reliability and validity in qualitative research. *Clinical effectiveness in nursing*, 4(1), 30-37.
- Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior: a meta-analytic review. *Clinical Psychology Review*, 20, 561–592.
- Lucero, N. B., Beckstrand R. L., Callister, L. C., & Sanchez Birkhead, A. C., (2012). Prevalence of postpartum depression among Hispanic immigrant women. *Journal of American Academy of Nurse Practitioner*, 24, 726- 734
- Major depression among adults (2017). National Institute of Mental Health. Retrieved from: <https://www.nimh.nih.gov/health/statistics/prevalence/major-depression-among-adults.shtml>
- Maneze, D., DiGiacomo, M., Salamonson, Y., Descallar, J., & Davidson, P. M. (2015). Facilitators and barriers to health-seeking behaviours among Filipino migrants: Inductive analysis to inform health promotion. *BioMed research international*, 2015.
- Mannava, P., Durrant, K., Fisher, J., Chersich, M., & Luchters, S. (2015). Attitudes and behaviours of maternal health care providers in interactions with clients: a systematic review. *Globalization and health*, 11(1), 1-17.

Marcano-Belisario, J. S., Gupta, A. K., O'Donoghue, J., Ramchandani, P., Morrison, C., & Car,

J. (2017). Implementation of depression screening in antenatal clinics through tablet computers: results of a feasibility study. *BMC medical informatics and decision making*, 17(1), 1-11.

Marcano-Belisario, J. S., Gupta, A. K., O'Donoghue, J., Ramchandani, P., Morrison, C., & Car,

J. (2017). Implementation of depression screening in antenatal clinics through tablet computers: results of a feasibility study. *BMC medical informatics and decision making*, 17(1), 1-11.

Martin, D. K., Bulmer, S. M., & Pettker, C. M. (2013). Childbirth expectations and sources of information among low-and moderate-income nulliparous pregnant women. *The Journal of Perinatal Education*, 22(2), 103-112.

Massey, P. M., Langellier, B. A., Sentell, T., & Manganello, J. (2017). Nativity and language preference as drivers of health information seeking: examining differences and trends from a US population-based survey. *Ethnicity & health*, 22(6), 596-609.

Mayberry, L. J., Horowitz, J. A., & Declercq, E. (2007). Depression symptom prevalence and demographic risk factors among US women during the first 2 years postpartum. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, 36(6), 542-549.

McLean, G. N. (2004). NHRD: What in the world is it? *Advances in Developing Human Resources*, 6 (3), 269–275.

McLean, G. N. (2014). National HRD, in *Handbook of Human Resource Development* (eds N. E. Chalofsky, T. S. Rocco and M. L. Morris), John Wiley & Sons, Inc., Hoboken, NJ, USA.

- Mechakra-Tahiri, S., Zunzunegui, M.V., Seguin, L., (2007). Self-rated health and postnatal depressive symptoms among immigrant mothers in Quebec. *Women Health* 45, 1-17.
- Memish, K., Martin, A., Bartlett, L., Dawkins, S., & Sanderson, K. (2017). Workplace mental health: An international review of guidelines. *Preventive Medicine*.
- Mental Illness*. (2022). National Institute of Mental Health. Retrieved January 2, 2022, from <https://www.nimh.nih.gov/health/statistics/mental-illness>
- Merrell, Laura Kathleen, "Exploration of the Pregnancy-Related Health Information Seeking Behavior of Women who Gave Birth in the Past Year" (2016). *Graduate Theses and Dissertations*. <http://scholarcommons.usf.edu/etd/6116>
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.
- mHealth in China and the United States: How Mobile Technology is Transforming Health Care in the World's Two Largest Economies* | *Brookings Institution*. (2016). *Brookings*. Retrieved 12 August 2016, from <https://www.brookings.edu/research/mhealth-in-china-and-the-united-states-how-mobile-technology-is-transforming-health-care-in-the-worlds-two-largest-economies/>
- Milgrom, J. & Gemmill, A. (2014). Screening for perinatal depression. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 28(1), 13-23. <http://dx.doi.org/10.1016/j.bpobgyn.2013.08.014>
- Miller, L., Shade, M., & Vasireddy, V. (2009). Beyond screening: assessment of perinatal depression in a perinatal care setting. *Archives of women's mental health*, 12(5), 329-334.
- Miller, L., Shade, M., & Vasireddy, V. (2009). Beyond screening: assessment of perinatal depression in a perinatal care setting. *Archives of women's mental health*, 12(5), 329-334.

- Montague, E., & Perchonok, J. (2012). Health and wellness technology use by historically underserved health consumers: systematic review. *Journal of medical Internet research*, 14(3), e78.
- Morrissey, E. R. (1974). Sources of error in the coding of questionnaire data. *Sociological Methods & Research*, 3(2), 209-232.
- Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research*, 40, 120-123.
- Muse, L., Harris, S.G., Giles, W.E., Field, H.S. (2008). Work-life benefits and positive organizational behavior: is there a connection? *Journal of Organizational Behavior*. 29(2):171–92
- Musoke, M. (2002). Maternal Health Care in Rural Uganda: Leveraging Traditional Systems and Modern Knowledge Systems. *Indigenous Knowledge Notes*, (40).
- Nadeem, E., Lange, J. M., & Miranda, J. (2008). Mental health care preferences among low-income and minority women. *Archives of Women's Mental Health*, 11(2), 93.
- Ngo-Metzger, Q., Massagli, M. P., Clarridge, B. R., Manocchia, M., Davis, R. B., Iezzoni, L. I., & Phillips, R. S. (2003). Linguistic and cultural barriers to care. *Journal of general internal medicine*, 18(1), 44-52.
- Nilsen, W., Kumar, S., Shar, A., Varoquiers, C., Wiley, T., & Riley, W. et al. (2012). Advancing the Science of mHealth. *Journal of Health Communication*, 17(sup1), 5-10.
<http://dx.doi.org/10.1080/10810730.2012.677394>
- Nölke, L., Mensing, M., Krämer, A., & Hornberg, C. (2015). Sociodemographic and health- (care-) related characteristics of online health information seekers: a cross-sectional German study. *BMC public health*, 15(1), 1-12.

- Nunes, A., Limpo, T., & Castro, S. L. (2019). Acceptance of mobile health applications: examining key determinants and moderators. *Frontiers in psychology*, 10, 2791.
- Nurmatov, U. B., Lee, S. H., Nwaru, B. I., Mukherjee, M., Grant, L., & Pagliari, C. (2014). The effectiveness of mHealth interventions for maternal, newborn and child health in low-and middle-income countries: Protocol for a systematic review and meta-analysis. *Journal of global health*, 4(1).
- O'Mahony, J. M., & Donnelly, T. T. (2013). How does gender influence immigrant and refugee women's postpartum depression help-seeking experiences? *Journal of Psychiatric and Mental Health Nursing*, 20(8). <http://doi.org/10.1111/jpm.12005>
- O'Mahony, J. M., Donnelly, T. T., Bouchal, S. R., & Este, D. (2013). Cultural background and socioeconomic influence of immigrant and refugee women coping with postpartum depression. *Journal of Immigrant and Minority Health*, 15(2), 300-314.
- O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instrumentation, and Computers*, 32, 396-402.
- O'hara, M. W., & Swain, A. M. (1996). Rates and risk of postpartum depression—a meta-analysis. *International review of psychiatry*, 8(1), 37-54.
- O'Mahony, J. M., Donnelly, T. T., Bouchal, S. R., & Este, D. (2012). Barriers and facilitators of social supports for immigrant and refugee women coping with postpartum depression. *Advances in nursing science*, 35(3), E42-E56.
- Organisation for Economic Cooperation and Development (2021, November 15). *Mental health*. <https://www.oecd.org/health/mental-health.htm>

- Organisation for Economic Cooperation and Development (OECD), 2013. Employment Outlook 2013. OECD Publishing, Paris (Retrieved from http://www.oecdilibrary.org/employment/oecd-employment-outlook-2013_empl_outlook-2013-en).
- Osborne, J. W. (2012). Logits and tigers and bears, oh my! A brief look at the simple math of logistic regression and how it can improve dissemination of results. *Practical Assessment, Research & Evaluation*, 17(11), n11.
- Oshlyansky, L., Cairns, P. A., & Thimbleby, H W. (2007). Validating the unified theory of acceptance and use of technology (UTAUT) tool cross-culturally. *BCS-HCI '07 Proceedings of the 21st British HCI Group Annual Conference*, Lancaster University, UK.
- Osteras, N., Gulbrandsen, P., Garrat, A., Benth, J. S., Dahl, F. A., Natvig, B., & Brage, S. (2008). A randomized comparison of a four- and a five-point scale version of the Norwegian function assessment scale. *Health and Quality of Life Outcomes*, 6 (14). Published online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2276196/>. doi: 10.1186/1477-7525-6-14
- Outlook 2013. OECD Publishing, Paris (Retrieved from http://www.oecdilibrary.org/employment/oecd-employment-outlook-2013_empl_outlook-2013-en).
- Patrick, K., Raab, F., Adams, M., Dillon, L., Zabinski, M., Rock, C., ... & Norman, G. (2009). A text message-based intervention for weight loss: randomized controlled trial. *Journal of medical Internet research*, 11(1), e1.
- Patterson, P., & Gong, G. (2009). Addressing health disparities in immigrant populations in the United States. *Cultural Proficiency in Addressing Health Disparities*. Sudbury, Mass: Jones and Bartlett.

- Paulson, J. F. (2010). Focusing on depression in expectant and new fathers: prenatal and postpartum depression not limited to mothers. *Psychiatric Times*, 27(2), 48-48.
- Paulson, J., Keefe, H., & Leiferman, J. (2009). Early parental depression and child language development. *Journal of Child Psychology And Psychiatry*, 50(3), 254-262.
<http://dx.doi.org/10.1111/j.1469-7610.2008.01973.x>
- Pavlish, C. (2002). Knowledge and care at the center of human resource development. Human resource development in Asia: Trends and challenges, 227-235.
- Perez Ramirez, F., García-García, I., & Peralta-Ramírez, M. I. (2013). The migration process as a stress factor in pregnant immigrant women in Spain. *Journal of Transcultural Nursing*, 24(4), 348-354.
- Perkins, D. H., Radelet, S., Snodgrass, D. R., Gillis, M., & Roemer, M. (2001). *Economics of development*. New York, N.Y.: W.W. Norton & Co.
- Pescosolido, B., and Boyer, C. (2010). Understanding the context and dynamic social processes of mental health treatment; in A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems. Edited by Scheid TL, Brown TN. New York, Cambridge University Press.
- Pew Research Center (2015). *Modern Immigration Wave Brings 59 Million to U.S., Driving Population Growth and Change Through 2065: Views of Immigration's Impact on U.S. Society Mixed*. Washington, D.C.: September.
- Phillips, G., Felix, L., Galli, L., Patel, V., & Edwards, P. (2010). The effectiveness of M-health technologies for improving health and health services: a systematic review protocol. *BMC research notes*, 3(1), 1.

- Pineros-Leano, M., Tabb, K. M., Sears, H., Meline, B., & Huang, H. (2015). Clinic staff attitudes towards the use of mHealth technology to conduct perinatal depression screenings: a qualitative study. *Family practice*, 32(2), 211-215.
- Pineros-Leano, M., Tabb, K., Sears, H., Meline, B., & Huang, H. (2014). Clinic staff attitudes towards the use of mHealth technology to conduct perinatal depression screenings: a qualitative study. *Family Practice*, 32(2), 211-215.
<http://dx.doi.org/10.1093/fampra/cmu083>
- Poole, H., & Mason, L. (2008). *Health visitors' views of screening for postnatal depression*. Liverpool: John Moore University
- Poole, H., Mason, L., & Osborn, T. (2006). Women's views of being screened for postnatal depression. *Community Practitioner*, 79(11), 363–367
- Pooler, J., Perry, D. F., & Ghandour, R. M. (2013). Prevalence and risk factors for postpartum depressive symptoms among women enrolled in WIC. *Maternal and Child Health Journal*, 17(10), 1969–80. <http://doi.org/10.1007/s10995-013-1224-y>
- Popping, R. (2010). Some views on agreement to be used in content analysis studies. *Quality & Quantity*, 44(6), 1067-1078.
- Postpartum Progress, Postpartum Depression by Number, 2016. Retrieved from:
<http://www.postpartumprogress.com/postpartum-de-2>
- Powell, R., & Single, H. (1996). Focus groups. *International Journal of Qualitative Health Care*, 8, 499–504.
- Rahman, A., Surkan, P., Cayetano, C., Rwagatare, P., & Dickson, K. (2013). Grand Challenges: Integrating maternal mental health into maternal and child health programmes. *Plos Med*, 10(5), e1001442. <http://dx.doi.org/10.1371/journal.pmed.1001442>

- Rajak, M., & Shaw, K. (2021). An extension of technology acceptance model for mHealth user adoption. *Technology in Society*, 67, 101800.
- Report on Illinois Foreign-born Population*. (2016) (pp. 1-29). Illinois Department of Human Services. Retrieved from http://www.dhs.state.il.us/OneNetLibrary/27894/documents/Report_On_Illinois_Foreign-Born_Population.pdf
- Requejo, J. & Bustreo, F. (2016). Putting Maternal Health in Perspective with a Life Course Approach to Women's Health. *Journal Of Women's Health*, 25(3), 211-212. <http://dx.doi.org/10.1089/jwh.2016.5783>
- Rho, M. J., Kim, H. S., Chung, K., & Choi, I. Y. (2015). Factors influencing the acceptance of telemedicine for diabetes management. *Cluster Computing*, 18(1), 321-331.
- Robertson, E., Grace, S., Wallington, T., & Stewart, D. (2004). Antenatal risk factors for postpartum depression: a synthesis of recent literature. *General Hospital Psychiatry*, 26(4), 289-295. doi: 10.1016/j.genhosppsych.2004.02.006
- Rodriguez, O., Lessinger, J., & Guarnaccia, P. (1992). The societal and organizational contexts of culturally sensitive mental health services: Findings from an evaluation of bilingual/Bicultural psychiatric programs. *The Journal Of Mental Health Administration*, 19(3), 213-223. <http://dx.doi.org/10.1007/bf02518987>
- Rosen, A. K., Itani, K. M., Cevasco, M., Kaafarani, H. M., Hanchate, A., Shin, M., ... & Borzecki, A. (2012). Validating the patient safety indicators in the Veterans Health Administration: do they accurately identify true safety events?. *Medical care*, 50(1), 74-85.

- Ruiz, A. G., Batalova, J. & Zong, J. (2015, March 20). *Immigrant Women in the United States*. Retrieved from: <https://www.migrationpolicy.org/article/immigrant-women-united-states#Employment and Occupations>
- Samkange-Zeeb, F., Borisova, L., Padilla, B., Bradby, H., Phillimore, J., Zeeb, H., & Brand, T. (2020). Superdiversity, migration and use of internet-based health information—results of a cross-sectional survey conducted in 4 European countries. *BMC public health*, 20(1), 1-12.
- Schmied, V., Black, E., Naidoo, N., Dahlen, H. G., & Liamputtong, P. (2017). Migrant women's experiences, meanings and ways of dealing with postnatal depression: A meta-ethnographic study. *PloS one*, 12(3), e0172385.
- Schnall, R., Higgins, T., Brown, W., Carballo-Diequez, A., & Bakken, S. (2014). Trust, Perceived Risk, Perceived Ease of Use and Perceived Usefulness as Factors Related to mHealth Technology Use. *Studies in health technology and informatics*, 216, 467-471.
- Schulte, P., & Vainio, H. (2010). Wellbeing at work—overview and perspective. *Scandinavian journal of work, environment & health*, 422-429.
- Seal, D., Bogart, L., & Ehrhardt, A. (1998). Small group dynamics: The utility of focus group discussions as a research method. *Group Dynamics: Theory, Research, and Practice*, 2, 253–266.
- Sears, L. E., Shi, Y., Coberley, C. R., & Pope, J. E. (2013). Overall wellbeing as a predictor of health care, productivity, and retention outcomes in a large employer. *Population health management*, 16(6), 397-405.
- Segre, L. S., O'Hara, M. W., Arndt, S., & Stuart, S. (2007). The prevalence of postpartum depression. *Social psychiatry and psychiatric epidemiology*, 42(4), 316-321.

- Selix, N. W., & Goyal, D. (2015). Postpartum depression among working women: A call for practice and policy change. *The Journal for Nurse Practitioners*, 11(9), 897-902.
- Shakespeare, J., Blake, F., & Garcia, J. (2003). A qualitative study of the acceptability of routine screening of postnatal women using the Edinburgh Postnatal Depression Scale. *British Journal of General Practice*, 53, 614-619.
- Shareef, M. A., Kumar, V., & Kumar, U. (2014). Predicting mobile health adoption behaviour: A demand side perspective. *Journal Of Customer Behaviour*, 13(3), 187-205.
<http://doi.org/10.1362/147539214X14103453768697>
- Shepherd-Banigan, M., Bell, J. F., Basu, A., Booth-LaForce, C., & Harris, J. R. (2016). Workplace stress and working from home influence depressive symptoms among employed women with young children. *International journal of behavioral medicine*, 23(1), 102-111.
- Sherry, J. M., & Ratzan, S. C. (2012). Measurement and evaluation outcomes for mHealth communication: don't we have an app for that?. *Journal of health communication*, 17(sup1), 1-3.
- Sherwin, H. N., McKeown, M., Evans, M. F., & Bhattacharyya, O. K. (2013). The waiting room “wait”: From annoyance to opportunity. *Canadian Family Physician*, 59(5), 479-481.
- Sidebottom, A. C., Harrison, P. A., Godecker, A., & Kim, H. (2012). Validation of the Patient Health Questionnaire (PHQ)-9 for prenatal depression screening. *Archives of women's mental health*, 15(5), 367-374.
- Silva, B. M. C., Rodrigues, J. J. P. C., de la Torre Díez, I., López-Coronado, M., & Saleem, K. (2015). Mobile-health: A review of current state in 2015. *Journal of Biomedical Informatics*, 56, 265-272. <http://doi.org/10.1016/j.jbi.2015.06.003>

- Silver, R. K., Kim, J. J., La Porte, L., Zagorsky, B., Desmarais, E., & Gibbons, R. D. (2017). Mobile Phone-Based Perinatal Depression Screening: Feasibility and Acceptance [15R]. *Obstetrics & Gynecology*, 129, 187S.
- Simmons, T. (2014). *An exploratory study of mhealth technology acceptance for type 2 diabetes self-management among adults in later life* (Doctoral Dissertation). Retrieved from <https://cdr.lib.unc.edu/indexablecontent/uuid:106b063c-7fe2-4c9a-a355-71a8f4592e50>
- Singleton, K., & Krause, E. (2009). Understanding cultural and linguistic barriers to health literacy. *The Online Journal of Issues in Nursing*, 14(3).
- Siu, A. L., Bibbins-Domingo, K., Grossman, D. C., Baumann, L. C., Davidson, K. W., Ebell, M., ... J, M. (2016). Screening for Depression in Adults. *JAMA*, 315(4), 380. <http://doi.org/10.1001/jama.2015.18392>
- Smith, A. (2015, April 1). U. S. smartphone use in 2015. Retrieved from: <http://www.pewinternet.org/2015/04/01/us-smartphone-use-in-2015/>
- Snowden, L. & Cheung, F. (1990). Use of inpatient mental health services by members of ethnic minority groups. *American Psychologist*, 45(3), 347-355. <http://dx.doi.org/10.1037/0003-066x.45.3.347>
- Sohr-Preston, S. & Scaramella, L. (2006). Implications of Timing of Maternal Depressive Symptoms for Early Cognitive and Language Development. *Clinical Child And Family Psychology Review*, 9(1), 65-83. <http://dx.doi.org/10.1007/s10567-006-0004-2>
- Song, D., Sands, R. G., & Wong, Y. L. I. (2004). Utilization of mental health services by low-income pregnant and postpartum women on medical assistance. *Women & health*, 39(1), 1-24.

- Song, H., May, A., Vaidhyathan, V., Cramer, E., Owais, R., & McRoy, S. (2013). A two-way text-messaging system answering health questions for low-income pregnant women. *Patient Education And Counseling*, 92(2), 182-187.
<http://dx.doi.org/10.1016/j.pec.2013.04.016>
- Starks, H. & Trinidad, S. B. (2007). Choose your method: A comparison of phenomenology, discourse analysis, and grounded theory. *Qualitative Health Research*, 17(10), 1372–80.
- State Demographics Data - IL. migrationpolicy.org. (2022). Retrieved 7 March 2022, from <https://www.migrationpolicy.org/data/state-profiles/state/demographics/IL>.
- Stein, A., Krebs, G., Richter, L., Tomkins, A., Rochat, T., & Bennish, M. (2005). Babies of a pandemic: Infant development and maternal HIV. *Archives of Disease in Childhood*, 90, 116–118.
- Stewart, D.E., Gagnon, A., Saucier, J.F., Wahoush, O., & Dougherty, G., (2008). Postpartum depression symptoms in newcomers. *Can. J. Psychiatry* 53, 121-124.
- Stokes, D., & Bergin, R. (2006). Methodology or methodolatry? An evaluation of focus groups and depth interviews. *Qualitative Market Research: An International Journal*, 9, 26–37.
- Sue, S., Fujino, D., Hu, L., Takeuchi, D., & et al., (1991). Community mental health services for ethnic minority groups: A test of the cultural responsiveness hypothesis. *Journal of Consulting And Clinical Psychology*, 59(4), 533-540. <http://dx.doi.org/10.1037/0022-006x.59.4.533>
- Sun, Y., Wang, N., Guo, X., & Peng, Z. (2013). Understanding The Acceptance Of Mobile Health Services: A Comparison And Integration of Alternative Models. *Journal of Electronic Commerce Research*, 14(2).

- SurveyMonkey (n.d). *Sample Size Calculator: Understanding Sample Sizes*. Retrieved 16 November 2017, from <https://www.surveymonkey.com/mp/sample-size-calculator/>
- Sustainable Development Goals: 17 Goals to Transform Our World*. (2016). United Nations Sustainable Development. Retrieved 12 August 2016, from <http://www.un.org/sustainabledevelopment/>
- Table 4. Persons Obtaining Lawful Permanent Resident Status by State or Territory of Residence: Fiscal Years 2013 To 2015*. (n.d.). Department of Homeland Security. Retrieved from: <https://www.dhs.gov/immigration-statistics/yearbook/2015/table4>
- Takeuchi, D., Chung, R., Lin, K., Shen, H., Kurasaki, K., Chun, C., & Sue, S. (1998). Lifetime and twelve-month prevalence rates of major depressive episodes and dysthymia among Chinese Americans in Los Angeles. *American Journal of Psychiatry*, 155(10), 1407-1414. <http://dx.doi.org/10.1176/ajp.155.10.1407>
- Tamrat, T. & Kachnowski, S. (2011). Special Delivery: An analysis of mHealth in maternal and newborn health programs and their outcomes around the world. *Maternal and Child Health Journal*, 16(5), 1092-1101. <http://dx.doi.org/10.1007/s10995-011-0836-3>
- Tan, L., Wang, M. J., Modini, M., Joyce, S., Mykletun, A., Christensen, H., & Harvey, S. B. (2014). Preventing the development of depression at work: a systematic review and meta-analysis of universal interventions in the workplace. *BMC medicine*, 12(1), 74.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
- Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of mixed methods research*, 1(1), 77-100.

- Teng, L., Blackmore, E. R., & Stewart, D. E. (2007). Healthcare worker's perceptions of barriers to care by immigrant women with postpartum depression: an exploratory qualitative study. *Archives of women's mental health*, 10(3), 93-101.
- Teng, L., Blackmore, E. R., & Stewart, D. E. (2007). Healthcare worker's perceptions of barriers to care by immigrant women with postpartum depression: an exploratory qualitative study. *Archives of women's mental health*, 10(3), 93-101.
- The Global Strategy for Women's, Children's, and Adolescent's Health 2016-2030*. (2016). *The Partnership for Maternal, Newborn & Child Health*. Retrieved 12 August 2016, from http://www.who.int/pmnch/activities/advocacy/globalstrategy/2016_2030/en/
- Thorsteinsson, E. B., Loi, N. M., & Farr, K. (2018). Changes in stigma and help-seeking in relation to postpartum depression: non-clinical parenting intervention sample. *PeerJ*, 6, e5893.
- Tobin, C., Di Napoli, P., & Wood-Gauthier, M. (2015). Recognition of risk factors for postpartum depression in refugee and immigrant women: are current screening practices adequate?. *Journal of immigrant and minority health*, 17(4), 1019-1024.
- Tompa, E. (2002). The impact of health on productivity: empirical evidence and policy implications. In: Sharpe A, St-Hilaire F, Banting K, editors. *The review of economic performance and social progress 2002: towards a social understanding of productivity*. Montreal: Institute for Research on Public Policy; 2002. p 181–202.
- U.S. Bureau of Labor Statistics (2021). Women in the labor force: A data book. Retrieved from: <https://www.bls.gov/opub/reports/womens-databook/2020/home.htm>
- United States Census Bureau (2017, September). Quick facts: Champaign County, Illinois. Retrieved from: <https://www.census.gov/quickfacts/table/PST045216/17019>

United States Department of Agriculture (2017). Food and Nutrition Service: Income Eligibility Guidelines. Retrieved from: <https://www.fns.usda.gov/sites/default/files/wic/WIC-IEGS-2017.pdf>

Vanderkruik, R., Raffi, E., Freeman, M. P., Wales, R., & Cohen, L. (2021). Perinatal depression screening using smartphone technology: Exploring uptake, engagement and future directions for the MGH Perinatal Depression Scale (MGHPDS). *Plos one*, 16(9), e0257065.

VanderWeele, T.J. (2017). On the promotion of human flourishing. *Proceedings of the National Academy of Sciences, U.S.A.*, 31:8148-8156. Retrieved from: <https://www.hsph.harvard.edu/tyler-vanderweele/program-on-integrative-knowledge/>

Vargas, P. A., Robles, E., Harris, J., & Radford, P. (2010). Using information technology to reduce asthma disparities in underserved populations: a pilot study. *Journal of Asthma*, 47(8), 889-894.

Varshney, U. (2014). Mobile health: Four emerging themes of research. *Decision Support Systems*, 66, 20-35. <http://dx.doi.org/10.1016/j.dss.2014.06.001>

Vega, W., Kolody, B., Aguilar-Gaxiola, S., & Catalano, R. (1999). Gaps in service utilization by Mexican Americans with mental health problems. *American Journal of Psychiatry*, 156(6), 928-934. <http://dx.doi.org/10.1176/ajp.156.6.928>

Velikova, G., Wright, E. P., Smith, A. B., Cull, A., Gould, A., Forman, D., ... & Selby, P. J. (1999). Automated collection of quality-of-life data: a comparison of paper and computer touch-screen questionnaires. *Journal of clinical oncology*, 17(3), 998-998.

- Venkatesh, V. & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 45, 186-204.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478.
- Venkatesh, V., Sykes, T. A., & Zhang, X. (2011, January). 'Just what the doctor ordered': a revised UTAUT for EMR system adoption and use by doctors. In *System Sciences (HICSS), 2011 44th Hawaii International Conference on* (pp. 1-10). IEEE.
- Wachs, T. D., Black, M. M., & Engle, P. L. (2009). Maternal depression: a global threat to children's health, development, and behavior and to human rights. *Child development perspectives*, 3(1), 51-59
- Waddell, G., & Burton, A.K. (2006). *Is work good for your health and wellbeing?* London: The Stationary Office.
- Waddington, P. A. J., & Bull, R. (2007). *Cognitive interviewing as a research technique*. Retrieved from: <http://sru.soc.surrey.ac.uk/SRU50.html>
- Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology*, 40(1), 92-118.
- Warr, P. (1990). The measurement of well-being and other aspects of mental-health. *Journal of Occupational Psychology*. 63(3):193–210.
- Watterson, J., Walsh, J., & Madeka, I. (2015). Using mHealth to Improve Usage of antenatal care, postnatal care, and immunization: a systematic review of the literature. *Biomed Research International*, 2015, 1-9. <http://dx.doi.org/10.1155/2015/153402>

- Wells, K., Klap, R., Koike, A., & Sherbourne, C. (2001). Ethnic disparities in unmet need for alcoholism, drug abuse, and mental health care. *American Journal of Psychiatry*, 158(12), 2027-2032. <http://dx.doi.org/10.1176/appi.ajp.158.12.2027>
- Werner, E., Miller, M., Osborne, L. M., Kuzava, S., & Monk, C. (2015). Preventing postpartum depression: review and recommendations. *Archives of women's mental health*, 18(1), 41-60.
- Wicklund, E. (2017). *mHealth App Looks to Identify, Help Treat Postpartum Depression*. Retrieved from: <https://mhealthintelligence.com/news/mhealth-app-looks-to-identify-help-treat-postpartum-depression>
- Wicklund, E. (2022). *Hospitals are Missing the Mark on mHealth Apps*. Retrieved 15 September 2021, from <https://mhealthintelligence.com/news/hospitals-are-missing-the-mark-on-mhealth-apps>
- Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8(3).
- Williams, M. D., Rana, N. P., Dwivedi, Y. K., & Lal, B. (2011). Is UTAUT really used or just cited for the sake of it? A systematic review of citations of UTAUT. *ECIS Proceedings*, Retrieve from <http://aisel.aisnet.org/ecis2011/231/>
- Willis, G. B. (2008). Cognitive interviewing. In Lavrakas, P. J. (Ed.). *Encyclopedia of survey research methods* (pp. 107-109). Thousand Oaks, CA: Sage Publications, Inc. doi: 10.4135/9781412963947
- Wills, M. J., El-Gayar, O. F., & Bennett, D. (2008). Examining healthcare professionals' acceptance of electronic medical records using UTAUT. *Issues in Information Systems*, 9(2), 396-401.

- Wilson, S., & Durbin, C. E. (2010). Effects of paternal depression on fathers' parenting behaviors: A meta-analytic review. *Clinical psychology review*, 30(2), 167-180.
- Wood, J. M. (2007). Understanding and Computing Cohen's Kappa: A Tutorial. *WebPsychEmpiricist*.
- Wood, N. D., Akloubou Gnonhosou, D. C., & Bowling, J. W. (2015). Combining parallel and exploratory factor analysis in identifying relationship scales in secondary data. *Marriage & family review*, 51(5), 385-395.
- World Bank (2021, June). *Labor force, female (%)*. Retrieved from: <https://data.worldbank.org/indicator/SL.TLF.TOTL.FE.ZS>
- World Federation of Mental Health [Internet] *Mental health in the workplace*. 2017 [Retrieved on: 2021 Jan 31]. Available from: <https://wfmh.global/>
- World Health Organization (2017). *World health day 2017 - Depression: Let's talk!* Retrieved from: <http://www.who.int/campaigns/world-health-day/2017/campaign-essentials/en/>
- World Health Organization, "mHealth: New Horizons for Health Through Mobile Technologies," *Global Observatory for eHealth Series*, Volume 3, 2011.
- Wu, L., & Chen, J. L. (2005). An extension of trust and TAM model with TPB in the initial adoption of on-line tax: an empirical study. *International Journal of Human-Computer Studies*, 62(6), 784-808.
- Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W.B. (2009). Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior*. 74(3):235–44.

- Yu, X., Han, H., Du, J., Wei, L., Li, C., Zhang, X., ... & Bleiberg, J. (2014). mHealth in China and the United States: how mobile technology is transforming healthcare in the world's two largest economies. *Washington, DC: Center for Technology Innovation at Brookings.*
- Yang, M., Jiang, J., Kiang, M., & Yuan, F. (2021). Re-examining the impact of multidimensional trust on patients' online medical consultation service continuance decision. *Information Systems Frontiers*, 1-25.
- Youn, J. H., & Jeong, I. S. (2011). Predictive validity of the postpartum depression predictors inventory - revised. *Asian nursing research*, 5(4), 210-215.
- Zelditch, M. (1970). Some methodological problems of field studies. Pp. 217-34 in *Qualitative Methodology*, edited by William Filstead. Chicago, IL: Rand McNal
- Zong, J., Batalova, J., & Hallock, J. (2018, February 8). *Frequently Requested Statistics on Immigrants and Immigration in United States*. Retrieved from:
<https://www.migrationpolicy.org/article/frequently-requested-statistics-immigrants-and-immigration-united-states#Workforce>

APPENDIX A: ONLINE SURVEY

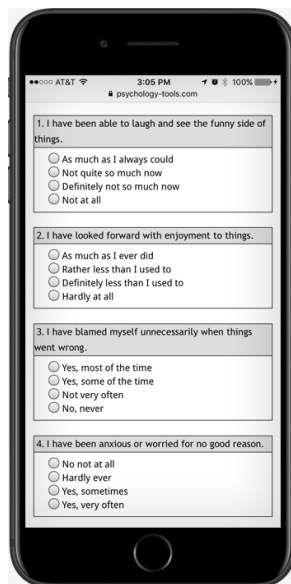
Stigma and Technology Acceptance of mHealth for Postpartum Depression Screenings Among Women in Central Illinois

1. Consent Page



You are invited to participate in a research study that investigates technology acceptance for the use of mobile technology (i.e. the use of tablets, mobile phones, laptops or other mobile devices) for prenatal and postpartum depression screenings among immigrant mothers. This study is conducted by Dr. Wenhao Huang, an Associate Professor in the Department of Education Policy, Organization and Leadership, College of Education, University of Illinois at Urbana-Champaign.

This study will take approximately 15 minutes to complete. You will be asked to complete an online survey about your experience with screenings for prenatal and postpartum depression (PPD) symptoms during your maternity checkups. Questions focus on your viewpoint with using mobile technology for depression screening during prenatal and postpartum checkups. You will also be asked about stigma perceptions on mental health based on your personal experiences. The picture below might be useful to refresh your memories on some of the questions asked in a depression screening survey:



You will have an opportunity to enter gift cards lottery upon completion of the survey for a \$20 gift card and

an opportunity to participate in an interview with a \$20 cash or gift card awarded. If you would like to participate in both or either one of these opportunities, please indicate your email at the survey end.

Your decision to participate or decline participation in this study is completely voluntary and you may choose to withdraw from this study at any time. Your participation in this research study will remain completely confidential. When this research is discussed or published, your anonymity will remain intact. However, laws and university rules might require us to disclose information. For example, if required by laws or University Policy, study information which identifies you may be seen or copied by the following people or groups: a) The university committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for Protection of Research Subjects; and b) University and state auditors, and Departments of the university responsible for research supervision.

If you have any questions about this project, you may contact Dr. Huang via email at wdhuang@illinois.edu or by phone at (217)-333-0807 or Ms. Syahidatul Khafizah Mohd Hajaraih at mohdhaj1@illinois.edu or (919)-995-4549.

If you feel you have not been treated according to the descriptions in this form, or if you have any questions about your rights as a research subject, including questions, concerns, complaints, or to offer input, you may contact the Office for the Protection of Research Subjects (OPRS) at irb@illinois.edu.

Please print a copy of this consent form for your records, if you so desire.

****I have read and understood the above consent form, I certify that I am 18 years old or older and had never taken the survey before. By clicking the NEXT button to enter the survey, I indicate my willingness to voluntarily taking the survey.**

2. Healthcare and Maternity Information

* 1. How many years of experience have you had with the health care practices in the U.S.?

- ☐ Less than 1 year ☐ More than 10 years
☐ Between 1-5 years ☐ Not applicable
☐ Between 6-10 years

* 2. What experience do you have with mHealth (using mobile device for health/healthcare) in general?

- ☐ I have used a mobile device for health/healthcare-related activities before
☐ I have never used a mobile device for health/healthcare-related activities before

3. Are you currently covered by any health insurance plan?

- ☐ Yes ☐ No

4. Are you currently enrolled in the Women, Infants, and Children (WIC) program provided by the Illinois Department of Human Services?

- ☐ Yes ☐ No
☐ Not Sure

* 5. Are you currently pregnant and/or gave birth(s) in the last 12 months?

- ☐ Yes ☐ No

6. How many times have you given birth in the U.S.?

- ☐ 0 ☐ 3
☐ 1 ☐ More than 3 times
☐ 2

7. How many times have you been screened for depression while you were pregnant or since becoming pregnant?

- ☐ 0 ☐ 3
☐ 1 ☐ More than 3 times
☐ 2

8. How many times have you been screened for depression after giving birth?

- ☐ 0 ☐ 3
☐ 1 ☐ More than 3 times
☐ 2

3. Section I

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 9. I would find mobile devices useful when completing the depression survey for pregnant women and mothers.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 10. Using mobile devices would allow me to complete the depression survey more effectively than other methods.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
☐				☐

- * 11. Using mobile devices to screen for depression would increase my awareness of depression symptoms.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
☐				☐

- * 12. Using mobile devices to screen for depression would increase the chances of detecting depression symptoms earlier.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 13. Using mobile devices to screen for depression would increase my chance of finding the help I might need immediately.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
☐				☐

4. Section II

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 14. It would be easier to complete the depression survey using mobile devices.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 15. It would be easy for me to give honest answer when completing the depression survey using mobile devices.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 16. I would find mobile devices as easy to use as other methods for completing the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 17. Learning to operate mobile devices to complete the depression survey would be easy for me.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

5. Section III

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 18. Using mobile devices to complete the depression survey would be a good idea.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 19. Using mobile devices would make completing the depression survey more interesting.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 20. Using mobile devices to complete the depression survey would be engaging.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 21. I would like to use mobile devices to complete the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

6. Section IV

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 22. People who influence my behavior would think that I should use mobile devices to complete the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 23. People who are important to me would think that I should use mobile devices to complete the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 24. My health provider would be helpful for facilitating mobile device use to complete the depression survey.

Strongly Disagree	Agree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 25. In general, my health provider would support the use of mobile devices to complete the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

7. Section V

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 26. I think that I would have the necessary resources to use mobile devices to complete the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 27. It would be easy for me to become skilled in completing the depression survey using mobile devices.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 28. The depression survey would not be compatible with the mobile devices that I use.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 29. A specific person (or group) would be available for assistance with any difficulties that arise when using mobile devices for completing the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

8. Section VI

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 30. I could complete the depression survey using mobile devices if there is no one to assist me or telling me what to do as I go.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 31. I could complete the depression survey using mobile devices if I could call someone for help if necessary.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 32. I could complete the depression survey using mobile devices if I had sufficient time to finish it.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 33. I could complete the depression survey using mobile devices if given a built-in help facility for assistance (for example: Help button).

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

9. Section VII

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 34. I would feel apprehensive about using mobile devices to complete the depression survey.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 35. It would be scary to think that the depression survey will generate inaccurate results because of the mobile devices that I used.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 36. I would be hesitant to use mobile devices to complete the depression survey for fear of making mistakes that will generate inaccurate results.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 37. Using a mobile device to complete the depression survey would be somewhat intimidating to me.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

10. Section IX

This section asks questions about your perceptions regarding mobile device use for depression screening purposes. Please select the best answer that explains your level of agreement with each statement.

- * 38. If the option is available, I intend to use mobile devices to complete the depression survey for the remainder of my pregnancy and after giving birth.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 39. If the option is available, I predict that I would use mobile devices to complete the depression survey for the remainder of my pregnancy and after giving birth.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
☐				☐

- * 40. If the option is available, I plan to use mobile devices to complete the depression survey for the remainder of my pregnancy and after giving birth.

Strongly Disagree	Neither Agree nor Disagree	Disagree	Agree
	Strongly Agree		
☐			☐

11. Section X

This section asks questions about your perceptions regarding stigma on mental illness. Please select the best answer that explains your level of agreement with each statement.

* 41. I think the public believes that...

	I Strongly Disagree	I Disagree	Neither Agree nor Disagree	I Agree	I Strongly Agree
...most people with mental illness are to blame for their problems	☐	☐	☐	☐	☐
...most people with mental illness are unpredictable	☐	☐	☐	☐	☐
...most people with mental illness will not recover or improve their health	☐	☐	☐	☐	☐
...most people with mental illness are dangerous	☐	☐	☐	☐	☐
...most people with mental illness are unable to take care of themselves	☐	☐	☐	☐	☐

12. Section XI

This section asks questions about your perceptions regarding stigma on mental illness. Please select the best answer that explains your level of agreement with each statement.

* 42. I think that...

	I Strongly Disagree	I Disagree	Neither Agree nor Disagree	I Agree	I Strongly Agree
...most people with mental illness are to blame for their problems	☐	☐	☐	☐	☐
...most people with mental illness are unpredictable	☐	☐	☐	☐	☐
...most people with mental illness will not recover or improve their health	☐	☐	☐	☐	☐
...most people with mental illness are dangerous	☐	☐	☐	☐	☐
...most people with mental illness are unable to take care of themselves	☐	☐	☐	☐	☐

13. Section XII

This section asks questions about your perceptions regarding stigma on mental illness. Please select the best answer that explains your level of agreement with each statement.

* 43. If I have a mental illness...

	I Strongly Disagree	I Disagree	Neither Agree nor Disagree	I Agree	I Strongly Agree
...I am unable to take care of myself	☐	☐	☐	☐	☐
...I will not recover or improve my health	☐	☐	☐	☐	☐
...I am to blame for my problems	☐	☐	☐	☐	☐
...I am unpredictable	☐	☐	☐	☐	☐
...I am dangerous	☐	☐	☐	☐	☐

14. Section XIII

This section asks questions about your perceptions regarding stigma on mental illness. Please select the best answer that explains your level of agreement with each statement.

* 44. If I have a mental illness, I might respect myself less...

	I Strongly Disagree	I Disagree	Neither Agree nor Disagree	I Agree	I Strongly Agree
...because I am unable to take care of myself	☐	☐	☐	☐	☐
...because I am dangerous	☐	☐	☐	☐	☐
...because I am to blame for my problems	☐	☐	☐	☐	☐
...because I will not recover or improve my health	☐	☐	☐	☐	☐
...because I am unpredictable	☐	☐	☐	☐	☐

15. Demographics

Please select answer(s) that best describes you.

* 45. What is your age group?

☐ 18 to 24	☐ 55 to 64
☐ 25 to 34	☐ 65 to 74
☐ 35 to 44	☐ 75 or older
☐ 45 to 54	

* 46. What is your ethnicity? (Please select all that apply).

☐ American Indian or Alaskan Native	☐ Hispanic or Latino
☐ Asian or Pacific Islander	☐ White / Caucasian
☐ Black or African American	☐ Prefer not to answer
☐ Other (please specify)	

* 47. Do you identify with any of the following religions?

☐ Atheism	☐ Inter/Non-denominational
☐ Buddhism	☐ Islam
☐ Catholicism	☐ Prefer not to answer
☐ Christianity	☐ I am spiritual but I do not identify with any religion
☐ Hinduism	☐ I do not identify with any religion nor I am spiritual
☐ Other (please specify)	

48. Were you born in the U.S.?

- ☐ Yes
- ☐ No
- ☐ Prefer not to answer

* 49. If your answer in the previous question is 'No', please indicate which country you were born at. If you could not find your country from the list, or prefer not to answer, please select "O-Other".

50. How long have you been in the U.S.?

- ☐ Less than 1 year
- ☐ Between 1-5 years
- ☐ Between 6-10 years
- ☐ More than 10 years

51. Are you a native English speaker?

- ☐ Yes ☐ No

52. What languages do you speak at home? (Check all that apply)

☐ Arabic	☐ Polish
☐ Armenian	☐ Portuguese
☐ Chinese	☐ Russian
☐ English	☐ Spanish
☐ French	☐ Tagalog
☐ French Creole	☐ Urdu
☐ German	☐ Vietnamese
☐ Greek	☐ Other (Please specify)
☐ Gujarati	
☐ Hindi	
☐ Italian	
☐ Japanese	
☐ Korean	
☐ Persian	

* 53. How frequently do you communicate with others in English?

- ☐ Very Infrequently
- ☐ Not very frequently
- ☐ Neither frequently nor infrequently
- ☐ Frequently
- ☐ Very frequently

* 54. What is your highest educational level?

- ☐ Less than a high school degree
- ☐ High school degree or equivalent (e.g., GED)
- ☐ Some college but no degree
- ☐ Associates degree
- ☐ Bachelor's degree
- ☐ Graduate degree
- ☐ Other

55. How did you hear about this research?

- ☐ From an email from your healthcare provider (e.g. public health clinic, private provider)
- ☐ From the researcher (i.e. from the research promotion table)
- ☐ From flyers or posters about the research
- ☐ Other (please specify)

16. Additional Information (Optional)

This section is optional. If you do not wish to leave a comment or participate in the raffle or interviews, please skip this part. Please note that all email addresses will be removed from the survey responses to protect the confidentiality of your responses.

56. Do you have any other comments, questions, or concerns?

57. Please indicate your email address if you wish to be included in the raffle for a \$20 prize.

58. Would like to participate in a focus group discussion for a \$20 value reward?

☐ Yes

☐ No

59. If you choose 'Yes' in the previous question, please leave your email address so we could contact you for the focus group participation.

APPENDIX B: RECRUITMENT POSTER

Recruitment Poster

****English Version (Translated to French, Korean,
Spanish, and Mandarin)**

HAVE YOU...

- Become Pregnant ? OR
- Recently Given Birth? OR
- Given Birth over a Year Ago? AND
- Been screened for Depression (during or after pregnancy)? AND
- Become Interested in Improving Services for Pregnant Women and Mothers?

WE NEED YOUR INPUT!

- Respond to survey and Interview
- Each completed survey qualifies for \$20 cash prize (5 prizes available)
- Each focus groups participant receives \$20 cash reward
- Please contact us at mohdhaj1@illinois.edu or 919- 995-4549 to contribute to this study!

APPENDIX C: CONSENT FORM FOR ONLINE SURVEY



ONLINE CONSENT

Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low-income Immigrant Perinatal Women in Central Illinois

You are invited to participate in a research study on investigate technology acceptance for the use of mobile technology for prenatal and postpartum depression screening among immigrant mothers. This study is conducted by Dr. Wenhao Huang, an Associate Professor at the Department of Education Policy, Organization and Leadership, College of Education, University of Illinois Urbana-Champaign.

This study will take approximately 15 minutes of your time. You will be asked to complete an online survey about your experience in getting screen for perinatal and postpartum depression (PPD) symptoms during your maternity checkups. The questions will focus on your views on using mobile technology for depression screening during perinatal and postpartum checkups. You will also be asked about the stigma on mental health based on your personal experiences. We will not ask any health related questions that need you to mention any of your medical or health history. You will have an opportunity to enter a \$20 gift card lottery (five prizes available) upon completion of the survey and an opportunity to participate in an interview and get a \$20 cash or gift card. If you would like to participate in both or either one of these opportunities, you may leave your email in the end of the survey. To protect the confidentiality of your survey responses the email addresses you supply if you are interested in lottery entry and/or express interest in participating in the interview will be removed from your survey responses upon receipt

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time without penalty. You may skip any questions you do not wish to answer. If you do not wish to complete this survey just close your browser.

Your participation in this research will be completely confidential and data will be averaged and reported in aggregate. Possible outlets of dissemination may be in the form of doctoral dissertation, research presentation, and academic meetings and conference presentation. Although your participation in this research may not benefit you personally, it will help us understand on the concerns of the users of the technology used in screening for PPD among immigrant women and mothers. There are no risks to individuals participating in this survey beyond those that exist in daily life.

When this research is discussed or published, no one will know that you were in the study. However, laws and university rules might require us to disclose information about you. For example, if required by laws or University Policy, study information which identifies you may be seen or copied by the following people or groups: a) The university committee and office that reviews and approves research studies, the Institutional Review Board (IRB) and Office for Protection of Research Subjects; and b) University and state auditors, and Departments of the university responsible for oversight of research.

If you have questions about this project, you may contact Dr. Huang via email at wdhuang@illinois.edu or by phone at (217)-333-0807 or Ms. Syahidatul Khafizah Mohd Hajaraih, at mohdhaj1@illinois.edu or call (919)-995-4549.

If you feel you have not been treated according to the descriptions in this form, or if you have any questions about your rights as a research subject, including questions, concerns, complaints, or to offer input, you may call the Office for the Protection of Research Subjects (OPRS) at 217-333-2670 or email OPRS at irb@illinois.edu.

Please print a copy of this consent form for your records, if you so desire.

I have read and understand the above consent form, I certify that I am 18 years old or older and, by clicking the submit button to enter the survey, I indicate my willingness voluntarily take part in the study.

SUBMIT

APPENDIX D: CONSENT FORM FOR FOCUS GROUP/ INTERVIEW



SOCIAL BEHAVIORAL RESEARCH CONSENT FORM

Research Information and Consent for Participation in Social Behavioral Research

Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low-Income Immigrant Women in Central Illinois

You are being asked to participate in a research study. Researchers are required to provide a consent form such as this one to tell you about the research, to explain that taking part is voluntary, to describe the risks and benefits of participation, and to help you to make an informed decision. You should feel free to ask the researchers any questions you may have.

Principal Investigator Name and Title: Wenhao Huang, Ph.D. (Associate Professor)

Department and Institution: Department of Education Policy, Organization, and Leadership, College of Education, University of Illinois at Urbana-Champaign.

Address and Contact Information: Wenhao Huang, 351 Education Center, 1310 S. 6th St., Champaign, Illinois 61820

Sponsor: N/A

Why am I being asked?

You are being asked to be a subject in a research study about the acceptance of technology used in screening for perinatal and postpartum depression among expecting immigrant women and immigrant mothers with child(ren) under the age of 12 months.

You have been asked to participate in the research because you meet the criteria of the participants in this study, which is as an immigrant woman or mother who have undergone the PPD screening using mobile technology.

Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future dealings with the University of Illinois at Urbana-Champaign. **If you decide to participate, you are free to withdraw at any time without affecting that relationship.**

Approximately 250 subjects may be involved in this research at the University of Illinois at Urbana-Champaign.

What is the purpose of this research?

This study seeks to investigate the perception of immigrant women towards the use of mobile technology in healthcare (mHealth) for PPD screening during the period of their pregnancy and after they give birth. Given their unique background, immigrant women face many challenges and barriers navigating healthcare system in a foreign land. The researcher in the current study will look at how

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528 East Green Street, Suite 203, MC-419, Champaign, IL 61820	T 217-333-2670 F 217-333-0405	irb@illinois.edu oprs.illinois.edu

immigrant perinatal and postpartum women perceive mHealth as able to remove the barriers that hinder them from getting the healthcare they need and whether or not stigma will affect their decision in accepting mHealth and consequently getting help for PPD.

What procedures are involved?

This research will involve the following procedures (check where applicable):

- ☐ Online Survey – can be completed prior or after the interview. Participants should agree to the online consent before completing the survey.
- ☐ Focus Groups - will be performed at the Champaign-Urbana Public Health District (CUPHD) office or location as desired by the participants and the researcher.

The interview will only be one time, face-to-face interview. The interview will be recorded and audio-taped. If you are not comfortable with the recording, a research staff will take notes of the interview. The researcher might do follow ups as necessary to make sure the information during the interview are transcribe and interpreted correctly. Each interview session will take about 45 – 60 minutes.

What are the potential risks and discomforts?

To the best of our knowledge, the things you will be doing have no more risk of harm than you would experience in everyday life.

Are there benefits to taking part in the research?

This study is not designed to benefit you directly. This study is designed to learn more about the acceptance of mHealth for PPD screening among the immigrant women population. The study results may be used to help other people in the future.

What other options are there?

You have the option to not participate in this study.

Will my study-related information be kept confidential?

Faculty, students, and staff who may see your information will maintain confidentiality to the extent of laws and university policies. Personal identifiers will not be published or presented.

What are the costs for participating in this research?

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There are no costs to you for participating in this research.

Will I be reimbursed for any of my expenses or paid for my participation in this research?

You will not be offered payment or any reimbursement for being in this study. However, as a survey participant, you will have a chance to enter a raffle to win a \$20 cash prize or gift card (5 prizes are available). If you choose to participate in the interview, you will receive a \$20 cash or gift card as a token of appreciation for participating in the study.

Can I withdraw or be removed from the study?

If you decide to participate, you are free to withdraw your consent and discontinue participation at any time. In the event you withdraw or are asked to leave the study, you won't be compensated as described above.

Who should I contact if I have questions?

Contact the researcher, Dr. Wen-hao Huang, phone number (217)-333-0807 or email address: wdhuang@illinois.edu OR Ms. Syahidatul Khafizah (Syeda) Mohd Hajaraih at phone number (919)-995-4549 or email address: mohdhaj1@illinois.edu

- if you have any questions about this study or your part in it,
- if you have questions, concerns or complaints about the research.

What are my rights as a research subject?

If you feel you have not been treated according to the descriptions in this form, or if you have any questions about your rights as a research subject, including questions, concerns, complaints, or to offer input, you may call the Office for the Protection of Research Subjects (OPRS) at 217-333-2670 or e-mail OPRS at irb@illinois.edu

Remember:

Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

*I give permission for my interview to be recorded: _____ YES _____ NO

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****I have read (or someone has read to me) the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research. I will be given a copy of this signed and dated form.**

Signature

Date

Printed Name

Signature of Person Obtaining Consent

Date (must be same as subject's)

Printed Name of Person Obtaining Consent

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APPENDIX E: INTERVIEW/ FOCUS GROUP GUIDE

Syahidatul_Interview_Guide_Short

RECEIVED

MAR 27 2017

Interview Questions

(INTRO)

UIUC OPRS

RECEIVED
APR 04 2017
UIUC OPRS

1. Would you please tell me about yourself?
e.g. (country of origin, first language, country duration, family)
- What services do you utilize at the Champaign Urbana Public Health District (CUPHD), if any.
2. a) How far along are you with your pregnancy? (If pregnant); AND/OR b) How old is your child now? (Participants with infant/toddler)
3. Did you give birth while in the United States? If YES, how long ago? OR If NO – move to the next question.

(PERCEPTION ABOUT DEPRESSION SCREENING)

4. Are you aware of the depression screening available to pregnant women and women who recently gave birth? (Briefly explain the state mandate that all pregnant and postpartum women to screened for depression during maternity checkup)
 - a. Might present screening instrument to refresh their memories
5. Do you think it's important to screen for depression during pregnancy and after giving birth? Have you ever been screened for depression? How do you feel about it? Why?
6. Do you trust depression-screening results? Why or why not?
7. Have you interacted with anyone with whom you are aware suffered from depression before and/or after giving birth? If YES, can you share your experience? OR If NO – move to the next question.
8. If you feel depressed, how comfortable are you sharing about those symptoms with others? Tell us why?
9. To what degree would you consider seeking help if the depression screening reveals prenatal and postpartum depression symptoms?

University of Illinois at Urbana-Champaign
Institutional Review Board

Approved: 4-2-17
IRB #: 17347

University of Illinois at Urbana-Champaign
Institutional Review Board

Approved October 31, 2018
Expires November 19, 2020
IRB #17347

10. To what degree would you consider using mobile devices instead of paper and pencil for depression screening? Tell us why?
11. If the option were available, to what degree would you prefer to use mobile devices for depression screening during and post pregnancy (ATT) in the future? Tell us why?
12. To what extent would you feel anxious when using mobile devices for depression screening during and post-pregnancy?
13. If you have to use mobile devices to complete the screening survey for depression, what do you think are the most important features or support that should be provided by the mobile devices' provider (FC)? Why do you say that?
14. Do you think using mobile devices would improve the accuracy of the depression-screening outcome (PE)? If so, how? Are you confident that the survey would generate correct results if you use a mobile device in completing the survey? Can you explain your answer?
15. How much and what kind of social support do you need when using mobile devices to complete the depression survey (SS)?

(STIGMA)

16. How do you think people are reacting towards women who are depressed during or after pregnancy? Why?
17. To what extent would you feel less self-respect while experiencing depression during or after pregnancy? Why?
18. To what extent do you think the results generated by the depression-screening survey you completed using mobile devices...
 - a. Are trustworthy? Why?
 - b. Encourage you to seek help, if needed? Why?
19. Do you think that using the mobile device for depression screening will change the way you view mental health care services? If so, how and in what way?

Focus Groups Guide

Consent: Read consent forms. Explain voluntary participation and freedom to leave anytime.

Introduction: Most clinics in the state are screening for depression during pregnancy and the postpartum (in compliance with a State policy mandate). We would like to know your perceptions of using mobile device for this screening, the barriers in using these devices for screenings, and areas for improvement. We plan to use the data from your responses to enhance the current screening in the clinic and find ways to improve the technology to facilitate screening process to run even smoother.

(OPENING)

(sample questions) Tell us your name, how far along you are with your pregnancy or how old is your children.

Domains of inquiry:

Knowledge of depression screening

(INTRODUCTION)

(sample questions) Did any of you aware of the depression screening available to pregnant women and women who recently gave birth?

- a. *Briefly explain the state mandate that all pregnant and postpartum women to screened for depression during maternity checkup*
- b. *Show screening instruments to refresh their memories*

(TRANSITION)

General Perceptions of screening for perinatal mood disorder

(sample questions) What was your thought or impression about the current screening process? Do you think it's important to screen for depression during pregnancy and after giving birth? Do you trust depression-screening results? What makes you say that?

- a. Perceived benefits of screening
- b. Perceived barriers of screening

(KEY QUESTIONS)

Perceptions of technology used during screenings

(Sample questions and probes)

1. If the option were available, would you prefer to use mobile devices (such as laptops, tablets or smartphones) for depression screening during and post pregnancy (ATT) in the future? Why so?

Stigma and Technology Acceptance of mHealth for Postpartum Depression Screenings Among Women in Central Illinois

2. Would you feel anxious when using mobile devices for depression screening during and post-pregnancy?
3. If you have to use mobile devices to complete the screening survey for depression, what do you think are the most important features or support that should be provided by the mobile devices' provider (FC)? Why do you say that?
4. Do you think results from depression screening for PPD using mobile devices would be more accurate (PE)? How so?
5. Do you think you need support to use the device for screening? Do you need someone to support you? If so, who? (SS)?

Stigma

(Sample questions and probes)

6. How do you think people are reacting towards women who are depressed during or after pregnancy? Why?
7. Have you interacted with anyone with whom you are aware suffered from depression before and/or after giving birth? What was that experience like? *(If no one had the experience, move to the next question)*
8. If you feel depressed, how comfortable are you sharing about those symptoms with others? Will you seek for help? Tell us why?
9. To what extent would you feel less self-respect while experiencing depression during or after pregnancy? Why?
10. To what extent do you think the results generated by the depression-screening survey you completed using mobile devices...
 - a. Are trustworthy? Why?
 - b. Encourage you to seek help, if needed? Why?
11. Do you think that using the mobile device for depression screening will change the way you view mental health care services? If so, how and in what way?

(ENDING)

Your information will be very helpful for our project. Before we finish, are there any other thoughts that you feel will be important for us to know to improve the technology used for the screening? Have we missed anything?

APPENDIX F: IRB APPROVAL

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research
Office for the Protection of Research Subjects
805 West Pennsylvania Ave
Urbana, IL 61801



November 22, 2017

Wen-Hao Huang
Educational Policy Studies
349 Education Bldg
1310 S Sixth St
CHAMPAIGN, IL 61820

RE: *Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low-income Immigrant Women in Central Illinois*
IRB Protocol Number: 17347

Dear Dr. Huang:

This letter authorizes the use of human subjects in your continuing project entitled *Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low-income Immigrant Women in Central Illinois*. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) approved the protocol as described in your IRB-1 application, by expedited continuing review. The expiration date for this protocol, IRB number 17347, is 11/19/2020. The risk designation applied to your project is *no more than minimal risk*.

The IRB has also reviewed the request for minor modifications. I will officially note for the record that these minor modifications to the original project, as noted in your correspondence received 11/20/2017, Adding one additional consent form that only lists online survey and focus group as options for participants, have been approved.

Copies of the attached date-stamped consent form(s) must be used in obtaining informed consent. If there is a need to revise or alter the consent form(s), please submit the revised form(s) for IRB review, approval, and date-stamping prior to use.

Please note that additional modifications to your project need to be submitted to the IRB for review and approval before the modifications are initiated. To submit modifications to your protocol, please complete the IRB Research Amendment Form (see <https://www.oprs.research.illinois.edu/forms-templates/forms/protocol-amendment-form>). Unless modifications are made to this project, no further submittals are required to the IRB.

You were granted a three-year approval. If there are any changes to the protocol that result in your study becoming ineligible for the extended approval period, the RPI is responsible for immediately notifying the IRB via an amendment. The protocol will be issued a modified expiration date accordingly.

We appreciate your conscientious adherence to the requirements of human subjects research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our website at <https://www.oprs.research.illinois.edu>.

Sincerely,

A handwritten signature in black ink, appearing to read 'Rebecca Miller'.

Rebecca Miller, MSW

Human Subjects Research Specialist, Office for the Protection of Research Subjects

Attachment(s): 2 Consent Forms

c: Syahidatul Kha Mohd Hajaraih



**OFFICE OF THE VICE CHANCELLOR
FOR RESEARCH & INNOVATION**

Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Approval: Continuing (Data Analysis Only)

October 9, 2020

Principal Investigator	Wen-Hao Huang
CC	Syahidatul Kha Mohd Hajaraih
Protocol Title	<i>Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low-income Immigrant Women in Central Illinois</i>
Protocol Number	17347
Funding Source	Unfunded
Review Type	Expedited 8
Status	Data Analysis Only
Risk Determination	No more than minimal risk
Approval Date	October 9, 2020
Expiration Date	October 8, 2023

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Institutional Review Board (IRB) has reviewed and approved the research study as described.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Using the approved consent documents, with the footer, from this approved package.
- Requesting approval from the IRB prior to implementing modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

IORG0000014 • FWA #00008584
217.333.2670 • irb@illinois.edu • oprs.research.illinois.edu

APPENDIX G: SUPPORT LETTERS



November 29, 2016

Institutional Review Board
528 East Green Street, Suite 203
University of Illinois, Urbana-
Champaign Champaign, IL, 61820

Dear Sir/Madam

Champaign-Urbana Public Health District (CUPHD) is a unit of local government. The mission of the CUPHD is to improve the health, safety and well-being of our community through prevention, education, collaboration and regulation.

Public Health Institute for Research and Excellence (PHIRE) is the research arm of the Champaign-Urbana Public Health District (CUPHD). The Institute has been created to promote best practices through quality education, training, technology, evidence-based research and effective partnerships that bridges academia and the local community knowledge.

We have reviewed Ms Hajaraih's proposal "Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low-income Immigrant Perinatal Women in Central Illinois".

For this research project, we will allow her to use our Women, Infant, and Children (WIC) Clinic in Champaign, IL as a recruitment site for her study.

The protocol for this research and the method for data analysis have been reviewed by the Research Institute at the Health District and have been approved.

If you need further information please do not hesitate to contact us. Thank You

Julie A. Pryde, MSW, LSW
Administrator

Awais Vaid, MBBS, MPH
Director, Planning and Research



Student Affairs Research Approval Form

In an effort to reduce survey fatigue the Faculty Senate mandated that the Division of Student Affairs regulate all research conducted on students at Illinois. Please complete this form and attach all documentation.

Today's date: 12/12/2018

Principal investigator: Wenhao Huang

Email: wdhuang@illinois.edu

Illinois unit or other institution: Education, Policy, Organization, & Leadership

Phone: 333-0807

Illinois campus address or complete mailing address if non-Illinois institution:
344 EDU, 1310 S. 6th St. Champaign, IL 61820

Title of research project:

Stigma and the Acceptance of mHealth for Perinatal and Postpartum Depression Screening among Low Income Immigrant Women in Central Illinois

Start and end dates of student administration: 1/1/2018 – 04/20/2018

Type (e.g., random sample, international, etc.) and number of students to be solicited:

Graduate students and/or spouses who are current residents of any of Family Graduate Housing apartments

Will data be used ONLY for internal purposes by your department or unit?

Please select one: No

If no, please seek IRB approval.

If yes, please attach copy of study protocol/instruments.

All non-Illinois entities are required to submit their institution's IRB approval or letter of exemption.

Have you prepared an Institutional Research Board request?

Please select one: Yes

If yes, PLEASE ATTACH A COPY OF ALL THE IRB FORMS and skip question 1.

See <http://www.irb.illinois.edu> for Illinois IRB information. **Send a copy of the approval or exempt notice once it is available.**

1. Please briefly stipulate the following:

a. Goal(s) of the project:

b. Inclusion and exclusion criteria of students:

c. Cost to the students (include how much time the project will take):

d. Risk to students (if any negative consequences include how they will be mitigated):



Student Affairs Research Approval Form

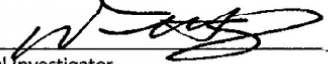
- e. Benefits to students (include any incentives):
- f. Funding source for the project:
- g. How the results will be used (include whom will benefit):

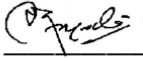
2. Who has been consulted about this project?

Alma R. Sealine, Acting Associate Vice Chancellor for Student Affairs and Director of Auxiliary, Health & Wellbeing and the Director of University Housing

Whitney Welsh, Complex Coordinator, Family Graduate Housing

Please provide original or electronic signatures (e.g., *John Smith* typing in a name is **NOT** considered an electronic signature):

 12.19.2018
Principal Investigator Date

 12/12/2018
Additional Researcher(s) (if any) Date

Student Affairs Approval by:

 1/7/2019
Dr. Belinda De La Rosa, Director of Assessment for Student Success and Engagement Date

Questions and/or this form should be submitted to Dr. Belinda De La Rosa, 300 Turner Student Services Building, blarosa@illinois.edu or (217) 244-6358.

APPENDIX H: CONSENT EMAILS AND RECRUITMENT EMAILS

RECRUITMENT EMAIL/ANNOUNCEMENT FOR PARTICIPANTS FOR FOCUS GROUPS

Dear Participants

I, Syahidatul Khafizah Mohd Hajaraih, am a part of the team in a research project to investigate technology acceptance for the use of mobile technology for prenatal and postpartum depression screening among immigrant mothers. The research is conducted by Professor W. David Huang at Department of Education Policy, Organization and Leadership and me, a doctoral student at the department. The finding of the research will advance our understanding on how we can better prepare technology to help screening for prenatal and postpartum depression (PPD) among expecting immigrant women and mothers who had child(ren) below 12 months of age.

As someone who meet the criteria of the participants in this study, you are cordially invited to participate in an interview to provide feedback and share your experiences in the postnatal and/or postpartum screening process. Your perspectives and insights will contribute in valuable ways to our work. But, clearly, your participation in this study is wholly voluntary and will not impact your status if you are currently enrolled in any of health program under the Illinois Department of Human Services. Each participants will receive a \$20 cash or gift card as a token of appreciation for participating in the study.

We expect the interview to last within one hour, and we anticipate no risk from participating other than what might be experienced in normal life. All collected data will be used for dissertation, presentation to stakeholders and in conferences, research and publication purposes and results of this study may lead to improvements of the technology of screening for PPD. We have attached that consent form here, as it provides more details about the research procedure, its purpose, and your role in the process.

If you have any questions or concern, please do not hesitate to contact us at mohdhaj1@illinois.edu or call 919-995-4549. We value your input and greatly appreciate your participation.

Best Regards,

Syahidatul Khafizah (Syeda) Mohd Hajaraih

RECRUITMENT EMAIL/ANNOUNCEMENT FOR PARTICIPANTS FOR ONLINE SURVEY

Dear Participants,

I, Syahidatul Khafizah Mohd Hajaraih, am a part of the team in a research project to investigate technology acceptance for the use of mobile technology for prenatal and postpartum depression screening among immigrant mothers. The research is conducted by Professor W. David Huang at Department of Education Policy, Organization and Leadership and me, a doctoral student at the department. The finding of the research will advance our understanding on how we can better prepare technology to help screening for prenatal and postpartum depression (PPD) among expecting immigrant women and mothers who had child(ren) below 12 months of age.

If you have been screened for PPD while undergone your maternity checkup, we hope that you would be willing to take part in the survey. Your input and feedback will be instrumental in our understanding on the concerns of the users of the technology used in screening for PPD among immigrant women and mothers. We anticipate that the survey will take about 15 minutes of your time.

We anticipate no risk to participating in this research other than what might be experienced in normal life. Results of this research may be used to improve the screening technology. Your participation in this research is wholly voluntary, and your decision to participate or not to participate in the study will not have any impact on your status if you are enrolled in any of the programs under the Illinois Department of Human Services All collected data will be used for research and publication purposes only. All online survey participants will have the chance to enter a raffle to win a \$20 cash or gift cards (5 prizes available) after they have finished answering the survey. The winner will be contacted through email or phone by the researcher after the data collection process has ended.

If you have any questions or concern, please do not hesitate to contact us at mohdhaj1@illinois.edu or call 919-995-4549. We value your input and greatly appreciate your participation.

Sincerely,

Syahidatul Khafizah (Syeda) Mohd Hajaraih

CONSENT EMAIL TO POST ANNOUNCEMENT ON SOCIAL MEDIA PAGE

Dear _____page administrator,

I, Syahidatul Khafizah Mohd Hajaraih, am a part of the team in a research project to investigate technology acceptance for the use of mobile technology for prenatal and postpartum depression screening among immigrant mothers. The research is conducted by Professor W. David Huang at Department of Education Policy, Organization and Leadership and me, a doctoral student at the department. The finding of the research will advance our understanding on how we can better prepare technology to help screening for prenatal and postpartum depression (PPD) among expecting immigrant women and mothers who had child(ren) below 12 months of age.

As part of the promotion to participate in this study, we would like to ask for permission to post announcements and promote the link to our online survey on your social media page. The announcement is as attached. The announcement will lead the viewers to the survey link. Interested participants will have an opportunity to enter a raffle for a prize of \$20 cash or gift card (5 prizes available) once they completed the survey. The announcement will also contain the opportunity to participate in the focus groups and each participants will be given \$20 cash or gift card as a token of appreciation.

We anticipate no risk to participating in this research other than what might be experienced in normal life. Results of this research may be used to improve the screening technology. Their participation in this research is wholly voluntary, and the decision to participate or not to participate in the study will not have any impact on their status if they are enrolled in any of the programs under the Illinois Department of Human Services All collected data will be used for research and publication purposes only.

I hope you may allow me to post the said announcement to attract more participants in the study. Please let me know if you have further questions or concerns. Thank you.

Sincerely,

Syahidatul Khafizah binti Mohd Hajaraih

CONSENT EMAIL TO POST ANNOUNCEMENT ON WEBSITE

Dear _____ administrator,

I, Syahidatul Khafizah Mohd Hajaraih, am a part of the team in a research project to investigate technology acceptance for the use of mobile technology for prenatal and postpartum depression screening among immigrant mothers. The research is conducted by Professor W. David Huang at Department of Education Policy, Organization and Leadership and me, a doctoral student at the department. The finding of the research will advance our understanding on how we can better prepare technology to help screening for prenatal and postpartum depression (PPD) among expecting immigrant women and mothers who had child(ren) below 12 months of age.

As part of the promotion to participate in this study, we would like to ask for permission to post announcements and promote the link to our online survey on your website. The announcement is as attached. The announcement will lead the viewers to the survey link. Interested participants will have an opportunity to answer the survey. The announcement will also contain the opportunity to be the interview participants.

We anticipate no risk to participating in this research other than what might be experienced in normal life. Results of this research may be used to improve the screening technology. Their participation in this research is wholly voluntary, and the decision to participate or not to participate in the study will not have any impact on their status if they are enrolled in any of the programs under the Illinois Department of Human Services All collected data will be used for research and publication purposes only.

I hope you can help me to post the said announcement to attract more participants to answer the survey. Please let me know if you have further questions or concerns. Thank you.

Sincerely,

Syahidatul Khafizah binti Mohd Hajaraih