AN EXTENDED COMMUNICATION INEQUALITIES APPROACH TO DISPARITIES IN OBESITY PREVENTIVE BEHAVIORS

BY

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DISSERTATION

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ABSTRACT

This dissertation integrates the theory of planned behavior (TPB) with information exposure and concepts from the communication inequality perspective with the purpose of identifying disparities between the more and less advantaged segments of society throughout the communication for behavioral change process. It was expected to find differences in exposure to health information, as well as differences in the degree to which attitudes, norms, and perceived behavioral control (PBC) influence intentions, and the degree to which intentions lead to behavior. To test the hypotheses and research questions, structural equation modelling and multigroup analysis using *MPlus* 7.2 were conducted. Two datasets were analyzed, the first one from the Youth Media Campaign Longitudinal Survey (YMCLS), which was conducted with the purpose of assessing the effect of the VERB media campaign in a nationally representative sample of children aged 9 to 13 years and their parents between 2004 and 2006 (N = 2,773). The second study corresponds to a two-Wave survey among female adolescents conducted in schools in Santiago, Chile (N = 751). In the first study, the effect of exposure to the VERB campaign on the practice of physical activity two years later was examined through a mediation model. In the second study, the effect of seeking and scanning information about physical activity and fruit and vegetable consumption in the practice of the respective behaviors was examined, also with a mediation model. In the context of physical activity, across the two studies the main tenets of the TPB held, as norms and PBC were positive and significantly associated with intentions, which in turn led to the practice of the behavior. Furthermore, mediated effects of norms and PBC via intentions were supported in the two studies. The integration of the TPB with information exposure also received support in the two studies, with exposure to the VERB campaign being a significant predictor of attitudes and PBC, and indirectly influencing physical activity via PBC

and intentions. In the Chile study, information scanning led to positive attitudes, norms, and PBC, and indirectly affected behavior though attitudes, PBC, and intentions. Information seeking, however, was negatively associated with behavior, both directly and mediated by other variables in the model. With respect to the disparities in the communication for behavioral change process it was found that children and adolescents from more disadvantaged backgrounds reported lower levels of exposure to the campaign and to health information. Moreover, subjects from more advantaged backgrounds were able to turn their intentions into behavioral change, whereas subjects from less advantaged backgrounds were not. Some results regarding the moderating role of social position indicators were unexpected for example, the positive association between exposure to the VERB campaign and attitudes only among children from less advantaged backgrounds. Taken together, the results of the two studies presented in this dissertation support an integration of the TPB with the concepts of information exposure and the moderation of social position indicators, as suggested by the communication inequality approach to better understand disparities in the communication for behavioral change process.

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Introduction

Obesity and overweight are severe problems that our society is facing. It is estimated that two thirds (69.2%) of the adult population in the United States are overweight, including 35.7% who are considered to be obese (Ogden, Carroll, Kit, & Flegal, 2014). Obesity is the second leading cause of preventable death in the US, and it is associated with severe health threats, such as diabetes, heart disease, and stroke, as well as some cancers (National Institutes of Health, 1998). Overweight and obesity are not restricted to adults; indeed, among adolescents aged 12 to 19 years, 18.4% are obese. A similar proportion of children aged 6 to 11 years (18%) are considered obese, whereas 12% of children between 2 and 5 years fall within this category (Ogden, Carroll, Kit, & Flegal, 2014).

These trends are no strangers to the rest of the world (FAO, 2013). It is estimated that 35% of adults around the world can be considered as obese or overweight, and it is expected that this rate will increase over the next few years (World Health Organization, 2009). Obesity and overweight are currently a more severe threat than underweight, as they are responsible for 5% of the deaths globally (World Health Organization, 2009).

Preventing obesity and overweight at different stages in life has become a priority. In that vein, it is fundamental to understand the process that leads to the adoption of obesity preventive behaviors, such as an increase in fruit and vegetable consumption and the practice of regular physical activity. Communication can play a key role in this process, as exposure to information may be a relevant motivator to adopt these behaviors. In this dissertation, I propose an integration of a widely utilized framework to understand behavioral change, the reasoned action approach (RAA; Fishbein & Ajzen, 2010) with information exposure. Furthermore, and since

increasing evidence indicates that obesity and overweight, as well as the protective factors associated with them, are unequally distributed in the population, I address the behavioral change process from the communication inequality point of view. This perspective proposes that the position an individual occupies in society cannot be disregarded when studying people's health behavior and the communication in that process. In sum, this dissertation aims to integrate the RAA and concept of information exposure examined through the lens of communication inequality.

An Unequal Threat

In the United States, the distribution of obesity in the population is disparate. Among women, the groups from lower income have higher prevalence of obesity than the groups from higher income. This trend is found across all races and ethnicities, and especially among Whites. Among White women, the prevalence of obesity for the high-income group is the lowest (27.5%) compared to the mid- (38.1%) and low-income (39.2%) groups. Obesity is also more prevalent among less educated women. Data indicate that whereas 23.4% of those with a college degree are obese, 42.1% of women with less than a high school education are considered to be obese (Ogden, Lamb, Carroll, & Flegal, 2010). Among men, the disparities in obesity by socioeconomic status (SES) are not as clear as for women. In fact, among African-American and Mexican-American men, higher incomes are associated with greater obesity prevalence. Overall, lower educational attainment is associated with greater prevalence of obesity (Ogden et al., 2010).

Race and ethnicity is an important disparity factor in obesity and overweight in the United States. For males and females, the prevalence of obesity is lower among Whites compared to African-Americans and Mexican-Americans. Among women, the group with the

highest obesity prevalence is African-Americans, and among men it is Mexican-Americans (Ogden et al., 2010).

Disparities regarding obesity in the United States also exist among children and adolescents. It is estimated that 44.8% of children aged 10 – 17 years whose families are below the poverty line are obese, compared to 22.2% of those whose families are more affluent. A similar trend is found for race and ethnicity; whereas 41.1% of African-American children are obese, only 26.8% of Whites are. And whereas 41.0% of Hispanic children are obese, 29.6% of non-Hispanics are (Singh, Kogan, Van Dyck, & Siahpush, 2008). Recent studies show that girls of lower SES are the group that is the most at risk of obesity and overweight (Zahnd et al., 2015).

Obesity and overweight are rapidly expanding to developing countries. Nevertheless, in developing countries wealthier individuals are still more at risk of becoming overweight and obese than the least well-off (e.g., Hilmers et al., 2015). Studies across countries show that the country's income is a key determinant of how obesity and overweight are distributed in the population. In more affluent countries, lower levels of education are associated with higher rates of obesity, while in low income countries obesity is still more prevalent among the more educated (Kinge, Strand, Vollset, & Skirbekk, 2015). This trend has also been observed among children. In higher income countries obesity is more prevalent among lower income children, whereas in low income countries, higher income children are more at risk of being obese (Broyles et al., 2015).

Developing countries, however, are experiencing an epidemiological transition, in which the association between SES and overweight is shifting and becoming similar to what is observed in industrialized nations. That is the case of Chile, where studies have shown that male adolescents from high SES have lower chances of being overweight compared to females and to

lower SES individuals (Azar, Franetovic, Martínez, & Santos, 2015). Also in Chile, disadvantaged populations, such as indigenous groups are increasingly affected by these health threats (Uauy, Albala, & Kain, 2001).

Overall, the data show increases in obesity rates that are of concern. Furthermore, in the US and progressively more in other countries disparities in obesity and overweight can cause their negative effects on health to be unequally distributed in society. In order to reverse this trend, individual behaviors have to be modified and healthy eating and exercise habits have to be adopted, but the contextual factors in which these behaviors take place cannot be disregarded. In the next section I discuss how communication research has addressed the problem of health inequalities so far.

Health Disparities and Communication Research

Health disparities have attracted considerable attention in the field of health communication (Harrington, 2013). Braveman (2006, p. 180) has defined health disparities or inequalities as "potentially avoidable differences in health (or in health risks that policy can influence) between groups of people who are more and less advantaged socially; these differences systematically place socially disadvantaged groups at further disadvantage on health." Disparities between the more and the less advantaged groups in society are found in morbidity and mortality, likelihood of performing risky behaviors, exposure to environmental threats, and access to the health care system, among many others (Harrington, 2013).

Communication scholars have argued that communication can play a huge role in public health and in addressing health disparities (Freimuth & Quinn, 2004), as exposure to information enables people to learn about health threats and preventive behavior, and to acquire information regarding the health care system. Furthermore, having the ability to communicate allows

individuals to stay connected with their community and to obtain information about their environment (Viswanath, 2006).

The increasing amount of research medical scientists conduct to learn more about disease and prevention has given rise to a great deal of information that could contribute to people's knowledge about preventive practices and motivation to engage in them. The problem is that, as stated by Viswanath (2006), "information is always unequally distributed" (p. 222). A similar observation can be made regarding communication competences, access to technologies, and motivations to acquire information, among many others. The more advantaged groups in society have more access to technologies and the media, in general, compared to the less advantaged groups (e.g., Hargittai, 2002). Furthermore, disparities exist in the degree to which patients understand medical recommendations and are capable to follow them (e.g., Baker et al., 1996); in the degree to which people seek out health information (e.g., Shim, Kelly, & Hornik, 2006); and in the degree to which people learn from the media (e.g., Hwang & Jeong, 2009). Given the importance of communication in the public health realm and the solid evidence regarding the existence of communication disparities, scholars in the field have studied this phenomenon from a variety of perspectives. In the following section, three of these approaches are briefly described and discussed.

Health literacy. Health literacy is perhaps one of the most widely cited concepts among researchers and practitioners interested in the dissimilar health outcomes of members of different groups in society. Health literacy was defined by the Institute of Medicine (Institute of Medicine, 2004, p. 1) as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services to make appropriate health decisions." Health literacy can be explained as a balance between demands and skills (Parker & Ratzan, 2010). On

the one hand, the health terrain is increasingly complex and demanding: the health care system is hard to navigate, every day new discoveries in the field of medicine are made public, the amount of health information increases, and the relationship between patients and health care providers is changing and demanding more patient engagement. On the other hand, several contextual characteristics, such as educational level, SES, availability of social support, among others, affect the degree to which individuals have the skills and abilities needed to access the information, handle it, and play the active role that is expected of them. Low health literacy is characterized by an imbalance between these demands and the skills and abilities individuals have (Parker & Ratzan, 2010).

The above conceptualization of health literacy begs the question about the skills that a person needs to have in order to be considered health literate. Early approaches equated health literacy to general literacy and considered schooling as a good proxy for health literacy (Berkman, Davis, & McCormack, 2010). Later conceptualizations made a more sophisticated definition of the types of skills that made up health literacy, such as numeracy, ability to speak and write effectively, listening skills, ability to use technology —in particular familiarity with the internet—, motivation, cognitive ability, networking, and social skills, among others (Berkman et al., 2010). The wide array of skills that comprise health literacy produces difficulty for creating a measure that is comprehensive enough and at the same time practical and applicable (Pleasant, McKinney, & Rikard, 2011).

Measuring health literacy is one of the major challenges researchers in the area face (Pleasant et al., 2011). Most of the health literacy assessments that exist are complex and long, for example, the Test of Functional Health Literacy in Adults (TOFHLA) has over 60 items and takes patients about 22 minutes to complete (Parker, Baker, Williams, & Nurss, 1995). Attempts

have been made to shorten this and other measures (see for example Baker, Williams, Parker, Gazmararian, & Nurss, 1999), but the resulting instruments are still long, which makes them unfeasible to use in surveys that include more variables. Researchers have made several efforts to create a valid and reliable measure of the construct in a survey format and with fewer items (e.g., Chew et al., 2008), but they have been criticized for measuring different facets of the concept and not what traditional assessments capture as health literacy (Haun, Luther, Dodd, & Donaldson, 2012).

Given the methodological challenges that measuring the construct entails, efforts to evaluate health literacy in the general public are scarce. The 2003 National Assessment of Adult Literacy survey (NAAL; Kutner, Greenberg, Jin, Paulsen, & White, 2006) was the first general assessment of health literacy for the American population. The NAAL assessed three sets of tasks: Clinical, prevention, and navigation of the health system. This assessment revealed that 22% of American adults had a basic level of literacy, 14% had below basic, 53% were categorized as intermediate, and only 12% had proficient health literacy.

The NAAL made evident disparities in health literacy for different race/ethnicity, income, and language groups. Hispanics were the group with the lowest health literacy, and both African Americans and American Indians-Alaska Natives had lower health literacy compared to non-Hispanic Whites and Asians-Pacific Islanders. Individuals living below the poverty line had lower health literacy compared to those above the poverty line. A similar trend was found for education. Those who spoke English natively or learned it at a younger age had higher health literacy than those who were not English speakers or learned the language later in life. Finally, the NAAL revealed that disparities in health literacy also existed for age, with adults over 65 having the lowest average compared to any other group (Kutner et al., 2006). Research has

shown that people with lower health literacy levels have a harder time dealing with the healthcare system and managing their own health (DeWalt, Berkman, Sheridan, Lohr, and Pignone, 2004; Parker & Gazmararian, 2003).

Limited health literacy has been linked to health disparities, as there seems to be an overlap between the groups that display the poorest health indicators and those who obtain the lowest results in health literacy assessments. Although some authors warn that the connection between health literacy and disparities is still diffuse (Baur, 2010), it is not surprising that the circumstances in which individuals are embedded influence their health literacy, which in turn influences health-related outcomes. For example, van der Heide et al. (2013) found that health literacy acted as a mediator in the relationship between educational attainment and health status.

The concept of health literacy is of interest to communication scholars because to a great extent the abilities that comprise health literacy are associated with communication competences, such as obtaining, processing, and understanding information, as well as the ability to communicate health related information (Berkman et al., 2010). People with higher health literacy are expected not only to communicate effectively with their providers, but also to go online and seek information, and to understand the information they acquire from the media (Parker & Gazmararian, 2003).

The knowledge gap hypothesis. The knowledge gap hypothesis is another approach utilized in the health communication field to address disparities. This perspective is specifically concerned with the unequal distribution of knowledge in society, in particular, with the knowledge that is acquired through exposure to the mass media. This hypothesis, proposed by Tichenor, Donohue, and Olien (1970), states that when the flow of information in a social system increases, the more privileged groups of society acquire knowledge about the subject at a faster

rate compared to other societal groups. This proposition challenges the idea that increasing information in a social system will tend to equalize knowledge acquisition. According to the knowledge gap hypothesis, the more information in the social system, the larger the gap between the more and the less advantaged groups (Donohue, Tichenor, & Olien, 1975).

The main concern behind the knowledge gap hypothesis framework was the distribution of power within a social system. More knowledge was expected to be associated with power, and if knowledge was unequally distributed, then power would be as well (Donohue et al., 1975). Thanks to their rapid knowledge acquirement, the more advantaged groups, those who come from more affluent backgrounds or are more educated, would consolidate their position. The less advantaged, in turn, would have fewer opportunities to progress. The same hypothesis has been applied in the health context (Finnegan & Viswanath, 1996), where the deprivation of knowledge may hinder individuals' ability to participate in health decision making and to access opportunities to adopt healthy behaviors.

Several reasons may exist to explain the gap between the more and less advantaged in the degree to which they acquire knowledge from the mass media, according to Tichenor et al. (1970). One of such reasons is that members of higher SES groups may be easier to reach through traditional channels, because they can easily access the channels that are paid and have more opportunities to do so, unlike members from lower SES. Also, differences in communication skills may exist, with members of higher SES groups having more reading and comprehension skills than their lower SES counterparts. This explanation is plausible, especially when considering topics with a high degree of complexity that require more skills to be processed.

A third factor that may explain the knowledge gap is the amount of previous information an individual has about the subject, which may have been acquired through formal education or previous exposure to the same content. Previous experience with similar information may make it easier for those in the more advantaged groups to deal with the new information and therefore, to acquire more knowledge from it. Additionally, the availability of social contacts may influence an individual's capacity to acquire knowledge from the mass media. A larger social network allows for more possibilities to discuss public affairs information, process that information, and store it. The more educated are expected to have larger social networks, as well as social networks that are richer in information and the capacity to interpret that information (Lin, 1999).

Selective exposure to media content, and acceptance and retention of information also play a role, according to Tichenor et al. (1970). Members of different societal groups are expected to differ in their media preferences and content selections. Members of more privileged groups may be more likely to prefer media content that leads to more knowledge about public affairs, such as the news, whereas those from underprivileged groups may select other types of content, such as entertainment (Prior, 2005). In the same vein, it is expected for individuals to prefer media messages that are similar to their own beliefs and to retain information that is consistent with what they already know and believe (Slater, 2007).

The nature of mass media systems also contributes to the knowledge gap (Tichenor et al., 1970). In general, print media has greater chances of transmitting information about public affairs, which in turn affects the likelihood that low educated people are exposed to these contents, because print media are usually preferred by those who are more educated. The existence of specialized media that target the more educated segments of society reinforces this

gap. In its origins, the knowledge gap hypothesis considered traditional media, but the advent of new information technologies, that has changed the ways people obtain information, challenge the original formulation of the hypothesis and opens the door for new questions regarding differences in access, use, and outcomes of information acquisition (Bonfadelli, 2002).

The digital divide. The digital divide has been another area of research from which communication scholars have approached disparities in health communication. When the internet came into existence, many saw in this new technology a window that would expand access to information and resources for many more in society. In the health realm, this could be a great opportunity, considering that health content and tools are increasingly made available through the internet and technological devices. After a while, however, data indicated that access to the internet was not equal for all societal groups. In fact, an organizing criteria was created to demonstrate that access to the internet divided the world between the "haves" and the "have nots". The National Telecommunications Information Administration of the US Department of Commerce, in its 1995 report entitled "Falling through the Net: A Survey of the 'Have Nots' in Rural and Urban America" (National Telecommunications and Information Administration, 1995) made these differences evident for the first time, showing that different groups in society adopted computer use at different rates. Subsequent reports extended these findings to the internet. According to these reports, technology users were for the most part young, White, non-Hispanic, urban residents, more educated, and wealthier (Hargittai, 2008).

The high price of computers when they first came out on the market made them inaccessible for the less advantaged groups. In fact, for most part of the 1990's and the early 2000's differences existed in the US with respect to computer ownership for race and income groups. The reduction in price of computers has made technology more accessible for people

from the less advantaged groups, but the increase of ownership for this group is still slower compared to the higher income groups (Attewell, 2001).

DiMaggio and colleagues have used the phrase “digital inequalities” (DiMaggio, Hargittai, Celeste, & Shafer, 2004) to refer to disparities in access and use of new digital technologies. To a great extent, the warrant for studying digital inequalities is given by the premise that being online provides benefits to people. If differences exist regarding the ability to access computers and being online, then differences exist regarding the benefits that these opportunities entail. Access to the internet translates into access to quality and specialized information, as well as instances for participation. Traditional media have an online presence, and governments have made concrete efforts to be online and offer services and information to their citizens through the internet. In the context of health, information about the health care system, symptoms and disease management, therapy options, health providers, among many other subjects, is available online for internet users.

But with the fast penetration of the internet, new types of inequalities among internet users have arisen. Many researchers have claimed that the dichotomy between the “haves” and the “have-nots” is by no means sufficient to characterize the disparities regarding internet use and the outcomes thereof (Bonfadelli, 2002; Selwyn, 2004). Some researchers use the term “second digital divide” to refer to gaps in use of computers and the internet, as well as the ability to use these technologies (Hargittai, 2002), and as a consequence, disparities in the benefits from going online (Attewell, 2001; DiMaggio et al., 2004). Researchers have found, for example, that people from higher SES groups are more likely than their counterparts to use the internet with the purpose of acquiring information (Bonfadelli, 2002; Wei & Hindman, 2011), accessing services (Bonfadelli, 2002), and other “capital enhancing activities” (Hargittai & Hinnant, 2008).

Furthermore, differences are found in the skills, experience, and comfort people have regarding online activities (Hargittai, 2002), as well as their "internet engagement" (Lee, 2009b).

As healthcare is increasingly gaining ground in cyberspace, the question about disparities in access and use of technologies becomes more and more salient to health communication researchers (Viswanath & Kreuter, 2007). Thus, the digital divide in all of its forms and shapes cannot be disregarded. The challenges that researchers in the digital divide tradition have identified are pertinent to the concerns that health communication practitioners and researchers may have when thinking about the interplay between technology, access to health information, and behavioral change.

Limitation of Previous Approaches to Disparities in Communication

The three perspectives to address inequalities in the health communication field reviewed above are not without limitations. Health literacy, for example, has been a concern mostly in the clinical setting, but its applications to public health are limited, to a great extent, because of the difficulties to measure it. Furthermore, little research has been conducted in the role of health literacy in the communication for behavioral change process.

The knowledge gap hypothesis and the digital divide are two perspectives concerned with disparities in the communication arena, which come from outside the health communication field. Both have been successfully incorporated by health communication researchers interested in understanding disparities in this context. Although the more recent accounts of the digital divide have explored disparities between societal groups and their relationship with technology, studies of the outcomes of these differences are still in their initial stages. As a consequence, the digital divide still does not provide insights beyond the question of access and it is restricted to the use of technology. This is a big limitation in the health communication realm, because health

information can be acquired from a wide array of sources, such as interpersonal, professional, mediated, etc. Similarly, the knowledge gap focuses on knowledge acquisition from the mass media, which also leaves behind other sources of health information that may be relevant when examining disparities, such as health professionals. Furthermore, even though knowledge may be necessary for adopting a new health behavior, it is by no means a sufficient condition for behavioral change (Viswanath et al., 2006). Thus other factors need to be taken into consideration when examining this process.

Communication Inequality

The communication inequality (CI) perspective (Viswanath, 2006) is broader than health literacy, the knowledge gap and the digital divide, because it seeks to understand how different social determinants may impact the communication process at different stages, as such, it is a more complete framework to understand how disparities may interfere in the communication for behavioral change process. CI bases its arguments on the increasing evidence from social epidemiology research which has found severe effects of social determinants on individuals' health (for an overview see Berkman & Kawachi, 2000).

The CI perspective focuses on the differences among social groups at the macro and the individual level, in their ability to generate, disseminate, use, access, process, and act on the health information received from their environment (Viswanath, 2006). CI seeks to address the individual in a larger context, where structural factors, such as the area of residence, educational attainment, income, occupation, among many others, influence the individual's capacity to communicate. CI proposes that, along with other factors, differences in communication processes and outcomes may explain health disparities between social groups (Viswanath & Emmons,

2006). The most common determinants that have been studied in the context of communication inequality are education, income, and race/ethnicity.

According to CI, social determinants are expected to influence all parts of the communication process, from the ability to access information, to the capacity of processing and acting based on the information acquired (Viswanath, 2006). Empirical research has tested the main tenets of the CI perspective. For example, Niederdeppe, Fiore, Baker, and Smith (2008) studied 18 smoking cessation campaigns and found that 9 of them were less effective among low SES populations in message recall, motivational response, and long term smoking abstinence. Furthermore, as argued by Viswanath and Emmons (2006), different message formats and appeals seem to work differently for people with different socioeconomic backgrounds (Niederdeppe, Farrelly, Nonnemaker, Davis, & Wagner, 2011), as well as for different race/ethnic groups (Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013). Despite the findings regarding access, recall, and behavior, a panoramic view of disparities throughout the communication process is lacking.

CI also has some limitations. First, although communication inequalities anticipate differences between societal groups in access and use of information, it does not explicitly state how the information is acquired and whether the mode of information acquisition is influenced by social position indicators. Second, the CI perspective does not explicitly refer to the most relevant predictors of behaviors according to previous research conducted in health communication and related fields.

This dissertation focuses on disparities in the communication for behavioral change process. As such, it adopts a CI perspective, but it integrates its main tenets with well-known theories of behavioral change, such as the theory of planned behavior (TPB) and more specific

assessments of health information acquisition. Through this dissertation, I aim to make three contributions: First, to extend the communication inequalities approach by incorporating a behavioral change model and examine how social position indicators influence the communication process, from the information exposure to the ability to undertake a behavioral change. Second, I aim to integrate the RAA, specifically the TPB, with a more refined conceptualization of information exposure to study the effect that access to health information has on known predictors of behavior. Finally, I expect to expand the frontiers of health communication research by testing a communication for behavioral change model across two populations, one in the United States, and one in Chile, where little research aiming to understand the communication for behavioral change process has been conducted.

In the next chapter I discuss the theoretical framework that guides this dissertation and the rationale for hypotheses and research questions. Then, I present two empirical studies in which I test the conceptual model I put forward in this research. In Chapter 3, a secondary analysis of the Youth Media Campaign Longitudinal Survey, used to evaluate the VERB campaign between 2004 and 2006, is presented. In Chapter 4, a longitudinal survey among female adolescents in Santiago, Chile, is presented. Finally, in Chapter 5 the findings of the two studies are commented in light of the theoretical discussion and the conceptual model that guides this dissertation.

Chapter 2

Theoretical Framework

Before presenting the research model on the moderating role of social position indicators in the communication for behavioral change model, I will present an overview of the communication inequality (CI) perspective that inspires my dissertation. Then, I revise the reasoned action approach (RAA), followed by a review of information exposure and specifically the concepts of information seeking and scanning. Finally, I will present the arguments regarding the proposed moderating effects of the social position indicators on the paths of the theoretical model.

Communication Inequality and Behavioral Change

As presented in the previous chapter, the CI approach is concerned with disparities between members of the more and the less advantaged groups in society throughout the communication process. This implies that differences between more and less advantaged groups are expected in the degree to which they access health information, their ability to pay attention and to process the information, and their capacity to act according to the information received.

As explained in the previous chapter, the CI perspective has limitations, specifically for explicating how disparities occur in the communication for behavioral change process. In order to address these limitations, other theoretical models and concepts widely utilized in the field of health communication may be brought to the table to supplement the CI perspective. Two concrete extensions to the CI approach are proposed in this dissertation. First, a more refined assessment of the modes through which individuals acquire health information, either from health communication campaigns, the mass media, internet, or their personal environment. Second, the RAA is incorporated as a model that more specifically explains the behavioral

change process. In that context, and from a CI perspective, the influence of social position indicators on the known predictors of behavior can be more clearly examined. Elements from these theories of behavioral change can be an excellent addition to the CI perspective, as these models clearly identify behavioral intentions as predictors of behavior and attitudes, subjective norms, and perceived behavioral control (PBC) as antecedents to behavioral intentions. In order to obtain a more refined understanding of how social determinants, such as SES or race/ethnicity, influence individuals' ability to adopt a health behavior, a closer examination to these behavioral change theories, their constructs, and propositions is needed.

The Reasoned Action Approach

The RAA (Fishbein, 2007) is a family of theories that includes the theory of reasoned action (TRA), the theory of planned behavior (TPB), and the integrative model of behavioral prediction (IM), whose main goal is to elucidate the factors that predict the likelihood of performing a behavior (Fishbein & Ajzen, 2010). For the purpose of building my theoretical framework, I will focus mainly on the TPB, but I will also draw on the IM, especially when examining additional predictors of behaviors.

The main tenet of this family of theories is that the single most important predictor of behavioral performance is behavioral intentions. In simple terms, when a person intends to perform a behavior, her chances of acting on these intentions are high.

The original model put forth by Fishbein and Ajzen (the TRA; 1975) proposed that intentions had two main antecedents: attitudes and perceived norms. Attitudes are evaluations of psychological objects, in this case, the behavior under examination. Subjective norms, in turn, are perceptions of social pressures regarding the performance of a behavior (Fishbein & Ajzen, 2010). Subjective norms are comprised of injunctive norms, which correspond to perceptions of

normative prescriptions about a behavior (Most people believe I should exercise); and descriptive norms, which are perceptions regarding the prevalence of the behavior (Many people around me are physically active). A subsequent addition to the model was self-efficacy, also called perceived behavioral control (PBC; Ajzen, 2002), which is defined as an individual's perception that she is capable or has control over carrying out a behavior. PBC is expected to act along with attitudes and subjective norms as a predictor of behavioral intentions.

Attitudes, subjective norms, and PBC are all based on beliefs, which in turn are grounded in information individuals obtain from their own experience or from the environment. Without being conscious of the process or making a deliberate effort, individuals form attitudes, as well as perceptions of subjective norms and PBC, automatically as they acquire information (Witzling, Shaw, & Amato, 2015). Thus, exposure to media content about the target behaviors, as well as to interpersonal conversations on the subject, is proposed by the RAA as a fundamental antecedent for attitudes, subjective norms, and PBC (Ajzen & Albarracín, 2007). Health interventions have put this premise into practice by crafting messages that attempt to modify the psychological predictors of intentions through attitudinal, normative, and behavioral skills arguments (Albarracín et al., 2005).

The main paths between the variables that the TRA, TPB, and IM propose have been supported through several studies, and across multiple behaviors. The link between behavioral intentions and behavior has been one of the most consistent of all proposed connections. For example, a meta-analysis of condom use studies (Albarracín, Johnson, Fishbein, & Muellerleile, 2001) found that the average correlation between intentions and condom use across 96 studies was moderate (r = .45). In the exercise domain, a meta-analysis (Hausenblas, Carron, & Mack, 1997) revealed that intention was a significant predictor of exercise, and that attitudes and PBC

were stronger predictors of intentions than subjective norms. More recently, a study among adult males in South Africa showed that the TPB constructs were still in force. In that study, attitudes, subjective norms, PBC, and intentions were significant predictors of self-reported physical activity (Jemmott Iii et al., 2015). The TPB variables have also demonstrated to be reliable predictors of sedentary behavior (Prapavessis, Gaston, & DeJesus, 2015). In the context of nutrition and healthy eating, no meta-analyses have been conducted to the extent of my knowledge to establish the predictive power of the theories, but individual studies have found support for the theoretical model in that context as well (e.g., Armitage & Conner, 1999).

The RAA is an adequate complement to understand the communication for behavioral change process from a CI perspective. Perhaps one of the most fundamental goals of health communication research and practice is to find ways to influence individual behaviors for good. CI proposes that communication has different effects on health behavior depending on the societal group individuals belong to. Therefore, a closer examination of the routes to behavioral performance and behavioral change is needed to understand where the differences between the more and less advantaged groups are located. The RAA provides the elements that CI needs to focus more specifically on the behavioral change process. At the same time, the RAA has been criticized for being overly utilized and for presenting a too simplistic explanation of behavior (for a summary see Hagger, 2015), leaving behind other important determinants that can add explanatory power to the theory, and also moderate the proposed effects. All in all, the convergence of CI and the RAA allows us to understand social inequalities in the behavioral change process.

Exposure to Health Information

One of the most widely accepted frameworks to understand the process of attitude change is McGuire's (1989). He proposes that several steps should occur before persuasion takes place, and the first of those steps is exposure to messages. One of the main concerns of those designing persuasive health campaigns is to maximize exposure (Hornik, 2002) in other words, making the right decisions regarding where to put the messages to make sure they get to their target audience. A great proportion of health communication studies are concentrated on the outcomes of health campaigns. According to Rogers (1996), a health communication campaign is characterized for being purposive, because it intends to cause specific human behavior changes; aimed at a large number of individuals; conducted within a specified period of time; and for involving an organized set of communication activities.

Exposure to health information, however, is by no means limited to exposure to health communication campaigns. In fact, these purposive messages make up only a small proportion of all the health messages individuals are exposed to on a daily basis (Lee, 2009a). The news as well as the entertainment media usually offer health related information to their audiences. Furthermore, interpersonal conversations, social media interaction, and internet searches, among other forms of communication, might have health as their main topic. Thus, these instances also contribute to individuals' exposure to health information. A closer examination of information exposure about health issues must not be limited to public health communication campaign. Instead, such perspective must include a broader list of sources, types of interaction, and types of content that are accessed.

Information seeking and scanning behaviors (SSB) are two different ways of engaging with information. The study of SSB is important in the context of communication and health

disparities, because they focus on how people acquire information from the media, health care providers, and their social networks. In the same vein, information seeking and scanning contribute to understanding the gap between the more and less advantaged groups in regard to health information acquisition.

Information seeking has been defined as "active efforts to obtain specific information outside of the normal patterns of exposure to mediated and interpersonal sources" (Niederdeppe et al., 2007, p. 155), whereas information scanning corresponds to "information acquisition that occurs within routine patterns of exposure to media and interpersonal sources that can be recalled with minimal prompt" (Niederdeppe et al., 2007, p. 154). Information scanning is characterized by incidental exposure to media content or conversations within ones' social network without specifically looking for it, while information seeking is a deliberate behavior.

Even though intentionality is more clearly a characteristic of information seeking, according to Niederdeppe and colleagues (2007), there is always a certain degree of intentionality in information scanning. Some individuals embed themselves in richer health information environments, for example, by subscribing to health magazines or having conversations with other individuals who work in healthcare or have experience in health-related matters. A health information environment is an important concept when focusing on communication and health disparities, because it is expected that an individual's information environment will vary as a function of other determinants, such as the individual's social networks (Knowing many or fewer people who know about health), education (Preference for certain content in the media over others), and income (e.g., ability to subscribe to media related to health, such as specialized magazines), among others. Many sources of information can be considered when studying SSB, such as health care providers, interpersonal networks, mass

media, and the internet, among others. The proponents of the SSB argue that all sources are subject to be used for both, seeking and scanning (Niederdeppe et al., 2007).

Early studies on SSB conceptualized scanning, and especially seeking, as general behaviors. In other words, seeking and scanning health information, in general, were conceived as possible predictors of health knowledge or health-behaviors (Shim et al., 2006). More recent studies, however, (Hornik et al., 2013; Kelly et al., 2010; Kelly, Niederdeppe, & Hornik, 2009; Niederdeppe et al., 2007; Ramírez et al., 2013) argue for a behavior-specific measure of information seeking and scanning, as SSB about a particular topic (Online information seeking of consumption of fruits and vegetables) might be a predecessor for behavioral performance (Adoption of a fruit and vegetable-rich diet).

SSB about specific behaviors are expected to be associated with behavioral performance, since through SSB, people learn strategies to engage in a specific health behavior. By seeking or scanning, people can learn new information about the benefits of a behavior, which can be a relevant motivator to put it into practice. Moreover, SSB from social networks can lead to a perception of social support needed to encourage the behavioral performance, and they can act as reminders of the subjective norms that are prevalent within a group of people regarding the behavior (Hornik et al., 2013; Ramírez et al., 2013).

Distinctions, however, may exist between seeking and scanning regarding their ability to predict behaviors. The relationship people establish with the information is expected to be different depending on the mode it was acquired (via seeking or via scanning). From an information processing perspective, for instance, the elaboration likelihood model (ELM; Petty & Cacioppo, 1986), information seeking might be more strongly associated with the central processing of information, whereas information scanning is closer to peripheral processing

(Niederdeppe et al., 2007). As the ELM proposes, central processing is more likely to result in strong attitude formation than peripheral processing. In spite of the greater weight that seeking might have on health decision making, scanning has been found to be more prevalent than seeking (Kelly et al., 2010). Thus, the influence of scanning on health behavior and health-related cognitions cannot be disregarded (Hovick & Bigsby, 2016).

Overall, SSB have been found to have a cross-sectional association with preventive behaviors, such as consumption of fruits and vegetables and exercising (Kelly et al., 2010; Ramanadhan & Viswanath, 2006); and screening behaviors, for example, colonoscopy (Kelly et al., 2010; Shim et al., 2006). Longitudinally, seeking has been found to be associated with the behavioral performance of dieting, exercising, and fruit and vegetable consumption (Ramírez et al., 2013), and scanning has been found to be a predictor of exercising, maintenance of fruit and vegetable consumption, and mammography screening among those who already engaged in the behavior (Hornik et al., 2013).

Altogether, the incorporation of SSB to a communication inequality approach to study disparities in a health communication context is necessary in order to address the complexities of individuals' health information acquisition and the expected differences between the more and less advantaged groups in society. In the next section I switch my attention to describing the social position indicators that I will address in my dissertation research.

Social Position Indicators

Health researchers have argued that the position individuals occupy in society affect their health due to differences in exposure, resources, and susceptibilities to health threats (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006). Viswanath's CI framework proposes that the social position influences the degree to which individuals access, use, process, and act on that

information. Social position comprises monetary resources, social class, and educational level, among many others. A more concrete definition of social position proposes that the construct "refers to the social and economic factors that influence what positions individuals or groups hold within the structure of a society" (Galobardes et al., 2006, p. 7). Two social position indicators will be addressed in this dissertation: SES, assessed as household income and educational attainment, and race/ethnicity.

Socioeconomic status. The association between SES and health is a widely studied area. A simple search in Google Scholar for the phrase 'socioeconomic status and health' results in almost 1.7 million hits. Early studies revealed an association between lower SES and poor health (for a review see: Feinstein, 1993). More recently, researchers' attention has turned to poor environmental conditions, which are frequently associated with SES, as factors that contribute to inequalities in health (Clarke et al., 2014).

The notion of SES derives from the stratified conception of society, which entails the idea that individuals can be categorized according to some indicators of their position within the larger group, and the degree of power, economic capacity, and prestige that this position entails (Mueller & Parcel, 1981). Several indicators of SES have been used in the literature, such as occupational status, educational level or attainment, and income (Mueller & Parcel, 1981). Occupation has been regarded as a good indicator of SES, because it provides information about the person's prestige in society as well as some notions of her monetary resources (Mueller & Parcel, 1981). Education, in turn, measures the knowledge-related assets of a person (Galobardes et al., 2006), which may be a good indicator of the power and prestige, but not necessarily of economic position. Income provides a more concrete measure of material resources individuals

have at their disposal (Galobardes et al., 2006), but not necessarily of prestige and power (Mueller & Parcel, 1981).

Research under the CI framework has traditionally utilized education and income as indicators of SES (Viswanath et al., 2006). Even though they provide different types of information, researchers have preferred education over income as a measure of SES (Lee, Ramírez, Lewis, Gray, & Hornik, 2012), mostly due to practical reasons, because participants are usually reluctant to disclose their earnings. In this dissertation, I look at income and educational attainment as indicators of SES.

Race/ethnicity. American society is nowadays more diverse than ever. Recent estimations of the US Census Bureau (2013) indicate that over 53 million people living in the United States are Hispanic (17% of the total population), 44.5 million are African American (about 13%), 18.9 million are of Asian descent (about 5%), 6.3 million are American Indians and Alaska Natives (about 1.2%), and 1.4 million are Native Hawaiians and Other Pacific Islanders (about 0.2%). The 2010 population census revealed that about 2.3% of the population described themselves as of more than one race (United States Census Bureau, 2011). Moreover, it is estimated that over 40 million US inhabitants were born outside the country, a vast majority of them (84.6%) speak a language other than English at home, and only about half speak English well (Gambino, Acosta, & Grieco, 2014).

The question for what is meant by racial and ethnic diversity is an open debate. Several types of studies fall under the umbrella of ethnic diversity. Studies that examine differences between members of the ethnic majority and minority groups within a country are considered to be focused on ethnicity (e.g., Blanchard, Fisher, et al., 2008), as are those that study immigrants (e.g., Popovic-Lipovac & Strasser, 2015), those that compare people within a country who speak

a different language (e.g., O'Driscoll, Banting, Borkoles, Eime, & Polman, 2014), or those that focus on specific ethnic groups and seek to characterize the particularities of their beliefs and behaviors (e.g., Sheats, Middlestadt, Ona, Juarez, & Kolbe, 2013), to mention a few.

Race and ethnicity as a social position indicator has the advantage of taking into account the increasingly rich ethnic and racial diversity in the United States and other areas of the world. Furthermore, a closer examination to this factor may allow for problems that specific cultural groups are facing to be identified, such as access to health care or cultural beliefs that may affect their willingness to engage in preventive or screening behaviors (Zhao, 2010). Unfortunately, as stated by Shim (2008), research in the communication inequalities framework has given much more attention to SES and has disregarded differences due to race or ethnic group membership.

Rationale for the Hypothesized Model

The theoretical model that guides my dissertation has as its main structure the predictions of the RAA, more specifically the TPB and the IM. Following these theories' tenets, I propose that attitudes, subjective norms, and PBC will be predictors of intentions, which in turn predict behavior. Moreover, it is proposed that information exposure, via health campaigns, seeking and/or scanning, influences the attitudes, subjective norms, and PBC-related beliefs individuals have regarding behaviors. Furthermore, I argue that social position indicators predict information exposure. The main contribution of my dissertation, however, is to examine the moderating role of two social position indicators, SES and race/ethnicity in the association among the TPB variables.

The model that inspires this dissertation goes beyond previous studies in the health communication field. In the IM, Fishbein (2000) argues that skills and environmental constrains should be regarded, along with behavioral intentions, as direct predictors of behavior. However, I

argue that, in addition to new predictors, researchers should also consider the interplay between the known predictors and other factors that may shed some light on the circumstances in which the hypothesized connections take place.

In this section, I explain the reasoning for why I expect the examined social position indicators to predict information exposure. Then, I explain why I expect SES and race/ethnicity to influence the links between information exposure and attitudes, perceived norms, and PBC; between these variables and behavioral intentions, and between intentions and behavior.

SES and information exposure. Exposure to health messages is likely determined by SES. When thinking about mass media coverage of health information or online content about the subject, it is expected people's ability to access these communication channels is influenced by their monetary resources. The earlier digital divide research confirmed that wide gaps exist between people with high and low income in terms of access to information technologies and the internet. To a great extent, these differences are explained by the cost of owning a computer and paying an internet subscription. Similarly, access to specialized information via subscription magazines and cable television, will be determined by the ability to pay for them.

Access to health information from medical professionals is also likely to be influenced by income. Lower SES groups are more likely to be uninsured or underinsured, and as a consequence, have fewer chances to develop a steady relationship with health care providers and to receive primary care periodically. This, in turn, may reduce their chances of receiving providers' advice about lifestyle behaviors. For example, studies have found that many children from lower income families use hospital emergency rooms as their main source of health care, and as a substitution for primary care (Orr, Charney, Straus, & Bloom, 1991).

Individual preference for information, which is likely influenced by educational attainment, can also contribute to differences in health information exposure. Studies on the so called 'second digital divide' (Attewell, 2001) have found that compared to the less educated, the more educated consumed more information and service-oriented online content and less entertainment (Bonfadelli, 2002). Looking at traditional media, it has been found in the political communication arena that individuals from higher SES backgrounds are more interested in public affairs news compared to lower SES groups, and to consume information from more specialized news sources (McLeod & Perse, 1994).

Research on information seeking and scanning reveals differences between social groups with respect to their SSB, with education being a strong predictor of both behaviors. Members of higher SES groups are more likely to seek information from more sources compared to people from lower SES (Ramanadhan & Viswanath, 2006). The more educated have been found to be more likely to seek and scan information (Shim et al., 2006). Education level has been found to be strongly related to health information seeking through different types of media (Viswanath & Ackerson, 2011), and individuals from more disadvantaged groups have been found to be less likely to seek health information on the web (Shim, 2008).

Members of different social groups not only differ on whether and to what extent they seek and scan information, but also their preferred sources (Beaudoin & Hong, 2011) and topics (Galarce et al., 2011). Among cancer patients, for instance, the use of the internet to seek information about treatment and quality of life was greatly influenced by educational level (Lee, Niederdeppe, & Freres, 2012).

Race/ethnicity and information exposure. As with SES, content selection may be a key factor when examining differences attributable to race/ethnicity on health information exposure.

Racial/ethnic differences exist in patterns of information consumption. A recent report of news consumption by Pew Research Center (2012) revealed that Whites (47%) are more likely than Blacks (44%) and Hispanics (36%) to get news online. A large study of over 250,000 web users (Goel, Hofman, & Sirer, 2012) revealed that Whites were more likely than any other racial/ethnic group, regardless of educational level, to use the internet for health-related purposes. Recent studies, however, have underscored the importance of addressing other factors, such as rurality, when examining the association between race/ethnicity and health information acquisition (Powe, 2015).

It has been claimed that given minority groups' tendency to have greater mistrust in the medical system, members of these groups would feel more motivated than Whites to actively seek information about health matters (Viswanath & Ackerson, 2011). In a nationally representative study focused on disadvantaged groups, Viswanath and Ackerson (2011) found that African Americans and Hispanics were more likely to pay attention to health information from media sources than non-Hispanic Whites. The information seeking and scanning findings, however, do not reveal a clear trend regarding the influence of race/ethnicity on information exposure. In one study, Blacks and Hispanics were found to be more likely to seek compared to Whites (Kelly et al., 2010), but other studies suggest that Hispanics were less likely to seek compared to Whites (Shim et al., 2006) and to Whites and African Americans (Ramanadhan & Viswanath, 2006).

SES and exposure, attitudes, subjective norms, and PBC. Even when members of lower SES groups achieved exposure to health messages, their chances of turning the acquired information into favorable attitudes, normative or control perceptions may be smaller compared to more advantaged groups. Research in the health literacy domain has found a consistent

relationship between educational attainment and health literacy (Kutner et al., 2006). Furthermore, it has been found that health literacy mediates the effect of education on health status (van der Heide et al., 2013). Lower levels of health literacy among less educated individuals could contribute to difficulties when making sense of the received messages. According to McGuire's (1989) hierarchy of effects model, comprehension is a crucial step in the persuasion process. Sense making of the acquired information is, according to this model, a fundamental antecedent of attitude change. Because normative perceptions and PBC, like attitudes, are based on beliefs, it is reasonable to think that information comprehension is also relevant for forming these cognitions.

Evidence of the moderating effect of SES on the relationship between information exposure and the TPB variables is lacking. Researchers, however, have found that message exposure has a differential effect on message recall for lower SES individuals compared to higher SES individuals. In their review of smoking cessation campaigns, Niederdeppe, Kuang, Crock, and Skelton (2008) found that several campaign evaluations showed that members of lower SES groups had lower levels of message recall than higher SES individuals. As Niederdeppe, Kuang, and colleagues (2008) put it, people with lower SES are expected to have less meaningful exposure to campaign messages, which hinders their ability to form favorable beliefs regarding the advocated behaviors.

Race/ethnicity and exposure, attitudes, subjective norms, and PBC. The main argument for why race/ethnicity influences the link between information exposure and the TPB health-related cognitions is that the health messages individuals are exposed to may make more sense for some groups than for others. Members of majority groups may feel represented and identified with the messages, while minorities see the messages as distant and less relevant. This

might be the case when examining the effects of mainstream media messages, as members of minority groups are less likely to feel represented by these outlets. Thus, even when exposure to messages promoting healthy behaviors could be equal among ethnic groups, members of the minority groups may be more likely to disregard these messages. Furthermore, lack of identification with the messages and their sources may hinder media messages' chances to influence people's attitudes, perceived norms, and PBC-related beliefs.

Content analytic research has demonstrated that ethnic minorities are severely underrepresented in the American media system. A study of major network news (Owens, 2008) showed that a majority of on-camera sources were White (77%), whereas only 8.6% were African American, 4.2% were Hispanic, and 2.6% were Asian. Whites made up the great majority of expert sources, whereas Blacks and Hispanics had a very small presence as experts in the media. Similar findings were reported in a larger study of local television news in 12 American cities (Poindexter, Smith, & Heider, 2003).

The underrepresentation of minorities is also the case with health-related content. Owens (2008) found that 80% of the sources in health and medicine-related stories were White, whereas only 9% of the stories about health had some African American source, and 6% had a Hispanic source. Interestingly, Asians were frequently portrayed in stories about health as professionals or researchers. In short, most of the people speaking about health and giving advice in the media are Whites. As a consequence, members of minority groups exposed to these messages may not feel represented by these sources. As we know from persuasion research (e.g., Feng & MacGeorge, 2010), source similarity is an important influence in the persuasive process.

Health communication campaigns can create messages and strategies for delivery that make the content more salient and relatable for members of minority groups. In order to

accomplish that, campaigns utilize concrete strategies (Len-Rios, 2009), among which we can count selecting the right sources, the right channels, and the right messages. The goal is not only to reach minority populations, but also to influence them with the campaign.

Even though audience racial/ethnic segmentation seems to be a reasonable approach considering the deep health disparities that exists between different ethnic groups in the country, there is little empirical evidence to demonstrate its effectiveness. In a paper about the topic, Hornik and Ramirez (2006) found no campaign evaluations in the literature that showed evidence that race/ethnicity segmentation in health campaign contributed to reducing health disparities. Evidence of this sort is fundamental to support the decision to embark on racial/ethnic segmentation strategies, as they are likely costly and time consuming (Hornik & Ramirez, 2006).

Besides issues of identification with mediated messages, associated problems may arise for members of minority groups when exposed to messages from interpersonal sources, in particular from experts in the health field. Lack of trust in the medical personnel and their recommendations regarding a healthy lifestyle are prevalent among minorities. This may also affect the chances of members of these groups to form attitudes, subjective norms, and control beliefs in line with the recommendations. Ethnic minorities have been found to have higher degrees of mistrust in the health care system than Whites (LaVeist, Nickerson, & Bowie, 2000). Even though patients report feeling more satisfied with care when doctors are of the same race or ethnic background, Whites have greater chances of accomplishing that compared with African Americans and Hispanics, since most of the doctors currently in practice are White (Laveist & Nuru-Jeter, 2002). Research on doctor-patient relationships has shown that trust in a physician is

associated with behavioral outcomes like adherence to medical recommendations (Hall, Dugan, Zheng, & Mishra, 2001).

Finally, the content of the message itself could be the reason why it may not resonate equally for all racial/ethnic groups. Messages received through the media or other sources regarding the behavior under examination may not be consistent with minority group's conceptions and values regarding the behaviors. In that case, individuals may adopt defensive strategies to protect their own beliefs and self-concept. Among these strategies we can count negative thoughts, counterarguments, and source derogation, which in turn may negatively affect the chances to conform to the message's recommendations (Lapinski & Boster, 2001).

Defensive strategies in the face of messages that go against previous beliefs and self-concept are likely, especially in the nutrition domain. A review of qualitative studies (Bisogni, Jastran, Seligson, & Thompson, 2012) concluded that ethnic minorities' perception of what healthy eating was did not necessarily match Western standards. Therefore, messages promoting these standards may not be well received by the racial/ethnic minorities. For example, studies have found that for Hispanics in the US, junk food is considered "American food" and consumption of that food is for them important in the acculturation process (Lindberg, Stevens, & Halperin, 2013). All in all, lack of identification, mistrust, and irrelevance of the messages promoting healthy eating and exercise may be the reason why differential effects of exposure on attitudes, norms, and PBC are expected for members of racial/ethnic minorities.

SES and attitudes, subjective norms, PBC and intentions. Lower levels of income and education are likely related to a decreased motivational response to health messages (Niederdeppe, Kuang, Crock, & Skelton, 2008). First, low educational attainment is likely associated with a lack of skills and knowledge regarding how to adopt healthy behaviors. Along

the same lines, lack of monetary resources necessary to engage in new practices may be a huge barrier for members of lower SES groups. For example, purchasing sport equipment for practicing physical activity may be a big investment.

As we have seen, the TPB and associated theories propose that intentions are the closest predictor of behavior. Behavioral intentions are more concrete than attitudes, subjective norms, and PBC, because they indicate that a change is being contemplated by the individual. Even though skills and abilities, and environmental constrains have been proposed to be direct predictors of behavior (Fishbein, 2000), it is possible that they affect the likelihood of individuals forming behavioral intentions as well. If individuals anticipate having difficulties to perform a behavior due to the lack of skills or lack of access to do so, despite the positive cognitions that a person may have, the chances for translating them into behavioral intentions may be smaller. Acknowledgement of these obstacles in adopting a new and healthier behavior may make individuals in lower SES groups less likely to turn positive attitudes, subjective norms, and PBC into behavioral intentions.

The scant empirical research testing the moderating role of SES in the relationship between the attitudes, subjective norms, and PBC and behavioral intentions is not conclusive. Support for the moderating effect was found by Sandvik, Gjestad, Samdal, Brug, and Klepp (2010), in a sample of children in Norway and using multi-group analysis comparing high-, mid-, and low-SES groups in the degree to which each of the TPB constructs predicted intake of fruits and vegetables. They found that for the mid-SES group, self-efficacy was not a predictor of fruit and vegetable consumption, as it was for the high- and low-SES participants. A recent meta-analysis revealed that the gap between PBC and behavior was significantly larger among the deprived groups in society (Vasiljevic, Ng, Griffin, Sutton, & Marteau, 2016). Conversely, other

studies have found no moderating effects. Lien, Lytle, and Komro (2002), in a study with school children in the context of fruit and vegetable consumption revealed that SES did not moderate the relations between the TPB constructs. A plausible reason for the lack of a significant moderating effect, according to Lien et al. (2002), is that children from lower SES groups were disproportionally more likely to drop from the study compared to their higher SES counterparts. Similarly, Ellis, Kosma, and Symons Downs (2013), in a study using multi-group analysis to compare across SES groups among adolescents in the states of Louisiana and Pennsylvania, found no interactive effect between SES and the TPB cognitions in the context of physical activity. More studies in diverse populations need to be done in order to test the moderating effect of SES and to overcome the limitations of previous studies.

Race/ethnicity and attitudes, subjective norms, PBC and intentions. According to the RAA, different behaviors are expected to be under the influence of different predictors of intentions. Some behaviors may be more likely to be influenced by attitudes, whereas others might be mostly affected by perceived norms or PBC. Similarly, the associations hypothesized by the TPB may take different forms across different cultural groups (Fishbein, 2000). Whereas in a certain ethnic group or culture there might be a strong association between, for example, attitudes and intentions, in other groups, the relationship might be weaker.

For a given behavior, it is possible that in a particular group the main predictor of intentions are attitudes, whereas in a different group, intentions are driven by another predictor, such as perceived norms or PBC. For example, Smith-McLallen and Fishbein (2009) found that for African Americans, PBC was the strongest predictor of intentions across a wide variety of behaviors, that included getting a mammogram (females), getting a prostate cancer screening test (PSA; males), getting a colonoscopy, consuming fruits and vegetables, dieting, and exercising.

For Whites, in turn, the main predictor of intentions varied for different behaviors. Whereas intentions to get a mammogram were driven by subjective norms and PBC, intentions to get a PSA and a colonoscopy were driven by subjective norms, and intentions to exercise and diet were mainly driven by attitudes and PBC (Smith-McLallen & Fishbein, 2009). Even though the relationships proposed by the TPB are still expected to hold across different cultures, they are most likely influenced by cultural factors.

There are certain elements that characterize specific racial/ethnic groups in the USA, for example, religiosity. Among all racial/ethnic groups in the United States, African Americans are the group most likely to be affiliated with a church or to declare to be religious. Eighty-seven percent of African Americans belong to a religion and 8% are not formally affiliated, but still feel religious. For Whites, in turn, affiliation to a church is about 83%; for Asians, 75%, and for Latinos, 83% (The Pew Forum on Religion and Public Life, 2008). Blanchard, Fisher, and colleagues (2008) have argued that African Americans' greater religiosity compared to Whites is one plausible explanation for a moderating effect of race/ethnicity on the link between attitudes, norms, and PBC and behavioral intentions. Given their religiosity, African Americans may be more likely to believe that it is not up to them to change their health status. Thus, regardless of their favorable cognitions about a health behavior, intentions may be weaker or null for this group compared to others.

In the recent years, researchers have examined the moderating role of race/ethnicity in the relationships predicted by the TPB. However, this line of inquiry is still in its infancy and the results are inconclusive. An early study in the physical activity domain conducted among Black and Caucasian college students (Blanchard et al., 2003) found a significant interaction between ethnicity and attitudes in predicting intentions to practice physical activity. Similarly, Blanchard,

Fisher, and colleagues (2008), in a sample of Caucasian and African American college students found that instrumental attitudes interacted with ethnicity. In their sample, attitudes were stronger in influencing behavioral intentions for Whites than for Blacks.

Other studies have found interactive effects of race/ethnicity and other health-cognitions on behavioral intentions. Blanchard and colleagues (2007), in a study with American college students, found no support for the interaction of ethnicity and attitudes, but their results indicated that ethnicity and PBC had an interactive effect on behavioral intentions, such that perceived control was significantly stronger for Whites compared to Blacks in predicting intentions to be physically active.

A number of studies in the context of physical activity have not been able to replicate such findings. A study among elementary school children in Canada that compared White and Asian students (Rhodes, Macdonald, & McKay, 2006) found that ethnicity did not moderate any of the TPB relations. Blanchard, Kupperman, and colleagues (2008), in a sample of college students and using SEM techniques and multi-group analysis, found that the TPB relations were invariant for Whites and Blacks, which indicates that no interactions between the TPB components and ethnicity were supported. With a similar technique, and using a random sample of adults in Hawaii, Nigg, Lippke, and Maddock (2009) compared the TPB across White, Japanese, Filipino, and Hawaiian groups. They found that the TPB was invariant across these populations, in other words, that there were no differences in the relations proposed by the TPB that were attributable to ethnicity.

In the domain of fruit and vegetable consumption, studies are scarce and the findings do not support a clear statement regarding the moderating effect of race/ethnicity. In a study with college students from two American universities that examined consumption of 5 or more

portions of fruit and vegetables per day, Blanchard, Fisher, et al. (2009), found no moderating effect of ethnicity on any of the TPB relations. In a similar study with students from three American universities and using SEM techniques, Blanchard, Kupperman, et al. (2009) found that the TPB model was invariant for Whites and Blacks, which indicates that no moderation took place. However, when they compared each individual coefficient in the model to assess whether differences existed; they found that subjective norms were a predictor of intentions to consume five portions of fruits or vegetables per day only for Blacks, but not for Whites.

As can be observed in the review presented above, in the exercise and the consumption of fruits and vegetable domains, findings regarding a moderating effect of race/ethnicity on the relationship between health cognitions and behavioral intentions are mixed. Furthermore, most of the studies have been conducted with convenient samples of college or school students instead of representative samples of other social groups. The use of convenient samples in this type of studies may hinder researchers' ability to grasp differences between racial/ethnic groups that are given by structural factors, because children attending the same school and young adults in the same college are likely to be more homogeneous than the general population. The studies that have been conducted in other samples are restricted to specific locations, such as Hawaii (Nigg et al., 2009), where the nature of the racial/ethnic diversity is different than in the continental United States.

SES, intentions and behavior. The link between behavioral intentions and behaviors is heavily influenced by factors outside of the individual. Fishbein (2000) proposed that environmental constraints as well as skills and abilities had an effect on behavioral performance, since these variables may influence the likelihood of performing a behavior. I argued above that beyond this main effect, both, skills and environmental constrains, could not only be predictors

of behaviors, but also moderators of the intentions-behaviors association. When a person has the skills needed to perform a behavior, and the environment facilitates such performance, then the effects of behavioral intentions on behavior are expected to be strengthened. Conversely, when a person lacks the skills and she finds environmental barriers to perform a behavior, the influence of behavioral intention on behavior is expected to be weaker.

Factors that may hinder healthy habits adoption are the characteristics of the environment. Neighborhoods that are deprived of stores that offer healthy food are called "food deserts" (for a review see: Walker, Keane, & Burke, 2010). Food deserts are defined by Cummins and Macintyre (2002, p. 436) as "poor urban areas, where residents cannot buy affordable, healthy food." Researchers have found, for example, that non-poor neighborhoods have as much as three times as many supermarkets compared with poor residential areas (Morland, Wing, Diez Roux, & Poole, 2002). Lack of places where fresh produce is available translates into fewer food choices for the less advantaged. Similarly, fewer exercise facilities are available in underserved zones, which affects residents' chances of becoming more physically active (Gordon-Larsen et al., 2006). All in all, environmental constraints that characterize underserved areas, without a doubt, affect chances of turning intentions into actual behaviors. Evidence, however is scant and equivocal. A recent meta-analysis in the context of physical activity and diet, for example, did not find support for the proposition that the intention-behavior gap was larger among the deprived population compared to the more affluent segment of society (Vasiljevic et al., 2016).

Race/ethnicity, intentions and behavior. Being part of a racial/ethnic group in the United States is associated with having environmental conditions that may facilitate or constrain the practice of the behavior. Researchers have found that neighborhoods with a larger proportion

of ethnic minorities are characterized by having less availability of sports facilities (e.g., Moore et al., 2008) as well as stores where fresh produce can be purchased (e.g., Moore & Diez Roux, 2006). According to recent research findings, neighborhoods that are predominantly African American have fewer supermarkets where fresh produce is usually offered, and more grocery stores compared to White neighborhoods (Block & Kouba, 2006). In a similar fashion, Powell, Slater, Mirtcheva, Bao, and Chaloupka (2007) found that neighborhoods where residents were predominantly African Americans had 52% of the supermarkets that were available in predominantly White areas. Neighborhoods where Hispanic population was predominant had 32% of the supermarkets of White neighborhoods.

Living in a "food desert" clearly limits the diet-related choices individuals make. A qualitative study (Yeh et al., 2008) revealed that African American women recognized the lack of access to fresh produce as an important barrier for increasing their fruit and vegetable consumption. In the same study, recent Hispanic immigrants declared that the absence of fresh fruits and vegetables they were used to in their country of origin was a barrier for healthy eating. Morland, Wing, and Roux (2002) found that per each additional supermarket in the census track, African Americans increased their consumption of fruits and vegetables by 32%, while White Americans increased their consumption by 11%. These results suggest that the availability of stores where healthy food can be purchase has a significant influence on people's diet. Thus, it is plausible that when intentions to eat healthy are formed, ease of access to the products can be a determinant for success in carrying out the behavior.

An analogous argument can be made for physical activity. Physical infrastructure for sports and exercises has been found to be less common in neighborhoods where racial/ethnic minorities reside (Moore et al., 2008). Furthermore, studies have found that the availability of

such facilities is an important predictor of the likelihood of engaging in physical activity among adolescents (Gordon-Larsen et al., 2006), as well as a moderator of the intentions – behavior relationship in the same population (Prins et al., 2010).

Only a few studies have examined the influence of race/ethnicity on the relationship between intentions and behavior. The results do not favor the claim that a moderating role exists, but the studies conducted up to now have several limitations. A recently published review of moderators of the behavioral intentions-behavior link in the physical activity domain (Rhodes & Dickau, 2013) found that only 9 studies testing this moderating effect were conducted. Just one of the 9 studies found a significant effect.

A closer look at the one study that found a significant moderation (Blanchard, Fisher, et al., 2008) reveals that the path between intentions and behavior was significant for Whites, although not for African Americans. This indicates that even when having high intentions to perform physical activity, African Americans were less likely than Whites to act on their intentions. An examination of the other 8 articles that found no significant moderation shows that most of these studies were conducted using convenience samples of college students (Blanchard, Fisher, et al., 2008; Blanchard et al., 2007; Blanchard, Kupperman et al., 2008), which might be a limitation given the expected homogeneity of the sample. Three of the studies used children and adolescent samples (Motl et al., 2002; Rhodes et al., 2006; Saunders, Motl, Dowda, Dishman, & Pate, 2004), and two collected data from adult populations (Blanchard et al. 2004; Nigg, Lippke, & Maddock, 2009).

Evidence for the moderating effect of race/ethnicity in the nutrition context is even scarcer. No review articles on the matter have been published, and a couple of recent studies (Blanchard, Fisher, et al., 2009; Blanchard, Kupperman, et al., 2009) found no significant

interactions between ethnicity (Whites versus African American) and behavioral intentions in predicting consumption of fruits and vegetables. Both studies, as many of those reviewed in the physical activity context, were conducted using convenience samples of college students.

Summary of the Rationale

In this chapter I have proposed that the two social position indicators studied in this dissertation are expected predictors of information exposure and moderators of the TPB relations. SES might be an important influence in the behavioral change process, as individuals with lower educational attainment may have more difficulties making sense of the messages received. Furthermore, lack of skills and resources, associated with lower SES groups, may limit the degree to which positive attitudes, subjective norms, and PBC turn into intentions. Finally, as stated by the IM, the environment in which individuals reside, which is highly associated with individuals' SES, facilitates or constrains their ability to act on their behavioral intentions.

For race/ethnicity, I focused on the racial/ethnic diversity in the American context, mostly because the largest proportion of the literature in this area comes from the United States. With that in mind, I proposed the link between information exposure and health-related cognitions to be moderated by race/ethnicity, as members of minority groups may feel less represented by media messages promoting healthy behaviors, and may have more mistrust in the advice of medical personnel compared to Whites. Race/ethnicity may also moderate the link between health-related cognitions and behavioral intentions, as cultural norms and expectations certainly affect the degree to which attitudes, perceived norms, and PBC, translate into a concrete intention to perform a behavior.

Similarly, the link between intentions and behaviors may be influenced by race/ethnicity, mainly due to the fact that members of the racial/ethnic minorities are likely to reside in areas

where access to resources that facilitate healthy behaviors is limited. Therefore, members of minority groups may have a harder time engaging in a healthy behavior, even after they have formed intentions accordingly. The empirical literature testing the influence of race/ethnicity on the link between health cognitions and intentions, and between intentions and behaviors is very restricted, has several limitations, and does not provide a clear conclusion.

All in all, the review of literature on this subject revealed that all these moderating effects are open questions to be further explored. In the next section, the hypotheses and research questions that guide this dissertation are proposed. Figure 2.1 presents a depiction of the conceptual model that summarizes these propositions.

Conceptual Model, Hypotheses, and Research Questions

The first set of hypotheses and research questions refers to the main effect differences among race/ethnicity and SES groups. Based on the above discussion, I derive the following hypotheses and research questions:

Mean Differences SES

H1a: High SES groups will have greater exposure to obesity preventive behaviors-related communications than low SES groups.

RQ1a: Do different SES groups differ in their (i) attitudes, (ii) subjective norms, and (iii) PBC regarding obesity preventive behaviors?

RQ2a: Do different SES groups differ in their behavioral intentions to practice obesity preventive behaviors?

H2a: High SES groups will be more likely to practice obesity preventive behaviors than low SES groups.

Mean Differences Race/ethnicity

H1b: Racial/ethnic minority groups will have lower levels of exposure to obesity preventive behaviors-related communications than majority groups.

RQ1b: Do different racial/ethnic groups differ in their (i) attitudes, (ii) subjective norms, and (iii) PBC regarding obesity preventive behaviors?

RQ2b: Do different racial/ethnic groups differ in their behavioral intentions to practice obesity preventive behaviors?

H2b: Racial/ethnic minority groups will be less likely to practice obesity preventive behaviors than majority groups.

Mediation Model

The second set of hypotheses refers to the mediation model that combines the tenets of the TPB with information exposure concepts for the whole sample. Based on the arguments provided above, the following hypotheses are posed:

H3: Exposure to obesity preventive behaviors-related communications will lead to (i) more positive attitudes, (ii) greater subjective norms, and (iii) more PBC regarding obesity preventive behaviors.

H4: (i) Attitudes, (ii) subjective norms, and (iii) PBC regarding obesity preventive behaviors will lead to greater intentions to practice such behaviors.

H5: Intentions to practice obesity preventive behaviors will predict the practice of such behaviors.

H6: Exposure to obesity preventive behaviors-related communications will lead to the practice of such behaviors.

H7: (i) Attitudes, (ii) subjective norms, (iii) PBC, and (iv) intentions will mediate the effect of exposure to obesity preventive behaviors-related communications on the practice of such behaviors.

H8: (i) Attitudes, (ii) subjective norms, and (iii) PBC will mediate the effect of exposure to obesity preventive behaviors-related communications on intentions to practice such behaviors.

H9: Intentions will mediate the effect of (i) attitudes, (ii) subjective norms, and (iii) PBC on the practice of obesity preventive behaviors.

The third and last set of hypotheses and research questions refers to the moderating effect of the examined social position indicators, SES and race/ethnicity. Based on the discussion laid out above, I propose:

Moderated Mediation SES

H10a: SES will moderate the effect of exposure to obesity preventive behaviors-related communications on (i) attitudes, (ii) subjective norms, and (iii) PBC regarding such behaviors.

RQ4a: Does SES moderate the effect of (i) attitudes, (ii) subjective norms, and (iii) PBC on intentions to practice obesity preventive behaviors?

RQ5a: Does SES moderate the effect of intentions to practice obesity preventive behaviors on the practice of such behaviors?

RQ6a: Does SES moderate the direct effect of exposure to obesity preventive behaviors-related communications on the practice of such behaviors?

RQ7a: Does SES moderate the indirect effects of the model?

Moderated Mediation Race/ethnicity

RQ3b: Does race/ethnicity moderate the effect of exposure to obesity preventive behaviors-related communications on (i) attitudes, (ii) subjective norms, and (iii) PBC regarding such behaviors?

RQ4b: Does race/ethnicity moderate the effect of (i) attitudes, (ii) subjective norms, and (iii) PBC on intentions to practice obesity preventive behaviors?

RQ5b: Does race/ethnicity moderate the effect of intentions to practice obesity preventive behaviors on the practice of such behaviors?

RQ6b: Does race/ethnicity moderate the direct effect of exposure to obesity preventive behaviors-related communications on the practice of such behaviors?

RQ7b: Does race/ethnicity moderate the indirect effects of the model?

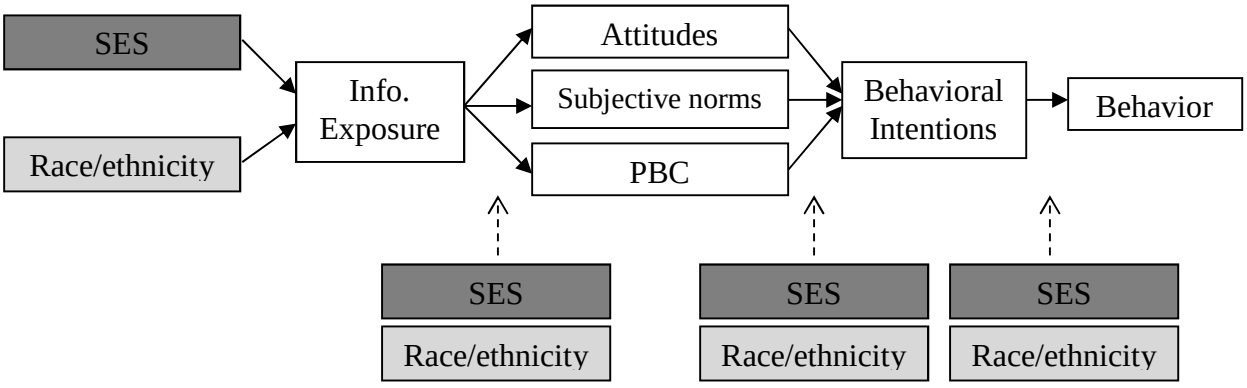


Figure 2.1. A hypothesized model.

Chapter 3

The Moderating Role of SES and Race/ethnicity in the Effect of a National Mass Media Campaign to Promote Physical Activity among "Tweens"

The VERB campaign was designed and conducted by the Centers for Disease Control and Prevention (CDC) between 2002 and 2006 with the purpose of increasing physical activity among children and adolescents between the ages of 9 and 13 years. For years, empirical evidence indicated that children in this age range, referred to as "Tweens" by the advertisers, were increasingly adopting sedentary habits and decreasing their practices of physical activity (Bauman, 2004).

VERB's purpose was to "sell" physical activity as something fun and cool for Tweens. The message "Find your VERB" invited children to think about the physical activities they enjoyed, and to practice them. Tweens were the main audience for the VERB message. The campaign spoke directly to Tweens and efforts were made to keep VERB as a "for kids by kids" brand (Wong, Greenwell, Gates, & Berkowitz, 2008).

The VERB campaign was the first publicly funded campaign to promote physical activity among the youth; it was guided by the principles of social marketing, and its scope and design aimed to fight with the same weapons as the commercial marketing messages that compete with the idea of having a healthy lifestyle (Wong et al., 2008). Following this principle, the VERB campaign comprised large amounts of paid advertising and a careful brand design.

The VERB campaign message and dissemination strategy was the product of extensive formative research conducted by the campaign team and the contracted advertising agencies. The process of developing the VERB brand was informed by interviews with Tweens, focus groups

with parents and adults who worked with Tweens, as well as interviews with industry professionals, and analysis of advertising and brands targeted to Tweens (Berkowitz et al., 2008).

In its design, the VERB campaign made concrete efforts to speak to a racial and ethnically diverse audience comprised of African Americans, Hispanics, Asians, and American Indian communities (Huhman et al., 2008). Firstly, the campaign strategist purchased a diverse set of media to make sure they would reach all these audiences with the messages. Furthermore, they contracted several advertising agencies with expertise on each of these race/ethnic groups, and created separate marketing plans for each of them. In the formative research stage, the campaign planners conducted extensive qualitative studies within each race or ethnic group, which provided unique insight about their views on physical activities as well as their worries regarding the behavior. The segmentation strategy allowed the VERB campaign to craft messages that were relevant to specific groups and to translate VERB messages into other languages, such as Spanish, in a way that made sense to the members of the audience and was still consistent with the purpose of the public health effort (Huhman et al., 2008).

One key concern for the VERB campaign designing team was the mechanism to properly evaluate the campaign, given its large scope and the publicly funded nature of the campaign. The VERB team faced several challenges when designing an outcome evaluation plan (Berkowitz et al., 2008). An ideal design for assessing the effects of the intervention would have been a randomized control trial, but given that the VERB campaign was a nation-wide effort, it was impossible to have a control group not exposed to the campaign at all. Instead, the campaign was evaluated using a quasi-experimental dose-response design with baseline measure (pre-campaign) and annual follow ups for two additional years (Berkowitz et al., 2008). As such, the

VERB campaign evaluation provides a high quality dataset in which the effects of exposure to the VERB campaign can be analyzed at three points in time.

Logic Model

The VERB campaign design was guided by several theoretical frameworks commonly used to inform health communication interventions (Berkowitz et al., 2008), such as social cognitive theory (Bandura, 2001), the theory of planned behavior (TPB; Fishbein & Ajzen, 2010), and the hierarchy of effects model (HOE; McGuire, 1989). The VERB campaign was designed following a logic model (Huhman, Heitzler, & Wong, 2004) or a "theory of action" (p. 1) for the campaign, inspired precisely by McGuire's HOE.

VERB's logic model proposed that proximal variables, such as awareness and recall of the VERB campaign would predict intermediate close variables which included the understanding of campaign messages, knowledge about the campaign, and beliefs about being active. These variables would, in turn, predict other (far) intermediate variables, such as attitudes towards physical activity, perceived behavioral control (PBC), outcome expectations, and intentions. And finally, these intermediate far variables would be predictors of physical activity. Given the proposed nature of the association between the variables involved in the model that guides the campaign design, the most appropriate technique to test these hypothesized relationships is structural equation modelling (Bauman, Smith, Maibach, & Reger-Nash, 2006).

An early analysis found partial support for the HOE model (Bauman et al., 2008), as campaign understanding was a direct predictor of physical activity and this effect was not mediated by attitudes or outcome expectations, the two intermediate variables examined in that study. Bauman and colleagues' (2008) findings underscore the importance of exploring other mediators of the causal link between campaign exposure and behavioral change. In the present

study, I propose that those additional mediators should come from well-known behavioral change theories, such as the TPB. In fact, the VERB campaign's logic model described by Huhman, Heitzler, and Wong (2004) contemplated the influence of intentions, attitudes, PBC, and subjective norms as key intermediate outcomes and predictors of behavioral change.

In this study, I examine the effect of exposure to a mass media and community-based campaign to promote physical activity mediated by the TPB constructs of intentions, attitudes, PBC, and norms. With respect to the normative component, I faced a small limitation, given that the design of the VERB campaign evaluation included items to assess descriptive norms, but not items to assess injunctive norms, which are, according to the most recent formulation of the TPB (Fishbein & Ajzen, 2010) and Fishbein's (2000) integrative model of behavioral prediction, the two components of what was originally labeled as subjective norms. However, the survey included a measure of perceived peer norms, which does not exactly conform to the definition of injunctive norms provided by the TPB proponents, but provides interesting insights regarding the degree to which the campaign influenced normative perceptions and whether those normative perceptions, in turn, influenced intentions and behavior.

Thus, the purpose of this study is to test whether exposure to information from a health campaign aiming to promote physical activity among children and adolescents predicts changes in attitudes, descriptive and peer norms, PBC, intentions, and performance of the behavior. Furthermore, I aim to test whether household income, parental educational attainment, and race/ethnicity are moderators in the model.

Hypotheses and Research Questions

This study focuses on the effect of a mass media and community-based health communication campaign on the practice of physical activity. The first set of hypotheses and research questions addresses the differences that could be expected among the examined social groups regarding each of the variables this study examines:

Group Differences: Household Income

H1a: Children in households with low income will have lower levels of exposure to the VERB campaign messages compared to children in households with high income.

RQ1a: Do children in households with low income differ in their (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity compared to children in households with high income?

RQ2a: Do children in households with low income differ in their intentions to practice physical activity compared to children in households with high income?

RQ3a: Do children in households with low income differ in their practices of physical activity compared to children in households with high income?

Group Differences: Parental Educational Attainment

H1b: Children of parents with low levels of education will have lower levels of exposure to the VERB campaign messages compared to children of more educated parents.

RQ1b: Do children of parents with low levels of education differ in their (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity compared to children of parents with high levels of education?

RQ2b: Do children of parents with low levels of education differ in their intentions to practice physical activity compared to children of parents with high levels of education?

RQ3b: Do children of parents with low levels of education differ in their practices of physical activity compared to children of parents with high levels of education?

Group Differences: Race/ethnicity

H1c: White Tweens will have greater levels of exposure to the VERB campaign messages compared to non-Whites.

RQ1c: Do children from different racial/ethnic groups differ in their (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity?

RQ2c: Do children from different racial/ethnic groups differ in their intentions to practice physical activity?

RQ3c: Do children from different racial/ethnic groups differ in their practices of physical activity?

Mediation Model

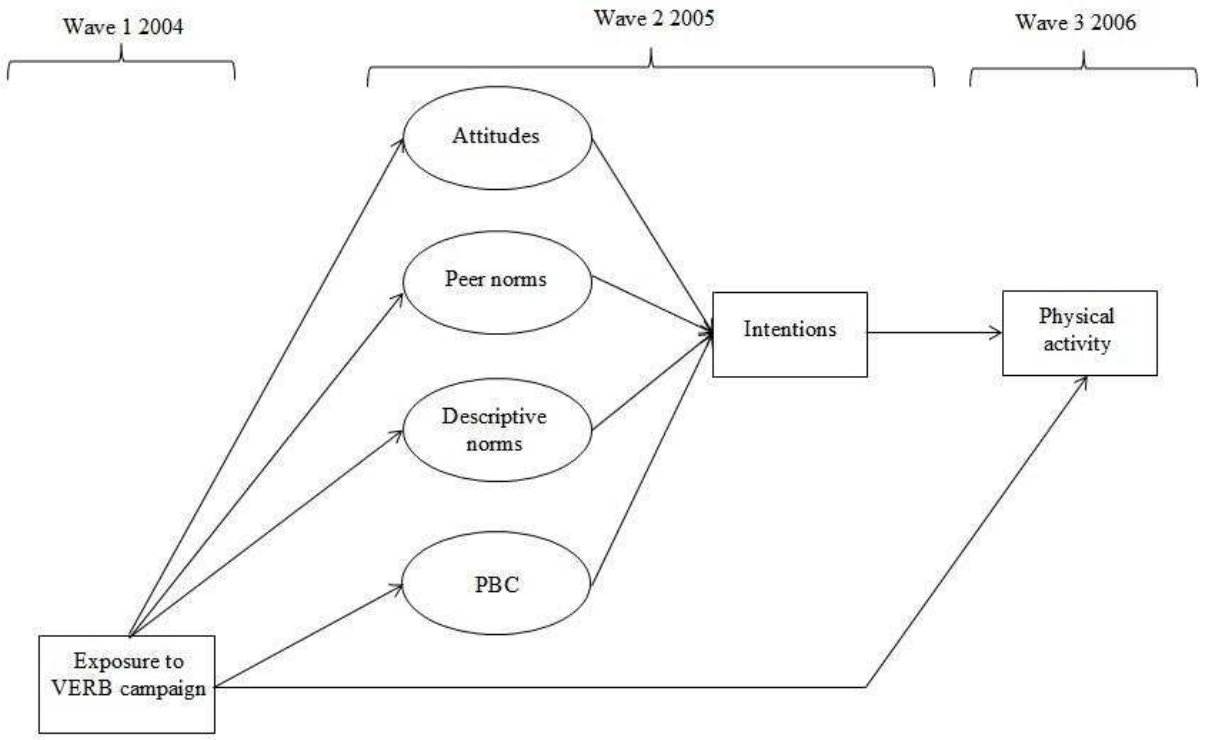
The second set of hypotheses refers to the overall mediation model proposed based on the integration of campaign exposure and the TPB constructs of attitudes, norms, PBC, intentions, and behaviors. Figure 3.1 summarizes the proposed mediated model.

H2: VERB campaign exposure in 2004 will predict (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity in 2005.

H3: (i) Attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity in 2005 will be positively associated with intentions to be physically active.

H4: Intentions in 2005 will predict the practice of physical activity in 2006.

H5: VERB campaign exposure in 2004 will directly predict the practice of physical activity in 2006.



Note. PBC = Perceived behavioral control.

Figure 3.1. Proposed theoretical model for VERB campaign effects.

H6: VERB campaign exposure in 2004 will predict the practice of physical activity in 2006 through 2005 (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, (iv) PBC, and (v) intentions.

H7: VERB campaign exposure in 2004 will predict intentions to be physically active in 2005 through (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC.

H8: (i) Attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC in 2005 will predict the practice of physical activity in 2006 through intentions.

The third set of hypotheses addresses the moderating effects that household income, parental educational attainment, and race/ethnicity have in the hypothesized model, for both, direct and indirect paths.

Moderating Effects: Household Income

H2a: Household income will moderate the effect of VERB campaign exposure in 2004 on (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity in 2005.

RQ4a: Does household income moderate the effect of (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity on intentions to be physically active?

RQ5a: Does household income moderate the effect of intentions to be physically active in 2005 on the practice of physical activity in 2006?

RQ6a: Does household income moderate the direct effect of VERB campaign exposure in 2004 on the practice of physical activity in 2006?

RQ7a: Does household income moderate the indirect effects of the model?

Moderating Effects: Parental Educational Attainment

H2b: Parental educational attainment will moderate the effect of VERB campaign exposure in 2004 on (i) attitudes (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity in 2005.

RQ4b: Does parental educational attainment moderate the effect of (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity on intentions to be physically active?

RQ5b: Does parental educational attainment moderate the effect of intentions to be physically active in 2005 on the practice of physical activity in 2006?

RQ6b: Does parental educational attainment moderate the direct effect of VERB campaign exposure in 2004 on the practice of physical activity in 2006?

RQ7b: Does parental educational attainment moderate the indirect effects of the model?

Moderating Effects: Race/ethnicity

RQ8: Does race/ethnicity moderate the effect of VERB campaign exposure in 2004 on (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity in 2005?

RQ4c: Does race/ethnicity moderate the effect of (i) attitudes, (ii) perceived peer norms, (iii) descriptive norms, and (iv) PBC regarding physical activity on intentions to be physically active?

RQ5c: Does race/ethnicity moderate the effect of intentions to be physically active in 2005 on the practice of physical activity in 2006?

RQ6c: Does race/ethnicity moderate the direct effect VERB campaign exposure in 2004 on the practice of physical activity in 2006?

RQ7c: Does race/ethnicity moderate the indirect effects of the model?

Methods

Survey Data

This study uses the data from the Youth Media Campaign Longitudinal Survey (YMCLS), which was conducted with the purpose of assessing the effect of the VERB media campaign in a nationally representative sample of Tweens and their parents. The YMCLS is comprised of three data panels. This study analyzes the second panel, which was collected at

three time points between 2004 and 2006. After the initial screening of the household in order to identify whether children between the ages of 9 and 13 years lived there, 5,177 cases were included in the panel. In total, 2,773 parent-child dyads completed the survey in every wave.

The YMCLS was conducted over the phone. Households were contacted using a list-assisted random-digit dialing technique. Surveys were conducted in Spanish and English, depending on the respondent's preference, between April and June of each year. Individual case missing data was rare in the YMCLS as median item response rate was about 99% (Potter, Judkins, Piesse, Nolin, & Huhman, 2008). However, individual case missing data were imputed in the original dataset using a series of hot deck procedures. Whole case imputation procedures are described elsewhere (Potter et al., 2008). The analyzed data set had no missing data.

Measures: Physical Activity

Number of physical activity sessions the previous week (free time and organized). Tweens were asked what physical activities they did during the past 7 days, not counting their physical education classes at school or recess. For each activity they were asked whether it was a free time (i.e., unsupervised) or an organized time activity (i.e., under supervision of a coach, for example). For the first five activities they mentioned, children were asked on how many of the last seven days they practiced each activity. Number of free time and number of organized time sessions correspond to the number of times the child said he or she performed up to five free or organized physical activities the week before the survey. This measure provides an indication of the amount of time the child spent practicing physical activities the week before the survey.

Measures: Theory of Planned Behavior

Intentions. Children were asked whether they believed they would be physically active during their free time on most days. Possible answers were: 1= "I am sure I will not be

physically active", 2= "I probably will not be physically active", 3= "I may or may not be physically active", 4= "I probably will be physically active", and 5="I am sure I will be physically active".

Attitudes. Tweens were asked about their outcome expectations regarding physical activity using six items with answers in a 4-point Likert-type scale (i.e., 1= "really disagree", 2= "sort of disagree", 3= "sort of agree", 4= "really agree"). Items included in the measure were "If I did physical activities on most days it would be boring" (reverse coded), "If I did physical activities on most days it would be fun", "If I did physical activities on most days it would help me make new friends", "If I did physical activities on most days it would help me spend more time with my friends", "If I did physical activities on most days it would make me feel good about myself", and "Physical activities on most days would keep me from things I like more" (reverse coded). Previous studies using the YMCLS data have labeled the first two items as attitudes and the rest as outcome expectations (Bauman et al., 2008), while others have labeled the six items as outcome expectations (Heitzler, Asbury, & Kusner, 2008). In this study I call them attitudes, because they all address relevant beliefs children may have regarding the practice of physical activity. Furthermore, after conducting a confirmatory factor analysis (CFA) to assess measurement consistency I dropped the sixth item from the attitudes scale, as it did not significantly load onto the corresponding latent variable. After dropping that item, the fit statistics of the measurement model achieved acceptable levels as I describe below. Therefore, for the purpose of this study, the variable is labeled attitudes and it is comprised of five items.

Perceived peer norms. Tweens were asked about their perceived peer norms regarding the practice of physical activity. Four items were used with answers in a 4-point Likert type agreement scale (1= "really disagree", 2= "sort of disagree", 3= "sort of agree", 4= "really

agree"). These items were "My friends think that doing physical activities is fun", "Kids my age think that doing physical activities is fun", "My friends think that doing physical activity is important", and "Kids my age think that doing physical activity is important".

Descriptive norms. Two items measured Tweens' perceived number of people doing physical activity in their environment. These items were "How many kids your age do physical activities every day?" and "How many of your friends do physical activities every day?" Answers to these items were 1= "none", 2= "some", 3= "most", 4= "all".

PBC. Tweens were asked four questions to assess their PBC regarding the practice of physical activity, all with answers in a 4-point Likert type agreement scale (i.e., 1= "really disagree", 2= "sort of disagree", 3= "sort of agree", 4= "really agree"). Items included in this measure were "I think I can be physically active no matter how busy my day is", "I think I can be physically active no matter how tired I might feel", "I think I can be physically active even if it is hot or cold outside", and "I think I have what it takes to be physically active".

A CFA was conducted in order to evaluate whether the measurement model comprised of attitudes, perceived peer norms, descriptive norms, and PBC fitted the data well. Based on Hu and Bentler's (1999) criteria, the measurement model had good fit, except for the chi square test, which is expected to be nonsignificant, but it is highly sensitive to large sample sizes, such as the one from the YMCLS, χ^2(df= 66) = 216.69, $p < .001$; CFI = .98; root mean square error of approximation (RMSEA) = .03 (90% CI = .020 -.03); SRMR = .02. Standardized factor loadings for the measurement model are presented in Table 3.1.

Table 3.1

Standardized Factor Loadings for Overall Measurement Model 2005

Item	2005 loading*	SE
ATTITUDES (α = .70)		
1. If I did physical activities on most days it would be boring	.53	.03
2. If I did physical activities on most days it would be fun	.68	.02
3. If I did physical activities on most days it would help me make new friends	.44	.03
4. If I did physical activities on most days it would help me spend more time with my friends	.56	.02
5. If I did physical activities on most days it would make me feel good about myself	.54	.02
PERCEIVED PEER NORMS (α = .70)		
1. My friends think that doing physical activities is fun	.72	.03
2. Kids my age think that doing physical activities is fun	.63	.02
3. My friends think that doing physical activity is important	.68	.03
4. Kids my age think that doing physical activity is important	.60	.02
DESCRIPTIVE NORMS (α = .50)		
1. How many kids your age do physical activities every day	.57	.02
2. How many of your friends do physical activities every day	.61	.02
PERCEIVED BEHAVIORAL CONTROL (α = .65)		
1. I think I can be physically active no matter how busy my day is	.54	.02
2. I think I can be physically active no matter how tired I might feel	.56	.02
3. I think I can be physically active even if it is hot or cold outside	.60	.02
4. I think I have what it takes to be physically active	.52	.02

Note. *All factor loadings are significant at $p < .0001$

Measures: Exposure to the VERB Campaign

Frequency of exposure to VERB campaign. Children were asked several questions to assess their exposure to the VERB campaign message. First, they were asked whether they had seen a message about kids getting active, if they answered “no”, they were categorized as no exposure, if they said “yes”, they were asked what was VERB all about. If they did not know

what VERB was about, they were categorized as no exposure. If they understood VERB they were categorized as having been exposed to the campaign[1], and frequency of exposure was asked. Frequency of exposure was categorized as 1= "exposed less than once a week", 2= "exposed once a week", 3= "exposed several times a week", and 4= "exposed every day". Tweens who said they did not see a message about kids getting active or those who had aided or unaided recall, but did not understand what VERB was about were coded as 0 = "no exposure or no understanding".

Measures: Social Position Indicators

Race/ethnicity. During the parental survey parents were first asked whether their children were of Hispanic or Latino origin. Afterwards, they were asked to describe their child's race with options that included White, Black or African-American, Asian, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native. For the purpose of this study race/ethnicity was recoded as 1= "non-Hispanic White" (*n*= 1,523) or 0= "All other races or ethnicities" (*n*= 1,250).

Parental educational attainment. Surveyed parents were asked for the highest grade or level of school they completed. Eleven options were given, from no education to graduate or professional degree. For the purpose of this study parental educational attainment was categorized based on the distribution of the sample into two levels: Less than a higher education degree (*n*= 1,494), and having an associate, college or professional degree (*n*= 1,279).

Household income. In 2004 parents were asked about the total income of all persons in their household over the past year, including salaries or other earnings, interest, retirement, and so on for all household members. Parents' responses were grouped into 14 categories from

[1] Children were classified as aided or unaided exposure based on whether they mentioned the VERB campaign right away or whether they needed to be prompted. For the purpose of this study, no distinction between aided or unaided exposure is made.

"$5,000 or less" to "over $100,000". The distribution of this variable was skewed towards the higher values. Two groups were created based on median split: annual income of 60,000 or less (*n*= 1,451); and annual income of 60,001 or more (*n*=1,322).

Control variables. Control variables included in the analysis were child's age, gender and minutes spent in front of a screen. For this latter measure, children were asked how much time they spent in front of a TV, computer or videogame the previous day. Wave 2 physical activity was also a control variable in the model.

Analytic Procedures

The first set of hypotheses and research questions refers to the differences between the social position indicator (household income, parental educational attainment, and race/ethnicity) groups or levels in the study variables. In order to address those hypotheses and research questions *t*-test were conducted. For attitudes, perceived peer norms, descriptive norms, and PBC sample means were computed in order to perform the comparisons.

To examine the mediation and the moderated mediation models, structural equation modeling (SEM) was conducted in *MPlus 7.2*. For the mediation model traditional SEM was performed. For the moderated mediation model, multigroup analysis was done once measure invariance was established. The procedure followed for multigroup analysis was the one outlined by Wang and Wang (2012). For all models examined, an RMSEA of .06 or less was considered good and .08 or less was considered acceptable; a CFI of .95 or more was deemed good and one of .90 or more was considered acceptable, and an SRMR of .08 or more was considered acceptable. The chi square test for overall model fit was not observed in this study given its sensitivity to large samples. Table 3.2 presents the correlation matrix for all variables in the model.

Preliminary Analysis: Assessing Measurement Invariance

Evaluating measurement invariance of the latent factors attitudes, perceived peer and descriptive norms, and PBC was a crucial step before testing whether differences existed between the examined groups in the path model. All other variables were treated as observed variables and thus were excluded from the measurement invariance analysis. The purpose of assessing measurement invariance was to allow the measurement model to be fixed across the groups when fitting the multigroup models to assure that any differences that were observed in the path model were due to differences in the regression coefficients and not to the measurement model. I followed the procedure outlined by Wang and Wang (2012) to test for measurement invariance for all the examined moderators (household income, parental educational attainment, and race/ethnicity). Fit statistics for the invariance test of the 2005 measurement model are presented in Table 3.3.

The first step to test for measurement invariance was to evaluate configural invariance by fitting a model with the same number of factors and the same pattern of loadings for both groups of each moderator simultaneously. In this model, all parameters (factor loadings and intercepts) were freely estimated. All configural models fitted the data well, which demonstrated that the items were indicators of the same latent variables across all groups.

Table 3.2

Bivariate Correlations and Descriptive Statistics All Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Gender	52.3% male																
2. Age	.02	10.97 (1.42)															
3. Screen time	-.04	.17**	98.67 (103.37)														
4. Exposure	.04*	.13**	.06**	1.99 (1.50)													
5. Attitudes 1	.00	-.09**	-.07**	.09**	3.56 (.74)												
6. Attitudes 2	-.01	-.07**	-.08**	.05**	.47**	3.66 (.63)											
7. Attitudes 3	.06**	.04	-.04	.07**	.15**	.23**	3.31 (.85)										
8. Attitudes 4	-.01	.03	-.01	.08**	.20**	.28**	.41**	3.48 (.78)									
9. Attitudes 5	.06**	-.04*	-.05**	.05**	.24**	.37**	.30**	.31**	3.66 (.61)								
1. Peer norms 1	-.09**	-.08**	-.06**	.03	.25**	.30**	.17**	.29**	.211**	3.63 (.65)							
11. Peer norms 2	-.08**	-.10**	-.07**	-.01	.18**	.27**	.16**	.23**	.170**	.43**	3.56 (.64)						
12. Peer norms 3	.02	-.04*	-.07**	.01	.20**	.26**	.22**	.25**	.26**	.32**	.27**	3.31 (.77)					
13. Peer norms 4	-.04	-.07**	-.08**	-.01	.15**	.24**	.16**	.20**	.22**	.33**	.38**	.50**	3.32 (.75)				
14. Descriptive norms 1	-.04*	-.05*	-.03	.04*	.13**	.17**	.11**	.17**	.10**	.23**	.21**	.20**	.20**	2.84 (.58)			
15. Descriptive norms 2	-.14**	-.06**	-.05**	.05*	.21**	.22**	.09**	.21**	.14**	.27**	.19**	.20**	.18**	.35**	2.97 (.76)		
16. PBC 1	.03	-.06**	-.06**	.02	.21**	.25**	.23**	.20**	.26**	.16**	.19**	.18**	.17**	.15**	.18**	3.38 (.76)	
17. PBC 2	-.01	-.06**	-.07**	.01	.19**	.25**	.15**	.18**	.23**	.18**	.17**	.20**	.22**	.15**	.19**	.40**	2.95 (.88)

Table 3.2 (cont.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18. PBC 3	-.04*	.01	-.07**	.11**	.24**	.31**	.17**	.21**	.20**	.20**	.19**	.20**	.17**	.16**	.17**	.30**	.36**
19. PBC 4	-.04*	.00	-.05**	.10**	.23**	.30**	.19**	.19**	.24**	.20**	.20**	.18**	.15**	.14**	.15**	.26**	.20**
20. Intentions	-.07**	-.11**	-.10**	.00	.24**	.27**	.13**	.21**	.21**	.21**	.17**	.17**	.19**	.18**	.28**	.30**	.31**
21. Free time PA W2	-.09**	-.05**	-.03	.06**	.08**	.10**	-.04*	.07**	.07**	.09**	.06**	.07**	.07**	.07**	.16**	.09**	.08**
22. Org. time PA W2	.01	.10**	-.05*	.11**	.13**	.11**	.14**	.10**	.08**	.10**	.06**	.09**	.04*	.06**	.14**	.09**	.08**
23. Free time PA W3	-.11**	-.09**	-.03	.03	.05**	.08**	-.02	.03	.05*	.07**	.00	.05*	.03	.07**	.12**	.04*	.07**
24. Org. time PA W3	.00	.04	-.06**	.06**	.12**	.11**	.12**	.10**	.05**	.08**	.06**	.08**	.06**	.09**	.14**	.09**	.08**

	18	19	20	21	22	23	24
18. PBC 3	3.50 (.77)						
19. PBC 4	.30**	3.79 (.51)					
20. Intentions	.20**	.22**	4.16 (.86)				
21. Free time PA W2	.11**	.11**	.22**	5.53 (4.96)			
22. Org. time PA W2	.11**	.14**	.18**	-.17**	1.61 (2.48)		
23. Free time PA W3	.07**	.03	.17**	.37**	-.08**	5.21 (4.57)	
24. Org. time PA W3	.11**	.12**	.12**	-.06**	.39**	-.208**	1.70 (2.55)

Note. * Correlation is significant at the .05 level (2-tailed), ** correlation is significant at the .01 level (2-tailed). PBC = Perceived behavioral control, PA = Physical activity

The second step was to fit a weak invariance model in which all loadings were set to be equal across the groups, while other parameters such intercepts were freely estimated. Weak invariance indicates that measures across groups are on the same scale and it is also called metric invariance. Change in CFI (*ΔCFI*) was used to evaluate invariance, with a change less or equal to .01 between nested models[2] considered to be a criterion for measurement invariance (Cheung & Rensvold, 2002).

Finally, the strong invariance models, in which all factor loadings and intercepts were set to be equal across the groups, were tested. Strong invariance is also called scalar invariance, and it indicates that the intercepts or scalars of a measure are equal across groups. Using *ΔCFI* to compare the configural model with the scalar invariance, I was able to conclude that for all examined models, strong invariance held. Given these findings, the factor loadings and the intercepts were constrained to be equal when examining the mediation models across both levels of the respective moderator.

Multigroup Analysis

Once strong measurement invariance was established, multigroup analyses using *MPlus 7.2* were conducted to test whether differences existed between the groups under study. The path models were estimated using MLMV[3], which is a robust estimator for non-normally distributed data. This estimator was chosen after observing that the dependent variables examined in this study were not normally distributed. With the MLMV estimator the chi square difference test cannot be used to compare fit of nested models directly; thus, comparisons for the direct effects were conducted using the *DIFFTEST* command, while the indirect effects were tested using the *MODEL TEST* command in *Mplus 7.2*. The mediation effects were estimated using *MPlus*'

[2] Configural, weak, and strong invariance are nested models.
[3] MLMV is a maximum likelihood estimation with robust standard errors useful with complete data only.

MODEL INDIRECT command, which uses the Delta method to compute the mediated effects estimates (MacKinnon, 2008). Two dependent variables were examined in this study: Number of free time physical activity sessions the previous week and number of organized time physical activity sessions the previous week.

Table 3.3

Fit Statistics for 2005 Measurement Model and Invariance Test

Model	χ2	df	*p*	AIC	RMSEA	RMSEA 90% CI	CFI	TLI	SRMR
Household income									
Configural invariance*	54.15	162	.00	80868.04	.04	.04, .05	.95	.94	.03
Weak invariance*	606.87	173	.00	80912.75	.04	.04, .05	.95	.93	.04
Strong invariance*	723.62	188	.00	80999.50	.05	.04, .05	.94	.93	.05
Parental educational attainment									
Configural invariance*	54.72	162	.00	81042.09	.04	.04, .05	.95	.94	.03
Weak invariance*	576.15	173	.00	81055.53	.04	.04, .05	.95	.94	.04
Strong invariance*	654.76	188	.00	81104.13	.04	.04, .05	.94	.94	.04
White versus all other races									
Configural invariance*	567.89	162	.00	80912.76	.04	.04, .05	.95	.94	.03
Weak invariance*	596.36	173	.00	80919.23	.04	.04, .05	.95	.94	.04
Strong invariance*	65.30	188	.00	80943.17	.04	.04, .05	.94	.94	.04

Note. * Configural, weak, and strong invariance are nested models.

The multigroup analysis was conducted following Wang and Wang's (2012) guidelines. First, in order to have a baseline for comparison, a configural model was fitted for each

dependent variable and each moderator. The models for both groups or levels of the moderator were fitted at the same time and global fit statistics were obtained. All paths, however, were unconstrained. The estimates of the configural model were observed to find paths that were likely to vary across the groups or levels of the moderator (e.g., a path that is positive and significant in one group, while not significant in the others). Once those paths were identified, they were tested one by one to assess whether they actually varied across groups. Several models in which the potentially different path was restricted to be equal across groups were fitted and compared to the corresponding configural model using the *DIFFTEST* option. Unlike measurement invariance, when conducting multigroup analysis a significant difference between the constrained and the configural model given by a significant chi square test indicates that the model with the path freely estimated provides a better fit than the model in which the path is set to be equal across the groups, and therefore, that the regression coefficient for such path is different from one group compared to the other.

Mean Differences Results

The first set of hypotheses and research questions addressed the differences in the variables under study between non-Hispanic White and non-White children, those from households with high or low income and those with parents with more or fewer years of formal education. *T*-tests were conducted to examine these mean differences. Group means, standard deviations, and the statistical tests for each variable are presented in Tables 3.4 to 3.6.

Mean Differences: Household Income

Table 3.4 presents the descriptive statistics for each of the household income groups. Supporting H1a, *t*-test revealed significant differences between household income groups for exposure to the VERB campaign messages in 2004, when the sampled children entered the

targeted age range for the campaign, with children from high income households reporting greater levels of exposure compared to their low income counterparts.

Table 3.4

Descriptive Statistics and t*-test for Household Income*

	Low *n* = 1451 *M* (SD)	High *n* = 1322 *M* (SD)	*t*
Age	1.96 (1.41)	1.99 (1.43)	$t(2771) = -.46, p > .05, r = .01$
Minutes screen	107.70 (114.69)	88.76 (88.30)	$t(2771) = 4.84, p < .01, r = .09$
Exposure	1.79 (1.54)	2.20 (1.42)	$t(2771) = -7.36, p < .01, r = .14$
Attitudes	3.50 (.51)	3.57 (.44)	$t(2771) = -4.28, p < .01, r = .08$
Peer norms	3.44 (.54)	3.47 (.48)	$t(2771) = -1.87, p > .05, r = .04$
Descriptive norms	2.89 (.57)	2.92 (.53)	$t(2771) = -1.22\ p > .05, r = .02$
PBC	3.38 (.55)	3.43 (.47)	$t(2771) = -2.42, p < .05, r = .05$
Intentions	4.21 (.86)	4.10 (.85)	$t(2771) = 3.40, p < .01, r = .06$
Free time PA sessions w2	5.80 (5.00)	5.23 (4.90)	$t(2771) = 3.04, p < .01, r = .06$
Org. time PA sessions W2	1.16 (2.28)	2.11 (2.61)	$t(2771) = -1.22, p < .01, r = .19$
Free time PA sessions w3	5.55 (4.74)	4.84 (4.34)	$t(2771) = 4.10, p < .01, r = .08$
Org. time PA sessions W3	1.24 (2.30)	2.20 (2.71)	$t(2771) = -1.16, p < .01, r = .19$

Regarding RQ1a, significant differences were found between the low and the high income groups for attitudes toward physical activity, such that high income children had more positive attitudes toward exercise. No differences were found for peer or descriptive norms. With respect to PBC, children from high income households scored higher than low income children.

Answering RQ2a, intentions to be physically active were significantly higher among Tweens from the low income households compared to Tweens in the high income groups. With respect to RQ3a, Tweens from low income households were more likely to report greater levels of free time physical activity in 2006 compared to high income Tweens, while high income Tweens reported greater levels of organized time activities compared to low income Tweens.

Mean Differences: Parental Educational Attainment

Table 3.5 presents the descriptive statistics for each of the parental educational attainment groups. Consistent with H1b, in 2004 children of more educated parents were significantly more exposed to the VERB campaign messages compared to the children of the less educated parents.

Regarding RQ1b, significant differences were found in attitudes toward physical activity between the children of less educated and the children of more educated parents, with the latter having more positive attitudes regarding physical activity. Children of more educated parents had greater perceived peer norms regarding physical activity than the children of the less educated parents. No differences were found for descriptive norms or PBC.

In response to RQ2b, intentions to be physically active were significantly higher for children of parents with low educational attainment compared to the children of more educated parents. Despite the greater intentions to be physically active in 2005, the children of the less educated parents reported fewer organized time physical activity sessions compared to the children of more educated parents. With respect to free time physical activity sessions, the children of less educated parents reported a greater number compared to the children of more educated parents.

Table 3.5

Descriptive Statistics and t*-test for Parental Educational Attainment*

	Low *n* = 1,494 *M* (SD)	High *n* = 1,279 *M* (SD)	*t*
Age	1.96 (1.41)	1.99 (1.42)	$t(2771) = -.70$, $p > .05$, $r = .01$
Minutes screen	104.02 (107.41)	92.42 (98.11)	$t(2771) = 2.95$, $p < .01$, $r = .06$
Exposure	1.83 (1.54)	2.17 (1.43)	$t(2771) = -6.06$, $p < .01$, $r = .11$
Attitudes	3.52 (.49)	3.56 (.44)	$t(2771) = -2.38$, $p < .05$, $r = .05$
Peer norms	3.43 (.53)	3.49 (.47)	$t(2771) = -2.56$, $p < .05$, $r = .05$
Descriptive norms	2.90 (.57)	2.92 (.53)	$t(2771) = -.81$, $p > .05$, $r = .02$
PBC	3.40 (.53)	3.41 (.47)	$t(2771) = -.72$, $p > .05$, $r = .01$
Intentions	4.21 (.86)	4.10 (.86)	$t(2771) = 3.55$, $p < .01$, $r = .07$
Free time PA sessions w2	5.73 (5.05)	5.29 (4.84)	$t(2771) = 2.33$, $p < .05$, $r = .04$
Org. time PA sessions W2	1.24 (2.32)	2.04 (2.60)	$t(2771) = -8.53$, $p < .01$, $r = .16$
Free time PA sessions w3	5.49 (4.74)	4.89 (4.33)	$t(2771) = 3.49$, $p < .01$, $r = .07$
Org. time PA sessions W3	1.36 (2.46)	2.09 (2.59)	$t(2771) = -7.64$, $p < .01$, $r = .14$

Mean Differences: Race/ethnicity

Table 3.6 presents the descriptive statistics and *t*-test for non-Hispanic Whites and non-Whites. Consistent with the expectations of H1c, in 2004 White Tweens were significantly more exposed to the VERB campaign messages than non-White Tweens.

In response to RQ1c, White children had more positive attitudes toward physical activity than non-White children. With respect to the other variables considered in this research question, Whites had a higher perception of peer norms than non-Whites. Similarly, White children had higher descriptive norms than non-Whites. For PBC, White children scored higher than non-

White children. Regarding RQ2c, no significant differences between White and non-White Tweens in their intentions to practice physical activity in 2005 were found.

When examining free time physical activity sessions to answer RQ3c, no differences between White and non-White children were found. However, significant differences between racial groups were found in the number of organized time physical activity sessions, with Whites, on average, reporting a greater number of organized time physical activity sessions than non-White Tweens.

Table 3.6

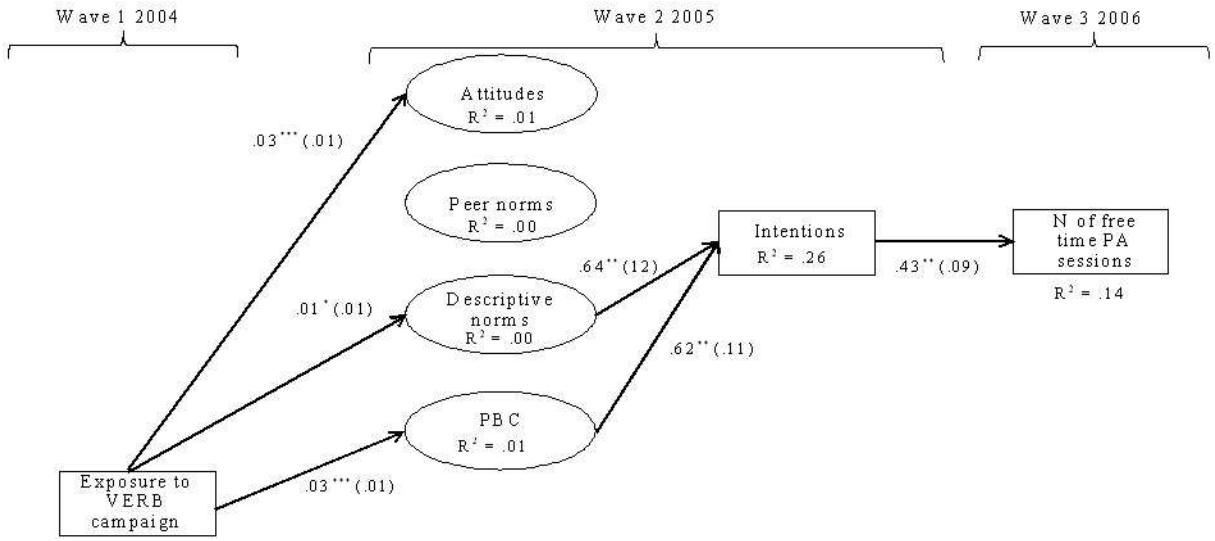
Descriptive Statistics and t*-test for Race/Ethnicity*

	White *n* = 1,523 *M* (SD)	Non-White *n* = 1,250 *M* (SD)	*t*
Age	1.99 (1.42)	1.95 (1.41)	$t(2771) = .86, p > .05, r = .02$
Minutes screen	88.52 (88.58)	111.04 (117.79)	$t(2771) = -5.74, p < .01, r = .11$
Exposure	2.07 (1.45)	1.88 (1.55)	$t(2771) = 3.43, p < .01, r = .07$
Attitudes	3.56 (.45)	3.49 (.50)	$t(2771) = 3.59, p < .01, r = .07$
Peer norms	3.48 (.48)	3.42 (.55)	$t(2771) = 3.29, p < .01, r = .06$
Descriptive norms	2.92 (.52)	2.88 (.59)	$t(2771) = 2.15, p < .05, r = .04$
PBC	3.44 (.47)	3.36 (.55)	$t(2771) = 4.00, p < .01, r = .08$
Intentions	4.13 (.85)	4.19 (.87)	$t(2771) = -1.76, p > .05, r = .03$
Free time PA sessions w2	5.55 (4.90)	5.51 (5.03)	$t(2771) = .24, p > .05, r = .00$
Org. time PA sessions W2	1.91 (2.51)	1.25 (2.40)	$t(2771) = 7.10, p < .01, r = .13$
Free time PA sessions w3	5.14 (4.58)	5.30 (4.55)	$t(2771) = - .90, p > .05, r = .02$
Org. time PA sessions W3	1.94 (2.54)	1.40 (2.53)	$t(2771) = 5.65, p < .01, r = .11$

Mediation Model Results

The second set of hypotheses referred to the mediation models for the whole sample. One mediation model for each of the dependent variables examined in this study was fitted for the whole sample. Both mediation models had good fit: Free time physical activity, χ^2(df = 167) = 802.84, $p < .001$; CFI = .91; RMSEA = .04 (90% CI = .03 - .04); SRMR = .04; Organized time physical activity, χ^2(df = 167) = 835.28, $p < .001$; CFI = .90; RMSEA = .04 (90% CI = .03 - .04); SRMR = .04. Figure 3.2 and 3.3 present the estimates for both models. In regards to H2, exposure to the VERB campaign in 2004 was a positive and significant predictor of attitudes (β = .11, $p < .001$), descriptive norms (β = .06 $p < .05$), and PBC (β = .08, $p < .001$) in 2005. No effect of exposure on perceived peer norms was found. For H3, descriptive norms (β = .23, $p < .01$) and PBC (β = .32, $p < .01$) were significant predictors of intentions, while attitudes and perceived peer norms were not. Consistent with H4, intentions was a significant predictor of number of organized time physical activity sessions (β = .05, $p < .01$) and number of free time physical activity sessions the previous week (β = .08, $p < .01$). The direct effect of exposure to the VERB campaign in 2004 on the practice of physical activity two years later was non-significant for both examined dependent variables.

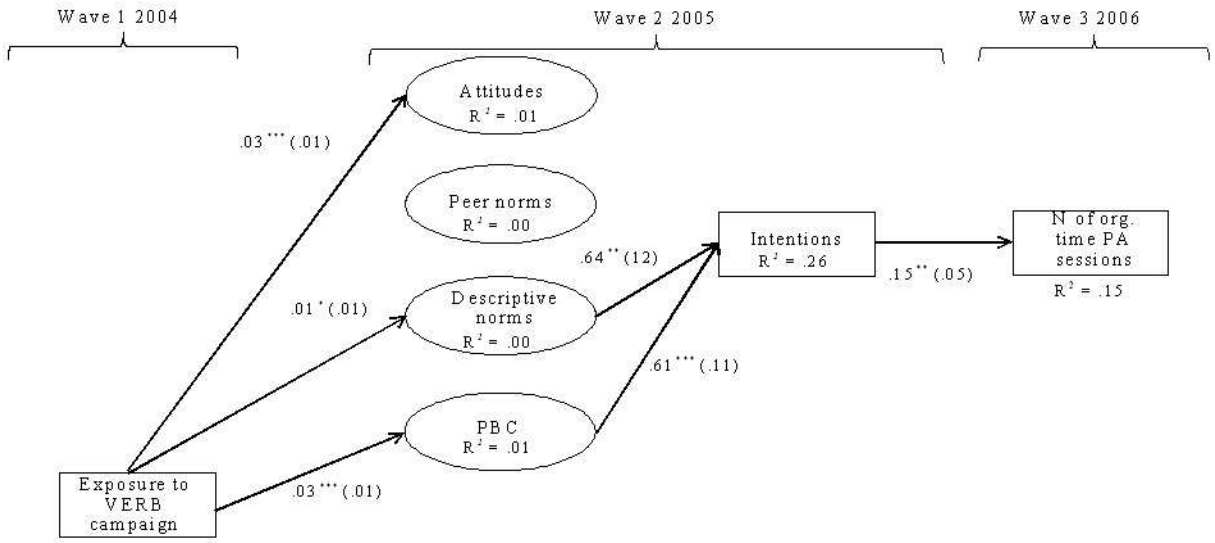
Results for the indirect effects of the overall models are presented in Table 3.7. H6 was supported for free and organized time physical activity when examining the indirect effect of exposure to the VERB campaign in 2004 on behavior in 2006 mediated by 2005 PBC and intention. No significant mediation of attitudes, perceived peer norms, and intentions was found.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. The indirect effects are detailed in Table 3.7. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.2. Mediation model for number of free time physical activity sessions the previous week: All sample.

H7 was also supported for PBC and descriptive norms, which positively mediated the effect of exposure to the VERB campaign in 2004 on intentions to be physically active in 2005. No mediation of attitudes or perceived peer norms was found. With regards to H8, it was supported for both behaviors when examining the effects of descriptive norms and PBC on the practice of physical activity mediated by intentions.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. The indirect effects are detailed in Table 3.7. For visual clarity, control variables (screen time, Wave 1 attitudes, peer and descriptive norms, and PBC, and Wave 2 PA) are omitted from the figure. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.3. Mediation model for number of organized time physical activity sessions the previous week: All sample.

Moderated Mediation Model Results

The third set of hypotheses and research questions posed in this study dealt with the moderating role of household income, parental educational attainment, and race/ethnicity in the path model designed to explain the link between exposure to the VERB campaign in 2004 and the practice of physical activity in 2006. In the following paragraphs results for moderations for the direct and indirect effects of the model are presented.

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Table 3.7

Indirect Effects for Mediation Models and Moderating Effects

	Effect	Estimate	Moderating effect	Difference test
H6	Exposure – Attitudes – Intentions – Free time PA	$B = .00$, $p > .05$	-	
	Exposure – Attitudes – Intentions – Org. time PA	$B = .00$, $p > .05$	-	
	Exposure – Desc. Norms – Intentions – Free time PA	$B = .00$, $p > .05$	-	
	Exposure – Desc. Norms – Intentions – Org. time PA	$B = .00$, $p < .05$	Significant for White only	χ^2_{diff} (1) = 3.81, $p = .51$
	Exposure – Peer Norms – Intentions – Free time PA	$B = .00$, $p > .05$	-	
	Exposure – Peer Norms – Intentions – Org. time PA	$B = .00$, $p > .05$	-	
	Exposure – PBC – Intentions – Free time PA	$B = .01$, $p < .05$	-	
	Exposure – PBC – Intentions– Org. time PA	$B = .002$, $p < .05$	Significant for White only	χ^2_{diff} (1) = 3.32, $p = .07$
H7	Exposure – Attitudes – Intentions	$B = .01$, $p > .05$	-	
	Exposure – Desc. Norms – Intentions	$B = .01$, $p < .05$	Significant for White only	χ^2_{diff} (1) = 2.80, $p = .09$
	Exposure – Peer Norms – Intentions	$B = -.00$, $p > .05$	-	
	Exposure – PBC – Intentions	$B = .02$, $p < .01$	Significant for White only	χ^2_{diff} (1) = 3.36, $p = .07$
H8	Attitudes – Intentions – Free time PA	$B = .10$, $p > .05$	-	
	Attitudes – Intentions – Org. time PA	$B = .04$, $p > .05$	-	
	Desc. Norms – Intentions – Free time PA	$B = .27$, $p < .001$	-	
	Desc. Norms – Intentions – Org. time PA	$B = .10$, $p < .01$	Significant for high income only	χ^2_{diff} (1) = 5.06, $p < .05$
			Significant for White only	χ^2_{diff} (1) = 4.86, $p < .05$
	Peer Norms – Intentions – Free time PA	$B = -.05$, $p > .05$	-	
	Peer Norms – Intentions – Org. time PA	$B = -.02$, $p > .05$	-	
	PBC – Intentions – Free time PA	$B = .26$, $p < .001$	-	
	PBC – Intentions – Org. time PA	$B = .10$, $p < .01$	Significant for high income only	χ^2_{diff} (1) =7.31, $p < .01$
			Significant for White only	χ^2_{diff} (1) = 6.89, < .01

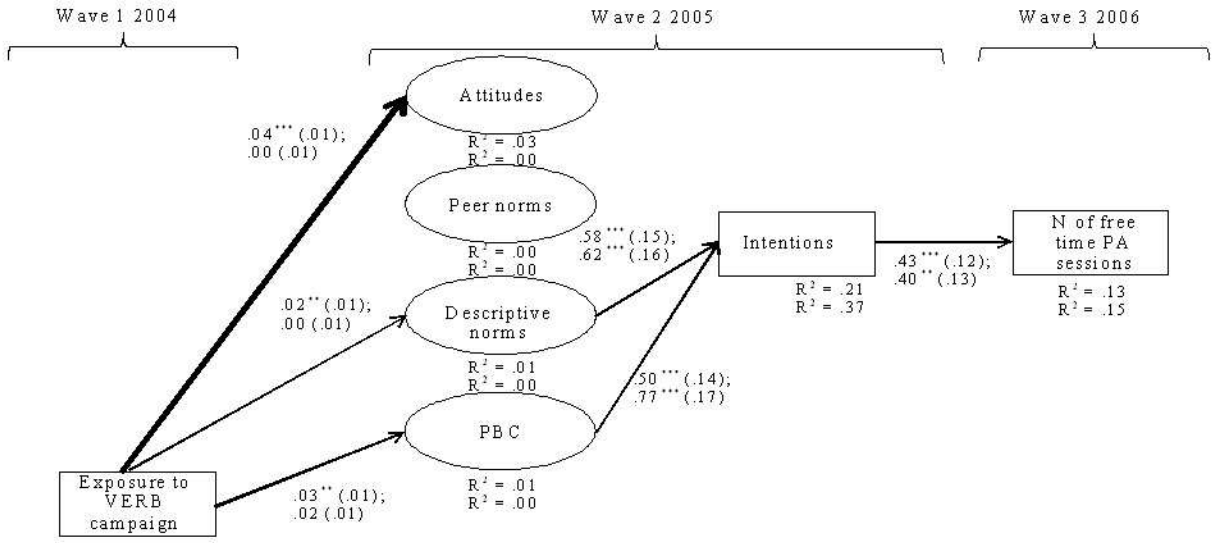
Note. PBC = Perceived behavioral control, PA = Physical activity

Moderated Mediation: Household Income

H2a and RQ4a-6a referred to the moderating role of household income in the direct effects of the model. H2a was partially supported as significant differences between the two examined income groups were found in the effect of exposure to the VERB campaign in 2004 on attitudes toward exercise in 2005, χ^2_{diff} (1) = 10.48, $p < .01$. The effect of campaign exposure was positive and significant ($\beta = .16$, $p < .001$) only for low income children, while nonsignificant for high income Tweens ($\beta = .02$, $p > .05$). No moderation of income was found for the effect of exposure on perceived peer norms, descriptive norms, and PBC regarding physical activity in 2005. In a similar fashion, household income did not moderate the effect of attitudes, perceived peer and descriptive norms, and PBC on intentions.

When examining the effect of intentions on the practice of organized time physical activity, a moderation of household income was observed, χ^2_{diff} (1) = 9.34, $p < .01$. In this case, the effect of intentions on behavior was positive and significant only among children from high income households ($\beta = .34$, $p < .001$) while nonsignificant for low income Tweens ($\beta = .02$, $p > .05$). No moderation of income was found in the path between intentions and number of free time physical activities, or for the direct effect of exposure on either of the examined behaviors. The results for the moderating effects of income are presented in Figures 3.4 and 3.5.

With respect to the moderation of the indirect effects of the model (RQ7a), household income significantly moderated the effect of descriptive norms on the practice of organized time physical activity mediated by intentions, such that the effect was positive and significant only among Tweens from high income households, $\beta = .02$, $p < .01$. Similarly, the effect of PBC on organized time physical activity mediated by intentions was positive and significant only among high income children $\beta = .04$, $p < .01$. The difference tests results can be observed in Table 3.7.

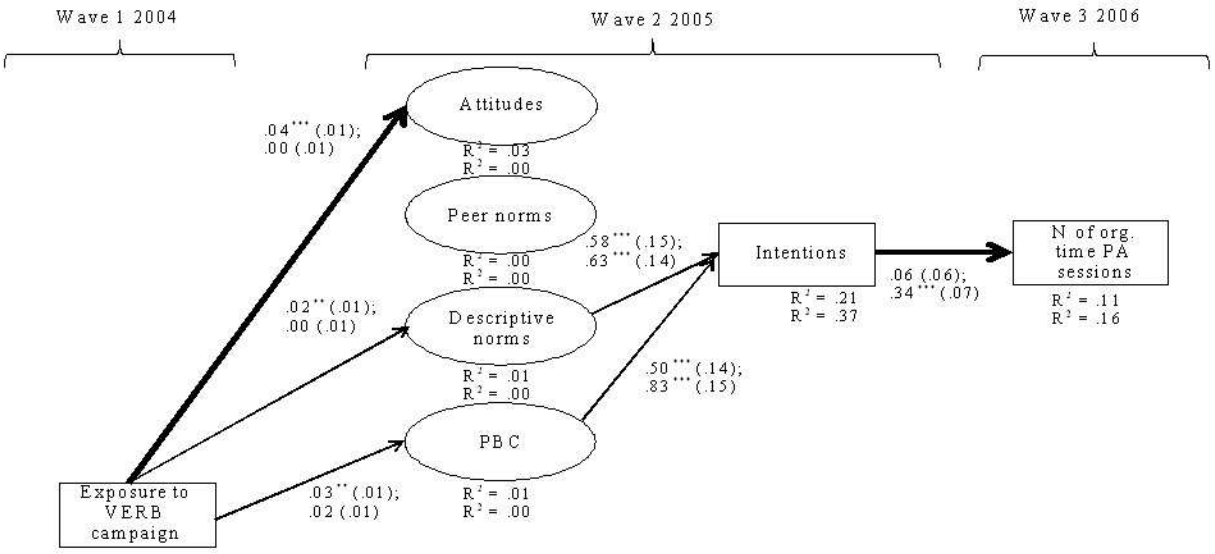


Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. Estimates for children from households with incomes of 60,000 or less are presented first (low; n = 1,451), followed by estimates for children of households with incomes of 60,001 or more (high; n = 1,322). Bold lines indicate paths that are significantly different across groups. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure and only paths that are significant for at least one group are shown. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.4. Moderated mediation model for number of free time physical activity sessions the previous week: Household income.

Moderated Mediation: Parental Educational Attainment

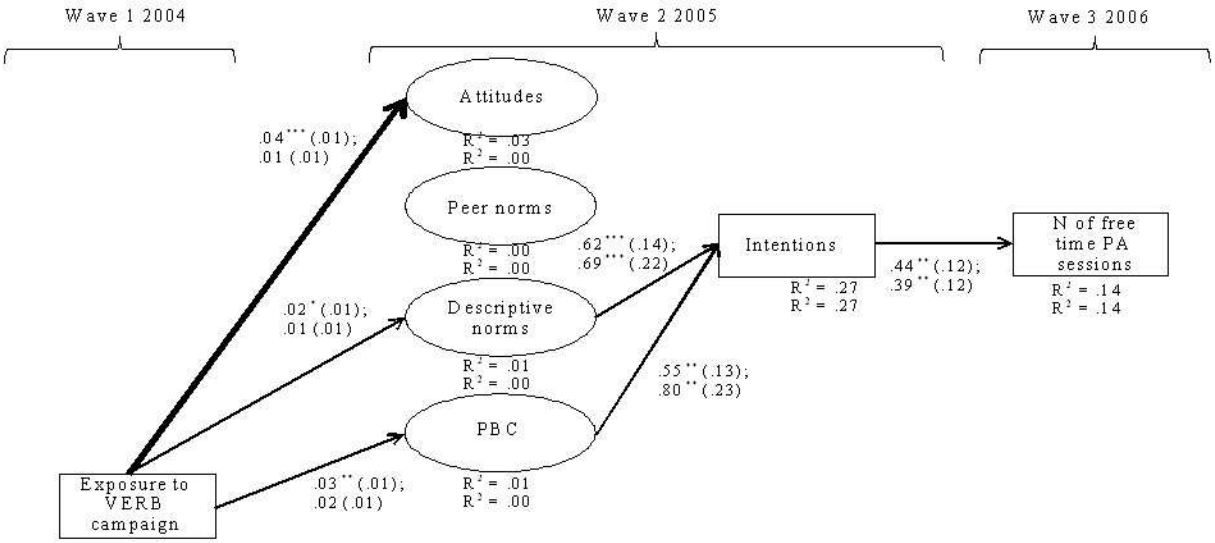
Figures 3.6 and 3.7 show the moderated mediation models for parental educational attainment. H2b was partially supported as significant differences were found among children of more and less educated parents in the effect of VERB campaign exposure in 2004 on attitudes toward physical activity in 2005, χ^2_{diff} (1) = 9.41, $p < .01$. In this case, the effect of exposure on attitudes was only significant for the children of parents with low levels of education ($\beta = .16$, $p < .001$), while nonsignificant for children of more educated parents ($\beta = .01$, $p > .05$). The effects of exposure on perceived peer and descriptive norms, and PBC regarding physical activity in 2005 were not moderated by parental education.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. Estimates for children from households with incomes of 60,000 or less are presented first (low; n = 1,451), followed by estimates for children of households with incomes of 60,001 or more (high; n = 1,322). Bold lines indicate paths that are significantly different across groups. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure and only paths that are significant for at least one group are shown. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.5. Moderated mediation model for number of organized time physical activity sessions the previous week: Household income.

In response to RQ4b, the effects of attitudes, perceived peer norms, descriptive norms, and PBC on intentions to be physically active were invariant across parental education groups. Regarding RQ5b, no moderation of parental educational attainment was found on the path that links intentions in 2005 to the practice of physical activity in 2006 for either of the studied behaviors. Similarly, regarding RQ6, parental education did not moderate the direct effect of exposure to the VERB campaign on the practice of physical activity in 2006. All the indirect effects of the model were found to be invariant across parental educational attainment groups.

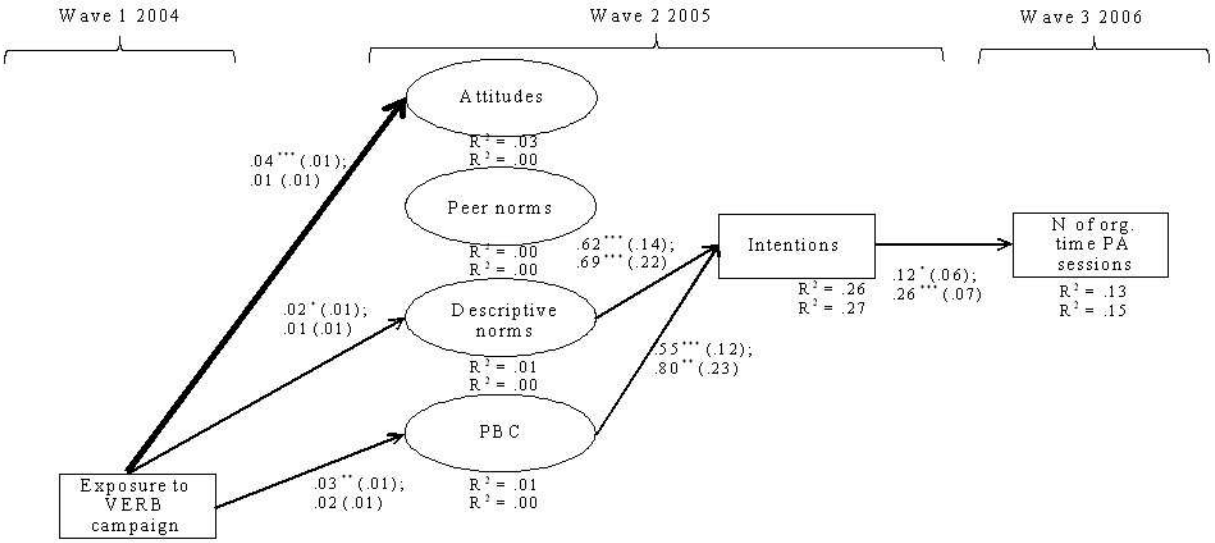


Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. Estimates for children of parents with less than a higher education degree (low; n = 1,494) are shown first, followed by estimates for children of parents with an associated, college, or professional degree (high; n = 1,279). Bold lines indicate paths that are significantly different across groups. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure and only paths that are significant for at least one group are shown. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.6. Moderated mediation model for number of free time physical activity sessions the previous week: Parental educational attainment.

Moderated Mediation: Race/ethnicity

Results for the moderated mediation models for race/ethnicity are presented in Figures 3.8 and 3.9. RQ8 asked about the moderating effect of race/ethnicity on the paths that linked exposure to the VERB campaign in 2004 and attitudes, perceived peer norms, descriptive norms, and PBC regarding physical activity in 2005. The moderation of the path from exposure to descriptive norms approached significance χ^2_{diff} (1) = 2.90, $p < .10$. Only among White children exposure to the campaign in 2004 was associated with more descriptive norms regarding physical activity in 2005 ($\beta = .09$, $p < .01$), whereas for non-White children this effect was nonsignificant ($\beta = .02$, $p > .05$). The other paths comprised in this research question were invariant across White and non-White children.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. Estimates for children of parents with less than a higher education degree (low; n = 1,494) are shown first, followed by estimates for children of parents with an associated, college, or professional degree (high; n = 1,279). Bold lines indicate paths that are significantly different across groups. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure and only paths that are significant for at least one group are shown. PA = Physical activity, PBC = Perceived behavioral control.

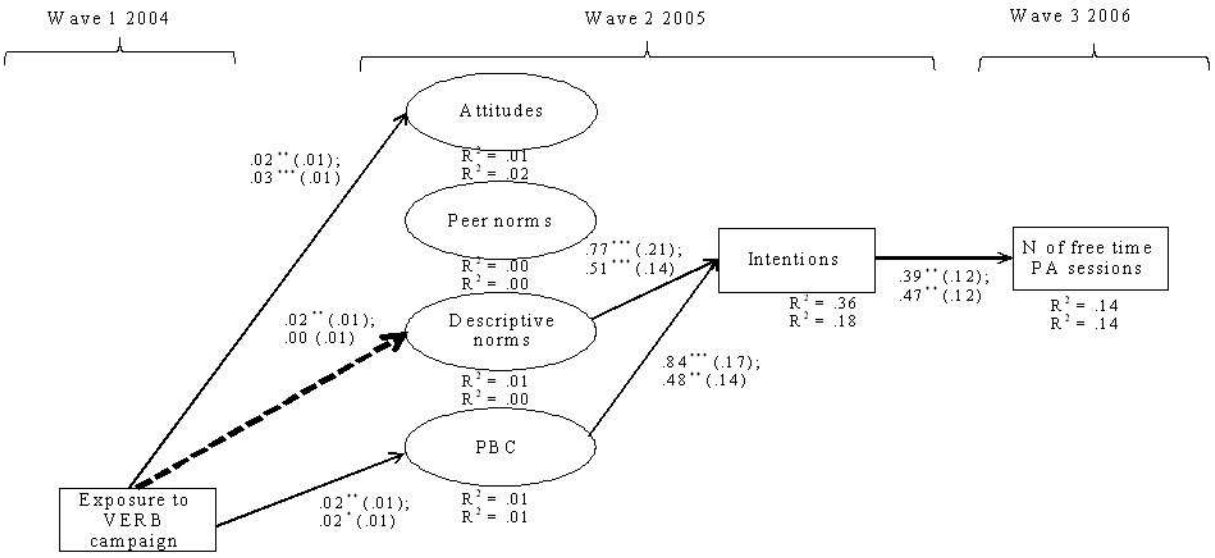
Figure 3.7. Moderated mediation model for number of organized time physical activity sessions the previous week: Parental educational attainment.

RQ4c concerned the moderation of race/ethnicity on the effects of attitudes, perceived peer and descriptive norms, and PBC regarding physical activity on intentions to be physically active. These four paths were invariant from Whites to non-Whites as well.

The subject of RQ5c was the moderation of race/ethnicity on the effect of intentions in 2005 on the practice of physical activity in 2006. Significant differences between White and non-White children were found in the degree to which intentions to be physically active in 2005 predicted the number of organized time physical activity sessions in 2006, χ^2_{diff} (1) = 5.06, $p <$ .05. Among White children this effect was positive and significant (β = .09, $p < .01$), while for non-White children the effect was not significant (β = .02, $p > .05$). No differences between the groups were found for the other dependent variable examined, as the effect of intention on the

number of free time physical activity sessions the week before was significant across both groups. In response to RQ6c, the direct effect of exposure to the VERB campaign in 2004 on the practice of physical activity in 2006 was not moderated by race/ethnicity.

In regards to RQ7c, which asked whether race/ethnicity moderated the indirect effects of the model, it was found that the indirect effect from exposure to the VERB campaign to number of organized time physical activity session, mediated by descriptive norms and intentions was moderated by race/ethnicity ($p < .10$). In this case, the effect was only significant among White Tweens, $\beta = .002$, $p < .05$. The same effect, but mediated by PBC and intentions was also moderated by race/ethnicity ($p < .10$), such that the effect was positive and significant among White Tweens only, $\beta = .003$, $p < .05$. In the same fashion, the moderating effect of race/ethnicity on the indirect paths that linked exposure to intentions via descriptive norms and PBC approached significance. In both cases, the indirect effects were positive and significant only among White children (descriptive norms $\beta = .03$ $p < .05$; PBC $\beta = .04$, $p < .05$). Finally, the effects of descriptive norms and PBC on organized time physical activity mediated by intentions were significantly moderated by race/ethnicity. As in the other revised indirect effects, the mediated effect of descriptive norms on behavior via intention was significant only among White Tweens, $\beta = .02$, $p < .01$. The mediated effect of PBC on behavior via intentions was also positive and significant only among Whites $\beta = .03$, $p < .01$.

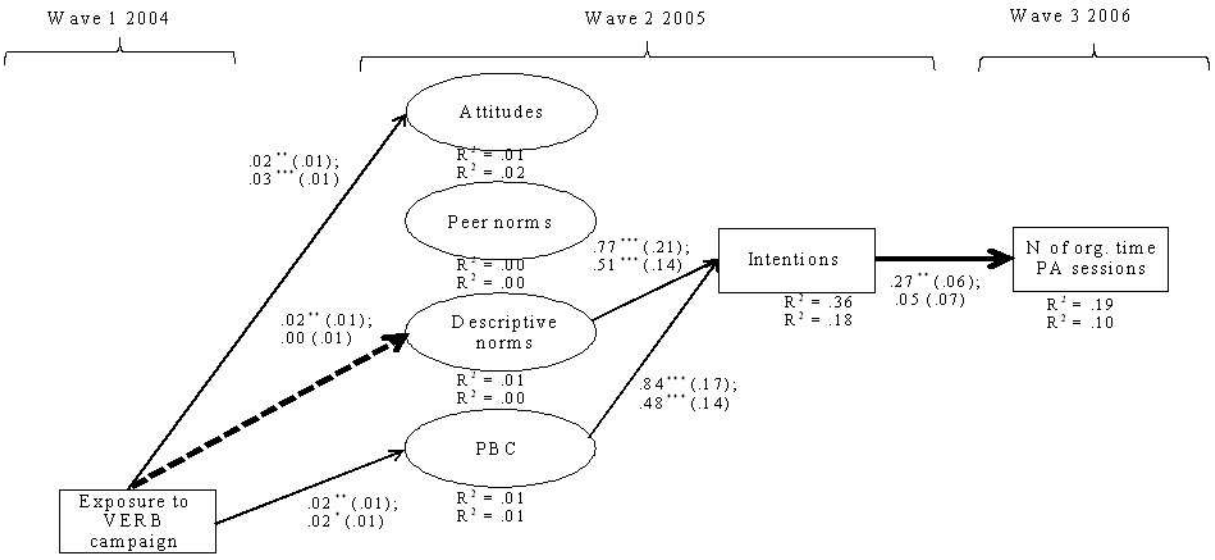


Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. Estimates for non-Hispanic Whites (n = 1,523) are presented first, followed by estimates for non-Whites (n = 1,250). Bold dashed lines indicate differences at $p < .10$. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure and only paths that are significant for at least one group are shown. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.8. Moderated mediation model for number of free time physical activity sessions the previous week: Race/ethnicity.

Discussion

Using longitudinal survey data, this study found that the effect of the VERB campaign on the number of free and organized time physical activity sessions was mediated by PBC and intentions. This result is consistent with the logic model that guided the campaign (Huhman et al., 2004), which proposed that exposure to the VERB campaign would influence certain mediating variables, among which we can count normative perceptions and PBC, which in turn would lead to an increase in physical activity. The results of this study indicate that the VERB campaign was able to boost Tweens' sense of control over their ability to practice physical activity, and this increase in PBC led to more intentions, which in turn predicted an increase in the practice of physical activity two years later. This effect was significant only for Whites.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. Estimates for non-Hispanic Whites (n = 1,523) are presented first, followed by estimates for non-Whites (n = 1,250). Bold lines indicate paths that are significantly different across groups. Bold dashed lines indicate differences at $p < .10$. For visual clarity, control variables (age, gender, screen time, and Wave 2 PA) are omitted from the figure and only paths that are significant for at least one group are shown. PA = Physical activity, PBC = Perceived behavioral control.

Figure 3.9. Moderated mediation model for number of organized time physical activity sessions the previous week: Race/ethnicity.

Another examined mediators, descriptive norms, also successfully bridged the effect of exposure to the VERB campaign and physical activity, but only among White children as well. These results show that, despite the efforts made by the VERB campaign to reach ethnically diverse audiences (Huhman et al., 2008), the message did not have the same effect across racial or ethnic groups. Given the nature of this study, it was not possible to break down the non-White group into more specific racial or ethnic segments to evaluate in which of them the effect was similar to the effect for Whites.

Previous studies evaluating the VERB campaign found a direct effect of exposure to the campaign messages and behavior. In the present study, when the mediators were taken into consideration, there was no direct effect of exposure to the VERB campaign in 2004 on the

practice of physical activity two years later after controlling for the previous year amount of physical activity. This finding is somewhat consistent with the one by Bauman and colleagues (2008) who found only partial support for the effect of the VERB campaign on physical activity mediated by understanding of the VERB message, attitudes and outcome expectations among Tweens from the first panel of the YMCLS. In the Bauman and colleagues' study, however, they found support for the direct effect of the campaign on behavior, even after taking into account the mediation of the aforementioned variables, which was not the case of the present study. This inconsistency is likely because of three reasons. First, in this study other mediators from the TPB literature, such as norms, PBC, and intentions were considered in the model, which were omitted in the case of the Bauman and colleagues' study. Second, the present study assesses the effect of VERB campaign exposure on behavior after two years, whereas the Bauman and colleagues' study assesses the effect one year later. Third, the Bauman and colleagues' study utilized the data from the YMCLS first panel, whereas this study uses the second panel. The second panel included younger children who became part of the VERB target audience in 2004, while the first panel comprised children who entered the targeted age range earlier.

In addition to the indirect effect of exposure on behavior via PBC and intentions, this study found that exposure to the campaign in 2004 predicted positive attitudes toward physical activity one year later. This finding is consistent with previous evaluations of the VERB campaign, for example Huhman and colleagues (2010), who found that the more Tweens saw the campaign, the more positive attitudes they had regarding physical activity. In the present study, the effect of exposure on attitudes was significant only for Tweens of low income households and children of less educated parents. This result is interesting and counterintuitive, as it would have been expected for the campaign to be more successful among children from more

advantaged backgrounds. Nevertheless, the VERB campaign planning team did great efforts to reach children from low SES groups and to speak directly to them, for example, to engage communities with the campaign activities (Huhman & Patnode, 2013). These efforts can explain the greater success in turning exposure to the campaign into positive attitudes regarding physical activity, even though the levels of exposure were, as expected, higher among Tweens from more advantaged backgrounds.

This study also found that, consistent with the TPB's original tenets, descriptive norms and PBC regarding physical activity were significantly associated with intentions to be physically active. Furthermore, it was found that an indirect effect from descriptive norms and from PBC on number of free and organized time physical activities the previous week in Wave 3 was significantly mediated by intentions. In the case of attitudes, neither a direct effect on intentions nor an indirect effect on behavior through intentions was supported. These results underscore the importance of the normative and the control components of the TPB when predicting exercise practices among children and young adolescents.

With respect to the behaviors examined in this study, disparities across the three moderators were found for the number of organized time physical activities. Non-White children as well as those from low income households and those with less educated parents reported lower levels of this behavior, while at the same time, low income and children of the less educated parents had greater levels of free time physical activity. When examining the moderated mediation models comparing White and non-White children, intentions were only a significant predictor of number of organized time physical activity sessions in 2006 for Whites.

Previous studies in the physical activity domain have not found a moderating effect of race/ethnicity in the path that links intentions to behavior. A study among elementary school

children in Canada that compared White and Asian students (Rhodes, Macdonald, & McKay, 2006) found that ethnicity did not moderate any of the TPB relations. Blanchard, Kupperman, and colleagues (2008), in a sample of college students and using SEM techniques and multi-group analysis, found that the TPB relations were invariant for Whites and Blacks. With a similar technique, and using a random sample of adults in Hawaii, Nigg, Lippke, and Maddock (2009) compared the TPB across White, Japanese, Filipino, and Hawaiian groups. They found that there were no differences in the relations proposed by the TPB that were attributable to ethnicity. The present study, however, was able to find a difference between White and non-White children in the degree to which intentions lead to number of organized time physical activity sessions.

Contributions

This study makes important theoretical contributions by providing support for the TPB and its integration with information exposure and the communication inequality perspective (Viswanath & Emmons, 2009). Through the examination of a nation-wide campaign in a representative sample of Tweens, this study found that exposure to the campaign message leads to increased PBC, which in turn leads to more intentions and finally to the practice of physical activity. Additionally, it was found that descriptive norms and PBC regarding physical activity were significant predictors of free time and organized time exercise through intentions to be physically active, consistent with the main tenets of the TPB.

Furthermore, this study supports that the position an individual occupies in society influences the degree to which exposure to a mass media and community-based campaign leads to favorable cognitions regarding a health behavior and to the practice of such behavior. At the same time, individuals' socioeconomic status and race/ethnicity influence the degree to which

intentions to be physically active lead to the practice of these behaviors, which expands Fishbein's (2000) integrative model of behavioral prediction, as it provides evidence supporting not only an additive effect of individual's context, but also a moderating effect of SES and race/ethnicity on the association between intentions and behaviors.

Along with theoretical implications, the findings in this study can make important practical contributions to the design and planning of health communication campaigns aiming to promote physical activity. Through this study we learned that the VERB campaign successfully influenced attitudes, as originally planned, but this effect only held for the children of less affluent households and those with less educated parents. These results are especially helpful for segmentation of messages and strategies in the context of a health campaign. Previous studies have found differential effects of exposure to a health campaign message depending on the position an individual occupies in society. For example, in the context of smoking cessation, it has been found that campaigns and interventions are less likely to be effective among socioeconomically disadvantaged populations relative to more advantaged groups (Niederdeppe, Fiore, Baker, & Smith, 2008).

Limitations

Despite this study's contributions, it has limitations that are worth mentioning. First, the data are somewhat old, which might raise concerns about the applicability of these findings one decade later. However, no nation-wide campaign to promote physical activity among children between the ages of 9 and 13 years has been conducted in the last decade. Furthermore, the YMCLS constitutes a high quality dataset, as the evaluation of the VERB campaign was carefully designed.

A second limitation is that, even though several measures to assess the practice of physical activity were available in the dataset, such as the practice of free time and organized time physical activity, the measures of intentions, attitudes, norms, and PBC were not specific to these behaviors, but addressed physical activity more broadly. This is a limitation, because according to the proponents of the TPB there should be an exact match between the behavior under examination and the items used to measure its predecessors in the model (Montano & Kasprzyk, 2008). Future studies should address this limitation and more specifically assess intentions of being physically active during free and organized time.

A third limitation of this study is its inability to test for the moderating effect of the interaction between race and SES in the paths of the model. Some authors have claimed that race/ethnic groups are not monolithic and that potential disparities among them cannot be understood without considering SES as a factor (Viswanath et al., 2006). In this study, performing such analysis would entail creating four categories: High SES (income or education) White, high SES non-White, low SES White, and low SES non-White. Despite the large sample size of the YMCLS a four-group categorization would be unfeasible because the resulting groups would not be large enough (n = 690, approximately) to support a complex model such as the one estimated in this study.

In spite of the aforementioned limitations, this study is one of the first examining the moderation of SES and race/ethnicity on a sequential mediation model assessing the effect of a nation-wide mass media campaign aimed to promote physical activity among children and early adolescents. This study extends and provides support for the communication inequality perspective and has important implications for the design and planning of campaigns aiming at a large and diverse audience.

Chapter 4

The Moderating Role of SES in the Effect of Seeking and Scanning on Physical Activity and Fruit and Vegetable Consumption in Chile

Obesity is becoming a worldwide epidemic. This study takes place in Chile, a developing country located in South America with a population of about 17 million. It is estimated that 25.1% of the Chilean adult population is obese, while 39.3% is overweight. Obesity is particularly prevalent among women (30.7% versus 19.2% of men), and marked by social disparities. Among Chileans with over 12 years of schooling, obesity rates are 18.5%, whereas among those with less than 8 years of schooling the rate is almost double (35.5%; Ministerio de Salud, 2010) .

In the context of this expanding epidemic, it is important to learn about obesity preventive behaviors and the impact that health messages can have on promoting them. In this study, I integrate the theory of planned behavior (TPB; Fishbein & Ajzen, 2010) with the concepts of seeking and scanning health information (Niederdeppe et al., 2007) to examine how these latter behaviors influence the consumption of fruits and vegetables and the practice of physical activity in a sample of high school students. Furthermore, I explore the moderating role of household income and parental educational attainment in the hypothesized path model. This study was conducted with a sample of female adolescents in Santiago, the capital of Chile, in three female-only schools. In the following sections the hypotheses and research questions are presented as well as the methodology utilized to collect and analyze the data.

Hypotheses and Research Questions

The first set of hypotheses and research questions refers to the differences between SES groups in each of the examined variables. The second set of hypotheses refers to the overall path

model examined in this study for each of the behaviors under study (i.e., fruit and vegetable consumption and physical activity). And finally, the third set of hypotheses and research questions explores the moderation of the social position indicators on the direct and indirect effects in the path model. Even though the original purpose of this study was to examine the moderating effects of household income, parental educational attainment, migrant condition, and indigenous group membership, the numbers of students from the sample that could be classified as members of an indigenous group (n = 100) and migrants (n=49) were too small to run the moderated mediation models. Thus, only the moderating roles of household income and parental educational attainment were examined.

Group Differences: Household Income

H1a: Students of households with low income will seek and scan health information to a lesser degree than students from more affluent households.

RQ1a: Do students of households with low income differ in their (i) attitudes, (ii) subjective norms, and (iii) PBC regarding fruit and vegetable consumption and physical activity compared to students from high income households?

RQ2a: Do students of households with low income differ in their intentions to consume fruit and vegetables and practice physical activity compared to students from high income households?

RQ3a: Do students of households with low income differ in their fruit and vegetable consumption and their practice of physical activity during their free time compared to students from high income households?

Group Differences: Mother's Educational Attainment

H1b: Students with more educated mothers will seek and scan health information to a greater degree than students with less educated mothers.

RQ1b: Do students with more educated mothers differ in their (i) attitudes, (ii) subjective norms, and (iii) PBC regarding fruit and vegetable consumption and physical activity compared to students with less educated mothers?

RQ2b: Do students with more educated mothers differ in their intentions to consume fruit and vegetables and practice physical activity compared to students with less educated mothers?

RQ3b: Do students with more educated mothers differ in their fruit and vegetable consumption and their practice of physical activity during their free time compared to students with less educated mothers?

Mediated Model

H2: Health information scanning will be positively associated with (i) attitudes, (ii) subjective norms, and (iii) PBC regarding the examined behaviors.

H3: Health information seeking will be positively associated with (i) attitudes, (ii) subjective norms, and (iii) PBC regarding the examined behaviors.

H 4: (i) Attitudes, (ii) subjective norms, and (iii) PBC will be positively associated with intentions to perform the examined behaviors.

H 5: Intentions at Wave 1 will significantly predict the performance of the examined behaviors at Wave 2.

H 6: Health information scanning at Wave 1 will predict performance of the examined behaviors at Wave 2.

H 7: Health information seeking at Wave 1 will predict performance of the examined behaviors at Wave 2.

H 8: The effect of health information scanning and/or seeking at Wave 1 on performance of the examined behaviors at Wave 2 will be mediated by (i) attitudes, (ii) subjective norms, and (iii) PBC, as well as by (iv) intentions.

H 9: The effect of (i) attitudes, (ii) subjective norms, and (iii) PBC at Wave 1 on the performance of the examined behaviors at Wave 2 will be mediated by intentions to perform the corresponding behavior.

H 10: The effect of health information seeking and/or scanning on intentions to perform the behavior will be mediated by (i) attitudes, (ii) subjective norms, and (iii) PBC.

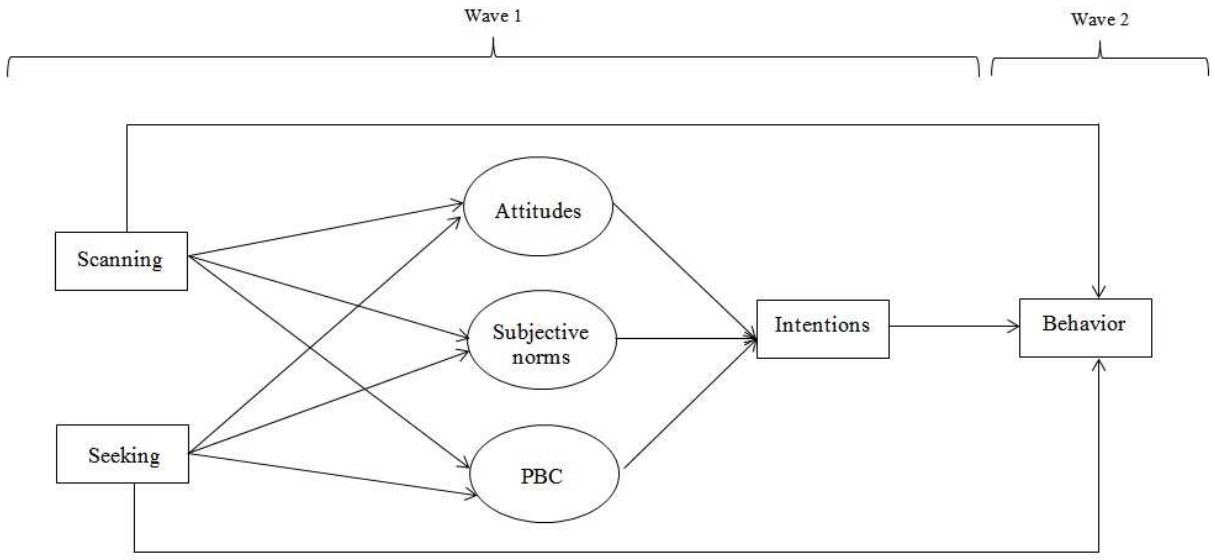


Figure 4.1. Proposed theoretical model for the effects of seeking and scanning health information on behavior.

Mediated Moderation Model: Household Income

H 11a: Significant differences will exist between students from more and less affluent households in the degree to which scanning and seeking health information are

associated with (i) attitudes, (ii) subjective norms, and (iii) PBC regarding the examined behaviors.

RQ4a: Does household income moderate the effect of (i) attitudes, (ii) subjective norms, and (iii) PBC on intentions to perform the examined behaviors?

RQ5a: Does household income moderate the effect of Wave 1 intentions on the performance of the examined behaviors in Wave 2?

RQ6a: Does household income moderate the direct effect of Wave 1 scanning and seeking health information on the performance of the examined behaviors in Wave 2?

RQ 7a: Does household income moderate the indirect effects of the model?

Mediated Moderation Model: Maternal Educational Attainment

H 11b: Significant differences will exist between students with more and less educated mothers in the degree to which scanning and seeking health information are associated with (i) attitudes, (ii) subjective norms, and (iii) PBC regarding the examined behaviors.

RQ4b: Does maternal educational attainment moderate the effect of (i) attitudes, (ii) subjective norms, and (iii) PBC on intentions to perform the examined behaviors?

RQ5b: Does maternal educational attainment moderate the effect of Wave 1 intentions on the performance of the examined behaviors in Wave 2?

RQ6b: Does maternal educational attainment moderate the direct effect of Wave 1 scanning and seeking health information on the performance of the examined behaviors in Wave 2?

RQ 7b: Does maternal educational attainment moderate the indirect effects of the model?

Methods

Participants

Seventh to eleventh-grade female students (N = 751) from 27 classes in three female-only high schools in Santiago, Chile, completed a survey at two different time points. The survey was administered in October 2015 for Wave 1 (n = 631), and in December 2015-January 2016 for Wave 2 (n = 495). Students were able to enter or leave the study at any Wave. Out of the 854 students registered in the 27 classes, 751 (87.9%) responded the survey at either Wave. Wave 1 survey was responded to by 631 (73.9%) students and Wave 2, by 495 (58.0%) students. Retention rate from Wave 1 to Wave 2 was 59.4% (n = 375).

Compared to students who completed the survey in only one Wave, those who responded to both Waves were slightly younger, reported seeking information about physical activity from more sources, and had greater levels of subjective norms regarding fruit and vegetable consumption. No significant difference between the two groups existed in key dependent variables. To deal with missing data, multiple imputations using *SPSS 23* was performed. All the analysis was conducted using the imputed dataset and the full sample size (N = 751).

Participants' mean age was 14.69 (SD = 1.43), their average BMI was 22.15 (SD = 3.51), 6.6% were not born in Chile, and 13.3% defined themselves as members of an indigenous group. Most students in the sample were in the 10^{th} grade (30.6%), followed by the 9^{th} (27.0%), 8^{th} (18.3%), 7^{th} (14.4%), and 11^{th} grade (9.7%).

Pilot Testing

The survey instrument utilized for this study was previously tested among members of the target population (i.e., Chilean adolescents in female-only schools) in 2014 with the purpose of evaluating the quality of the measures and students' understanding of the wording, given that

all instruments were translated from English to Spanish. I followed the translation and back-translation procedure to assure fidelity in the translation process. In the pilot testing, a first group of students (n = 41) completed the first version of the survey. Then, cognitive interviews (Beatty & Willis, 2007) were conducted with eight students. The survey instrument was revised after these applications and interviews. Finally, the second version of the survey was completed by a second group of students (n = 32). Missing data and application problems decreased from the first application to the second application, thus the current survey protocol is based on the results of this second version of the pilot survey.

Procedure

For the main study, a summary of the project was submitted to the Department of Health and the Department of Public Education in the Municipality of Santiago. They agreed to invite their three female-only high schools to participate in the study. Then, the researcher and a representative of the Department of Public Education met with each of the school principals to explain the research procedure. The original design considered a parental survey to be applied during a parents' meeting with the purpose of measuring the student's SES accurately by assessing parents' educational attainment and household income, and to measure family's social capital; however, the principals indicated that the parents' meetings were not well attended and therefore, a high participation of parents was not assured. Thus, it was decided to only conduct the two-Wave student survey, ask students about their parents' educational attainment and income, and discard the social capital measure.

Based on the number of students per class, a sample of classes from each school was drawn. In school 1 and school 2, eleven classes were invited to participate from each, and in school 3, five classes were invited. After obtaining IRB approval, the researcher visited each of

the 27 classrooms and handed out an information letter and a withdrawal form to be sent to parents. Withdrawal forms were collected on the day of the survey. Three students were withdrawn from the study and others decided not to participate without showing the withdrawal form.

In a designated class period for each of the classes, the researcher described the purpose of the study, the voluntary and confidential nature of the survey, and obtained students' signed assent forms. The same procedure was followed in each Wave. The assent and survey procedure took between 25 and 45 minutes in Wave 1, and between 15 and 20 minutes in Wave 2, because the survey instrument was shorter. In each Wave, students participated in a raffle and one of them was randomly selected to receive a Samsung Mini Tablet. All recruitment materials, survey instruments and communication with participants were in Spanish.

Measures

Physical activity (Y1, 2; Waves 1 and 2). To assess physical activity a question following the format used by Hornik et al. (2013) was asked to students: In the last week (last seven days), how many days were you physically active outside of school hours? Possible answers were 0 to 7.

Fruit and vegetable consumption (Y1, 2; Waves 1 and 2). The questions to assess fruit and vegetable consumption followed the format of the *HINTS* items (National Institutes of Health, 2014) Students were asked how many cups of fruits they ate or drank the day before the survey, and how many cups of vegetables they had had. Next to the questions there was a box that showed examples of how much fruit or vegetable was equivalent to a cup-sized portion. Possible answers were 1= "none", 2= "½ or less", 3= "between ½ and 1 cup", 4= "between 1 and

2 cups", 5= "between 2 and 3 cups", 6= "between 3 and 4 cups", 7= "more than 4 cups". The two items were combined to create a continuous measure of fruit and vegetable consumption.

Attitudes (M1; Wave 1). To assess attitudes towards the two behaviors under examination, students were asked how they felt about the idea of practicing physical activity during free time and eating fruits and vegetables every day following the recommendations of Fishbein and Ajzen (2010) and the format outlined by Montano and Kasprzyk (2008). Answers were in a 5-item semantic differential scale with 9 points and anchors bad/good, foolish/smart, useless/useful, unpleasant/pleasant, and unenjoyable/enjoyable. Scale reliability was excellent for physical activity (α = .83) and for fruit and vegetable consumption (α = .86).

Subjective norms (M2; Wave 1). Two items were used to assess subjective norms, one tapped descriptive norms: "Most people who are important to me practice physical activity in their free time/eat fruits and vegetables every day"; and one tapped injunctive norms: "Most people whose opinion I value would approve of my practicing physical activity in my free time/eating fruits and vegetables every day". Items were taken from previous studies in similar populations (Kwan, Cairney, Hay, & Faught, 2013; Plotnikoff et al., 2011; Yun & Silk, 2011), and adapted based on the results of the pilot study. Answers were in a 5-point likert-type scale with 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=strongly agree. Scale reliability was good in the context of fruit and vegetable consumption (α = .82), and it was not computed in the context of physical activity as the items were included separately in the model and not as a scale.

Table 4.1

Standardized Factor Loadings for Overall Measurement Models

	Fruits and vegetables		Physical activity	
Item	loading	SE	loading	SE
ATTITUDES				
1. Bad/good	.84	.01	.84	.01
2. Foolish/smart	.92	.01	.88	.01
3. Useless/useful	.90	.01	.90	.01
4. Unpleasant/pleasant	.78	.02	.69	.02
5. Unenjoyable/enjoyable	.80	.02	.77	.02
SUBJECTIVE NORMS				
1. Most people who are important to me eat fruits and vegetables every day/practice physical activity outside of school	.93	.03	-	-
2. Most people whose opinion I value would approve of my eating fruits and vegetables every day/practicing physical activity outside of school.	.76	.03	-	-
PERCEIVED BEHAVIORAL CONTROL				
1. It is easy to eat fruits and vegetables every day/practice physical activity outside of school.	.79	.02	.54	.03
2. I am confident that I can eat fruits and vegetables every day/practice physical activity outside of school.	.84	.01	.74	.02
3. If I wanted to I could easily eat fruits and vegetables every day/practice physical activity outside of school.	.95	.01	.87	.02
4. It is mostly up to me whether I eat fruits and vegetables every day/practice physical activity outside of school.	.69	.02	.76	.02

Note. All factor loadings are significant at $p < .0001$. The measurement model for physical activity included attitudes and perceived behavioral control only.

The measurement model that comprised attitudes, subjective norms and PBC fit the data well in the context of fruit and vegetable consumption, χ^2(df= 39) = 192.64, p > .05; CFI = .98; RMSEA = .07 (90% CI .06 - .08); SRMR = .04. For physical activity, however, the measure of subjective norms did not hold together well. In consequence, descriptive and injunctive norms were treated as two individual variables. The fit statistic for the measurement model comprising attitudes and PBC in the context of physical activity fit the data well, χ^2(df=39) = 185.44, p > .05; CFI = .97; RMSEA .07 (90% CI .06 - .08); SRMR = .04. Table 4.1 shows the loadings for the measurement models.

Intentions (M4; Wave 1). Intentions to be physically active and to consume fruits and vegetables were measured with one item each (Montano & Kasprzyk, 2008): "How likely is it that you will be practicing physical activity during your free time/eating fruits and vegetables every day in the near future?" Answers were: 1=very unlikely, 2=unlikely, 3=neither likely nor unlikely, 4=likely, and 5=very likely.

Health information seeking and scanning (X1, 2; Wave 1). The measure for health information seeking and scanning used in this study was the result of modifications done to the SSB-G instrument (Niederdeppe, et al., 2007) based on the results of the pilot testing, with the purpose of making the measure applicable in a self-administered survey among adolescents in Chile. Seven different sources were examined. For all interpersonal sources (i.e., doctor or other health professional, family members, and friends or classmates) students were asked two questions: "In the last two months, have you had conversations with [source] in which that person has mentioned something about physical activity/fruit and vegetable consumption?" to measure scanning, and "Independently of whether [source] said something, did you ask questions about physical activity/fruit and vegetable consumption?" to measure seeking. For the other

examined sources (i.e., television, social networking sites, internet, and print materials such as flyers or posters) scanning was measured with the following question: "Did you run into information about physical activity/fruit and vegetable consumption while watching/checking/browsing [source]?"

The items for seeking were worded more specifically for each source, all starting with the stem "Independently of whether you run into information on [source]…" For TV, the question followed "… did you wait to watch a show or news story about physical activity/fruit and vegetable consumption". For SNS, "… did you actively seek in SNS information about physical activity/fruit and vegetable consumption" For internet, "… did you search (using Google or another search engine) information about physical activity/fruit and vegetable consumption?" For print materials, "… did you ask for a flyer with information about physical activity/fruit and vegetable consumption?" All seeking and scanning items had three possible answers: 0=no; 1=yes, once; 2=yes, several times. All the seeking items were dichotomized and added up to form a single index, and the same was done with the scanning items[4].

Household income (Mod1; W1). In Wave 1, students were asked about their household's monthly income. Eight possible answers were presented and an "I don't know" answer was available. All cases were grouped into two categories originated by median split: Low income, which included all cases with household income lower than 300,000 Chilean pesos per month (less than U.S.$420; *n* = 361); and high income, with more than 300,001 (more than U.S.$421; *n* = 390) per month. In Chile the minimum wage is $214,000 per month (U.S.$340).

[4] Correlations between seeking and scanning were high for fruit and vegetable consumption (r = .52) and for physical activity (r = .72). Multicollinearity diagnosis, however, are within acceptable ranges (VIF = 1.76 for FV consumption and VIF = 2.25 for PA). Furthermore when attempting to combine the seeking and scanning items into one measure of exposure to health information, the results were confusing, as most of the associations with the predictors of intentions were negative. Based on this information, I decided to keep seeking and scanning as two different, yet correlated, exogenous variables in the model.

Parental educational attainment (Mod2; W 1). Students were asked for the highest educational level achieved by their parents. Given that maternal educational attainment had fewer missing cases, in this study I used this variable as a moderator. Possible answers were "none", "incomplete primary school", "complete primary school", "incomplete high school", "complete high school", "technical superior incomplete", "technical superior complete", "university incomplete", and "university complete". Responses were grouped into two categories based on median split: Low educational attainment, which went from some primary education to complete high school (n = 430); and high educational attainment, which included all cases with complete or incomplete higher education, either technical or university (n = 321).

Control variables. Body mass index (BMI), age, grade in school, and TV viewing were included as control variables in the models because they were significantly related to the variables of interest. School and internet use were not significantly associated with the variables of interest, thus they were excluded from the analysis.

Analytic Procedures

For the first set of hypotheses and research questions that referred to mean differences between students from different SES, *t*-tests were conducted for each of the examined variables. Overall mediation models were examined for each of the dependent variables using structural equation modelling (SEM) in *MPlus 7.2*. Maximum likelihood estimation was used for fitting the path models, after assessing that the variables examined met the normality assumptions[5]. First, the measurement models that comprised attitudes, subjective norms, and PBC were examined using confirmatory factor analysis (CFA) to evaluate model fit. For all CFA and SEM, three fit statistics were evaluated. For the root mean square of approximation (RMSEA), a value equal or less than .06 was considered good and .08 or less was considered acceptable. For the

[5] For both dependent variables skewness and kurtosis were between -.75 and 1.28.

standardized root mean square residual (SRMR), a value of .08 or less was considered acceptable, and for the CFI, a value of .90 or more was acceptable and one of .95 or more was optimal. Correlations among all variables in the study are presented in Table 4.2.

Preliminary Analysis: Measure Invariance

Before testing the moderated mediation models, it was necessary to assure that the measurement model included in this study was invariant across the examined groups. To test for measurement invariance, first a configural model was fit. In this model, the measurement models for both groups or levels of the moderator were fitted together, but all paths were allowed to be freely estimated. Then, a weak invariance model, in which all factor loadings were set to be equal across the groups, was fitted. Finally, a strong invariance model, in which all factor loading and intercepts were set to be equal across the groups, was fitted. Configural, weak, and strong invariance models are all nested models. A measure is strongly invariant if the fit of the strong invariance model is not different from the fit of the configural model. If that is the case, it is possible to estimate further path models keeping the measurement model (i.e., loadings and intercepts) constant across groups. Change in CFI (*ΔCFI*) was used to compare the fit of the configural and strong invariance models, with a change less or equal to .01 between nested models considered to be a criterion for measurement invariance (Cheung & Rensvold, 2002). In all cases, the strong invariance had no worse fit than the configural model, thus all further analyses were conducted with the measurement model constant across the groups. Table 4.3 presents the fit statistics for all the nested models for both moderators.

Table 4.2

Bivariate Correlations and Descriptive Statistics All Sample

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Age	14.69 (1.43)																		
2. BMI	.22**	22.15 (3.51)																	
3. TV viewing	-.05	.02	4.60 (2.46)																
4. Grade	.86**	.22**	-.06	3.03 (1.21)															
5. Scanning FV	-.01	-.02	.06	-.01	4.92 (1.90)														
6. Seeking FV	.05	.01	-.04	-.02	.52**	3.29 (2.52)													
7. Scanning PA	.04	.01	.00	.03	.49**	.43**	5.00 (2.25)												
8. Seeking PA	.05	.06	-.02	-.01	.41**	.66**	.72**	3.90 (2.58)											
9. Attitudes FV 1	-.09	-.01	-.02	-.02	-.07	-.26**	-.04	-.16	7.93 (2.02)										
10. Attitudes FV 2	-.06	.04	.00	.01	-.08	-.33**	-.03	-.19**	.67*	7.29 (2.32)									
11. Attitudes FV 3	-.078*	-.01	.02	-.01	-.06	-.31*	-.04	-.15*	.61**	.76*	7.79 (2.12)								
12.Attitudes FV 4	-.06	.00	-.06	-.02	.01	-.18	-.04	-.13	.503**	.64*	.58	7.19 (2.26)							
13. Attitudes FV 5	-.05	.01	-.02	-.01	-.01	-.23*	-.05	-.14	.57**	.65**	.60**	.71*	7.38 (2.35)						
14. Desc. norms FV	-.11*	-.03	.04	-.09	.10	-.12	.05	-.04	.22	.34	.26	.30	.30	3.61 (1.16)					
15. Injunctive norms FV	-.07	.00	.00	-.07	.07	-.08	.06	-.03	.25	.28	.24	.24	.22	.54	3.66 (1.05)				
16. PBC FV 1	-.11*	.00	-.03	-.06	.02	-.19	-.01	-.15	.42**	.43	.36	.42*	.46	.37	.33	4.03 (1.24)			
17. PBC FV 2	-.08	-.03	.00	-.04	.03	-.16	.01	-.12	.44**	.44	.35	.41*	.40*	.30	.28	.68**	4.18 (1.16)		
18. PBC FV 3	-.11**	-.05	.02	-.05	.02	-.29	-.04	-.19*	.47*	.54**	.43*	.52*	.57*	.44	.32	.62*	.71*	4.13 (1.21)	
19. PBC FV 4	-.07	-.01	.07	-.01	.07	-.17**	.00	-.09	.30	.40**	.35*	.34*	.29	.28	.22*	.45*	.46*	.56**	4.09 (1.18)

Table 4.2 (cont.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20. Attitudes PA 1	-.08	-.02	-.02	-.02	.04	-.24	.03	-.09	.58*	.58**	.51*	.48*	.45	.25	.23	.30	.31*	.42	.31*
21. Attitudes PA 2	-.04	.03	.00	.03	-.02	-.26*	.05	-.09	.50*	.68**	.57*	.50*	.49*	.32	.25	.31	.30	.44**	.28
22. Attitudes PA 3	-.11*	.00	.05	-.02	.00	-.30	.00	-.14*	.55	.68**	.66*	.55*	.54	.33	.25	.34	.35	.52*	.36**
23. Attitudes PA 4	-.05	-.01	.03	.00	.07	-.12	.13	.06	.30	.40	.44	.41	.38*	.19	.16	.22	.18	.30	.22
24. Attitudes PA 5	-.08*	-.01	-.01	-.02	.05	-.14	.13	.05	.46**	.56**	.53**	.45*	.47**	.26	.22	.32*	.31*	.41*	.29**
25. Desc. norms PA	-.06	-.07	.07	-.07	.13	.15	.16**	.14*	.02	-.02	-.01	.01	.04	.14	.18	.13	.07	.02	.02
26. Injunctive norms PA	-.06	.07	.00	-.02	.05	-.18	.03	-.09	.39	.42*	.39*	.32	.33	.24	.28	.25	.30	.38	.28
27. PBC PA 1	-.05	-.09	.02	-.03	.14*	.11	.19*	.21	.10	.17	.13	.15	.17	.18	.08	.13	.09	.18	.22
28. PBC PA 2	-.08	-.03	.00	-.04	.04	-.11	.16*	.06	.31*	.35*	.35*	.30*	.34	.27	.26	.34	.36	.39	.30**
29. PBC PA 3	-.08	-.02	.08*	-.03	.06	-.20*	.05	-.05	.34*	.44**	.44*	.35	.41*	.33*	.22	.39	.36	.49**	.37**
30. PBC PA 4	-.08	.00	.10**	-.04	.04	-.21	.05	-.08	.30	.45*	.42*	.36	.39*	.35	.24	.39*	.35	.50*	.41**
31. Intentions FV	.01	-.02	-.04	.00	.08	.19	.10	.09	.07	-.09	-.15	.03	-.02	.10	-.02	.08	.07	.08	-.03
32. Intentions PA	-.04	-.01	-.05	.00	.13**	.00	.17**	.16*	.22	.25*	.25*	.22	.24	.13	.12	.11	.12	.21	.18
33. Cups of FV yesterday W1	-.04	-.14**	-.05	-.03	.19*	.35*	.17*	.26**	-.26	-.26	-.21	-.15	-.15	-.03	-.10	-.07	-.10	-.17	-.09
34. Cups of FV yesterday W2	.05	-.10*	-.01	.05	.10	.01	.05	.01	.15**	.15**	.12*	.15*	.14*	.08	.06	.15	.17**	.16*	.12*
35. Days PA week W1	-.05	-.06	-.03	-.10*	.12**	.31**	.27**	.39**	-.11	-.17	-.12	-.10	-.08	-.06	.01	-.09	-.13	-.16	-.15
36. Days PA week W2	-.01	-.08	-.03	-.04	.08	.05	.11	.10	.07	.08	.03	.08	.07	.05	.03	.08	.10*	.11	.10

Table 4.2 (cont.)

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
20. Attitudes PA 1	7.42 (2.16)																
21. Attitudes PA 2	.63*	6.67 (2.45)															
22. Attitudes PA 3	.68*	.71**	7.34 (2.49)														
23. Attitudes PA 4	.45*	.56*	.53*	6.11 (2.46)													
24. Attitudes PA 5	.56**	.60**	.62**	.67**	6.50 (2.42)												
25. Desc. norms PA	-.04	.02	-.04	.11	.08	2.99 (1.07)											
26. Injunctive norms PA	.42**	.41	.46*	.29	.35*	-.01	4.04 (1.22)										
27. PBC PA 1	.24	.20	.18	.30	.31	.13	.22	3.39 (1.21)									
28. PBC PA 2	.34	.39*	.40*	.41**	.47**	.16	.32	.44	3.79 (1.21)								
29. PBC PA 3	.37*	.43**	.44*	.39*	.41**	.05	.42	.44	.56**	3.93 (1.23)							
30. PBC PA 4	.33	.36*	.42	.28*	.38*	.02	.34*	.32	.48**	.59**	3.99 (1.22)						
31. Intentions F&V	-.06	-.11	-.10	-.14	-.06	.09	-.18	.04	-.07	-.12	.01	4.47 (1.84)					
32. Intentions PA	.35	.31	.30	.35**	.40*	.07	.27	.35*	.39**	.32**	.26*	-.02	3.59 (1.19)				
33. Cups F&V yesterday W1	-.30	-.20	-.27	-.10	-.18	.12	-.20	.06	-.15	-.16	-.17	.17	-.06	3.40 (2.39)			
34. Cups F&V yesterday W2	.13*	.14**	.14**	.15*	.17**	.02	.10	.09	.15**	.13**	.11	.02	.07	.13	3.64 (2.54)		
35. Days PA week W1	-.07	-.10	-.15	.06	.01	.20**	-.08	.26	.12**	-.01	-.04	.07	.19*	.19*	.13	2.77 (1.99)	
36. Days PA week W2	.08	.07	.04	.11	.12	.05	.08	.19**	.14*	.13	.14	.02	.12	.05	.06	.16	2.86 (2.15)

Note. * Correlation is significant at the .05 level (2-tailed), ** correlation is significant at the .01 level (2-tailed). PBC = Perceived behavioral control, PA = Physical activity, FV = Fruits and vegetables.

Table 4.3

Fit Statistics for Measurement Models and Invariance Test

Model	χ2	df	*P*	AIC	RMSEA	RMSEA 90% CI	CFI	TLI	SRMR
Fruit and vegetables: Household income									
Configural invariance*	249.78	78	.00	23397.38	.08	.07, .09	.97	.96	.04
Weak invariance*	274.52	86	.00	23406.11	.08	.07, .09	.97	.96	.05
Strong invariance*	308.46	97	.00	23418.06	.08	.07, .09	.97	.96	.06
Fruit and vegetables: Maternal educational attainment									
Configural invariance*	267.25	78	.00	23487.41	.08	.07, .09	.97	.96	.04
Weak invariance*	272.87	86	.00	23477.03	.08	.07, .09	.97	.96	.04
Strong invariance*	287.41	97	.00	23469.57	.07	.06, .08	.97	.97	.05
Physical activity: Household income**									
Configural invariance*	193.43	48	.00	21907.19	.09	.08, .10	.97	.95	.05
Weak invariance*	215.70	55	.00	21915.46	.09	.08, .10	.96	.95	.07
Strong invariance*	238.02	64	.00	21919.78	.09	.07, .10	.96	.96	.07
Physical activity: Maternal educational attainment**									
Configural invariance*	184.60	48	.00	2194.66	.09	.07, .10	.97	.95	.05
Weak invariance*	202.47	55	.00	21944.52	.09	.07, .10	.97	.96	.06
Strong invariance*	21.26	64	.00	21934.31	.08	.07, .09	.97	.96	.06

Note. * Configural, weak, and strong invariance are nested models. ** The measurement model for physical activity comprised attitudes and PBC, as injunctive and descriptive norms were treated as observed variables in this case.

Moderated Mediation Model

The first step in the moderated mediation analysis was to fit a configural model, in which the models for all the levels of the moderator were tested simultaneously, but the paths were allowed to vary across groups. This model allowed identifying the paths that appeared to be different from one group to another. Once those paths were identified, a new model was fitted in which that specific identified path was set to be invariant across the groups. The fit statistics of the model with the restricted path was compared against the fit of the configural model. If the fit of the fixed path model was worse than the fit of the configural model, then there were arguments to support the claim that the path was in fact different across groups, in other words, that moderation existed. Chi square difference test was used to compare the fit statistics of the fixed path against the configural model. If the chi square test for differences was significant, it meant that the configural model had better fit than the fixed path model and thus, that the path varied across groups or levels of the moderator, which indicated a moderating effect.

Results

Group Differences: Household Income

Table 4.4 presents the means and standard deviations for both income groups and the results of the *t*-tests. H1a was supported for information seeking, adolescents from more affluent households reported greater levels of scanning information about fruit and vegetable consumption, and physical activity, than their low household income counterparts. No differences were found for information seeking regarding either of the behaviors.

In response to RQ1a, students of high income households reported more positive attitudes toward fruit and vegetable consumption and physical activity. Students from high income household also reported greater descriptive norms regarding fruit and vegetable consumption and

injunctive norms regarding physical activity compared to low household income students. Additionally, levels of PBC regarding fruit and vegetable consumption and about physical activity were higher among high income students compared to low income students.

Table 4.4

Descriptive Statistics Household Income and t-*test*

	Low N = 361 *M* (SD)	High N = 390 *M* (SD)	*t*
Scanning FV	4.78 (1.87)	5.08 (1.74)	$t(749) = -2.28$, $p < .05$, $r = .08$
Seeking FV	3.73 (2.26)	3.61 (2.15)	$t(749) = .70$, $p > .05$, $r = .03$
Scanning PA	4.74 (2.20)	5.29 (2.11)	$t(749) = -3.47$, $p < .01$, $r = .13$
Seeking PA	3.82 (2.50)	4.08 (2.54)	$t(749) = -1.40$, $p > .05$, $r = .05$
Attitudes FV	7.18 (1.93)	7.61 (1.82)	$t(749) = -3.13$, $p < .01$, $r = .11$
Attitudes PA	6.44 (2.03)	6.92 (1.91)	$t(749) = -3.36$, $p < .01$, $r = .12$
Desc. norms FV	3.42 (1.07)	3.71 (1.06)	$t(749) = -3.65$, $p < .01$, $r = .13$
Injunctive norms FV	3.57 (.90)	3.70 (1.00)	$t(749) = -1.92$, $p > .05$, $r = .07$
Desc. Norms PA	2.95 (.93)	3.03 (.96)	$t(749) = -1.08$, $p > .05$, $r = .04$
Injunctive norms PA	3.85 (1.11)	4.14 (1.10)	$t(749) = -3.65$, $p < .01$, $r = .13$
PBC FV	3.92 (.98)	4.19 (.95)	$t(749) = -3.82$, $p < .01$, $r = .14$
PBC PA	3.61 (.92)	3.86 (.91)	$t(749) = -3.68$, $p < .01$, $r = .13$
Intentions FV	4.56 (1.08)	4.45 (1.20)	$t(749) = 1.34$, $p > .05$, $r = .05$
Intentions PA	3.49 (1.03)	3.62 (1.06)	$t(749) = -1.73$, $p > .05$, $r = .06$
Cups FV wave 1	3.53 (2.09)	3.41 (2.29)	$t(749) = .76$, $p > .05$, $r = .03$
Cups FV wave 2	3.60 (2.20)	3.89 (2.30)	$t(749) = -1.78$, $p > .05$, $r = .06$
Days PA wave 1	2.78 (1.78)	2.83 (1.83)	$t(749) = -.39$, $p > .05$, $r = .01$
Days PA wave 2	2.84 (1.77)	3.01 (1.82)	$t(749) = -1.28$, $p > .05$, $r = .05$

Note. FV = Fruit and vegetable consumption, PA = Physical activity, PBC = PBC.

With respect to RQ2a, no differences were found for intentions to be physically active or to consume fruits and vegetables, and regarding RQ3a, no significant differences between household income groups were found for any of the examined behaviors.

Group Differences: Mother's Educational Attainment

Table 4.5 presents the means and standard deviations for each of the maternal educational attainment groups and the results of the *t*-tests. H1b was not supported, because no significant differences that were attributable to maternal educational attainment were found for seeking or scanning health information. Regarding RQ1b, children of the more educated mothers had more positive attitudes toward fruit and vegetable consumption, but no differences were found for physical activity. Students with more educated mothers reported greater levels of descriptive and injunctive norms regarding fruit and vegetable consumption and injunctive norms regarding physical activity than the children of mothers with low educational attainment. Students with more educated mothers also reported greater levels of PBC regarding fruit and vegetable consumption. No differences were found for PBC in the context of physical activity.

In response to RQ2b no differences were found for intentions to be physically active or to consume fruits and vegetables. Similarly, regarding RQ3b, no differences were found in the consumption of fruits and vegetables. With respect to physical activity, students with more educated mothers reported a greater number of days in which they practiced physical activity the previous week in Wave 2.

Table 4.5

Descriptive Statistics Maternal Educational Attainment and t-*test*

	Low N = 430 *M* (SD)	High N = 321 *M* (SD)	*t*
Scanning FV	4.87 (1.79)	5.02 (1.83)	$t(749) = -1.14$, $p > .05$, $r = .04$
Seeking FV	3.64 (2.19)	3.71 (2.23)	$t(749) = -.45$, $p > .05$, $r = .02$
Scanning PA	5.01 (2.18)	5.04 (2.17)	$t(749) = -.19$, $p > .05$, $r = .01$
Seeking PA	3.91 (2.52)	4.01 (2.52)	$t(749) = -.56$, $p > .05$, $r = .02$
Attitudes FV	7.29 (1.91)	7.57 (1.83)	$t(749) = -2.03$, $p < .05$, $r = .07$
Attitudes PA	6.58 (2.03)	6.84 (1.91)	$t(749) = -1.77$, $p > .05$, $r = .06$
Desc. norms FV	3.49 (1.08)	3.69 (1.06)	$t(749) = -2.54$, $p < .01$, $r = .09$
Injunctive norms FV	3.56 (.94)	3.75 (.96)	$t(749) = -2.66$, $p < .01$, $r = .10$
Desc. Norms PA	2.9 (.91)	3.04 (.99)	$t(749) = -1.26$, $p > .05$, $r = .05$
Injunctive norms PA	3.93 (1.13)	4.11 (1.09)	$t(749) = -2.22$, $p < .05$, $r = .08$
PBC FV	3.99 (.98)	4.17 (.94)	$t(749) = -2.59$, $p < .01$, $r = .09$
PBC PA	3.72 (.91)	3.77 (.95)	$t(749) = -.78$, $p > .05$, $r = .03$
Intentions FV	4.52 (1.20)	4.48 (1.07)	$t(749) = .43$, $p > .05$, $r = .02$
Intentions PA	3.51 (1.03)	3.63 (1.06)	$t(749) = -1.59$, $p > .05$, $r = .06$
Cups FV Wave 1	3.40 (2.21)	3.56 (2.17)	$t(749) = -.98$, $p > .05$, $r = .04$
Cups FV Wave 2	3.64 (2.31)	3.90 (2.17)	$t(749) = -1.55$, $p > .05$, $r = .06$
Days PA Wave 1	2.76 (1.74)	2.87 (1.89)	$t(749) = -.79$, $p > .05$, $r = .03$
Days PA Wave 2	2.81 (1.82)	3.08 (1.75)	$t(749) = -2.05$, $p < .05$, $r = .07$

Note. FV = Fruit and vegetable consumption, PA = Physical activity, PBC = Perceived behavioral control.

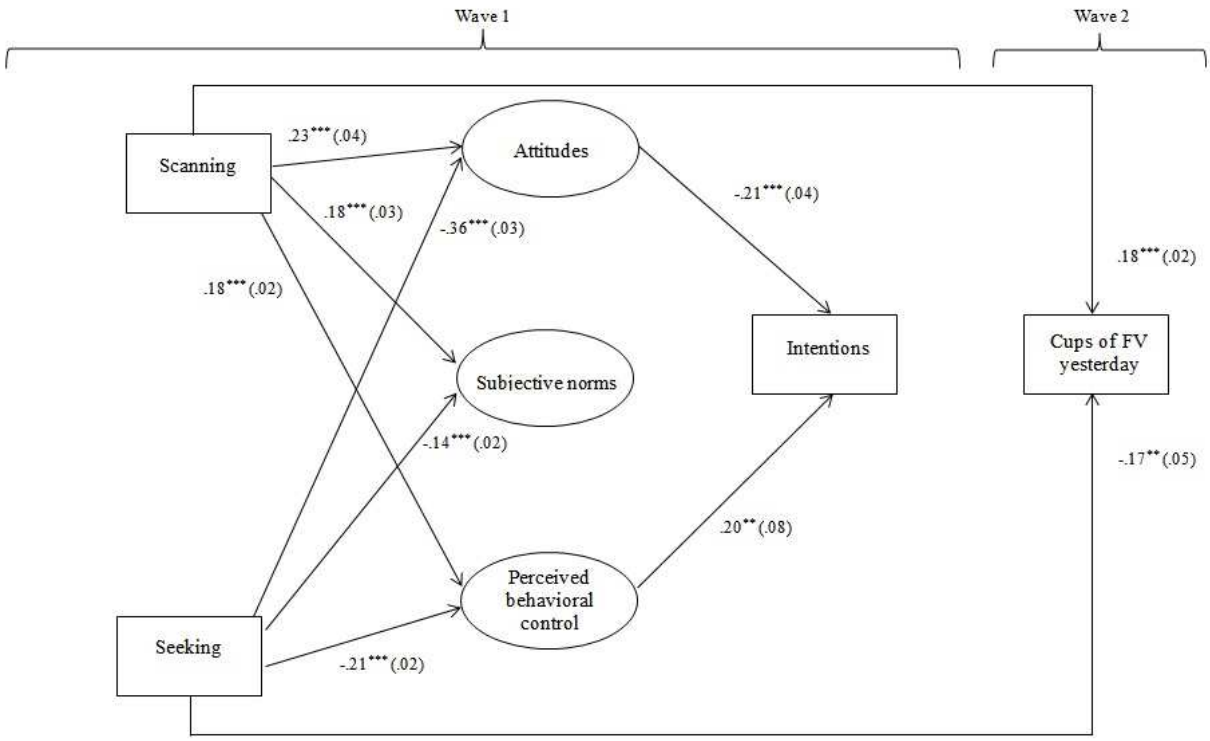
Mediation Model: All Sample

The second set of hypotheses was associated with the overall mediation model for the whole sample. Two models were fitted, one for each of the examined dependent variables, and all with good fit statistics as can be seen in Table 4.7. Figures 4.2 and 4.3 present the results for the mediation models.

The first hypothesis for the overall mediation model, H2, anticipated a positive effect of health information scanning on attitudes, subjective norms, and PBC regarding the examined behaviors. As anticipated, scanning information about fruit and vegetable consumption was associated with more positive attitudes (β = .26, p < .001), subjective norms (β = .32, p < .001), and PBC (β = .37, p < .001) regarding the behavior. In the case of physical activity, information scanning led to more positive attitudes (β = .31, p < .001) and PBC (β = .28 p < .001), as well as stronger injunctive norms (β = .15, p < .001). No effect of scanning was found for descriptive norms in this case.

H3 proposed a positive association between health information seeking and attitudes, subjective norms, and PBC regarding the examined behaviors. This hypothesis found support only in the context of physical activity, where information seeking was positively associated with descriptive norms (β = .12, p < .05). In the context of fruit and vegetable consumption, information seeking was negatively associated with attitudes toward the behavior (β = -.51, p < .001), subjective norms (β = -.32, p < .001), and PBC (β = -.51, p < .001). Similarly, in the context of physical activity, information seeking was negatively associated with attitudes (β = -.33, p < .001), injunctive norms (β = -.13, p < .001), and PBC (β =-.22, p < .001).

The effect of attitudes, subjective norms, and PBC on intentions was the subject of H4, which found partial support in the context of physical activity, where attitudes (β = .24, p < .001), descriptive norms (β = .09, p < .01), and PBC (β = .34, p < .001) were positively associated with intentions. Injunctive norms were not linked to intentions. In the context of fruit and vegetable consumption, PBC (β = .16, p < .01) was also positively associated with intentions, but, contrary to expectations, the relationship between attitudes and intentions was negative (β = -.29, p < .001).



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. For visual clarity, control variables (age, body mass index, TV use, grade, and Wave 1 dependent variable) are omitted from the figure. Only significant paths are depicted. No mediated effects were found for this model. FV = Fruits and vegetables.

Correlation between seeking and scanning was high ($r = .52$). Multicollinearity diagnosis, however, are within acceptable ranges (VIF = 1.76). When attempting to combine the seeking and scanning items into one measure of exposure to health information, the results were confusing, as most of the associations with the predictors of intentions were negative. Based on this information, I decided to keep seeking and scanning as two different, yet correlated, exogenous variables in the model.

Figure 4.2. Mediation model for cups of fruits and vegetables consumed: All sample.

H5, which anticipated that intentions at Wave 1 would significantly predict the performance of the examined behaviors in Wave 2, was supported only in the context of physical activity, where intentions to be physically active in Wave 1 predicted days of physical activity the week before in Wave 2 ($\beta = .16$, $p < .01$). Intentions in Wave 1 were not a predictor of fruit and vegetable consumption in Wave 2.

Consistent with H6, scanning at Wave 1 directly predicted more consumption of fruits and vegetables in Wave 2 (β = .19, p < .001) and more physical activity in Wave 2 (β = .05, p < .05). H7 found no support, as health information seeking at Wave 1 negatively predicted fruit and vegetable intake in Wave 2 (β = -.16, p < .01), and failed to predict physical activity in Wave 2.

Table 4.6

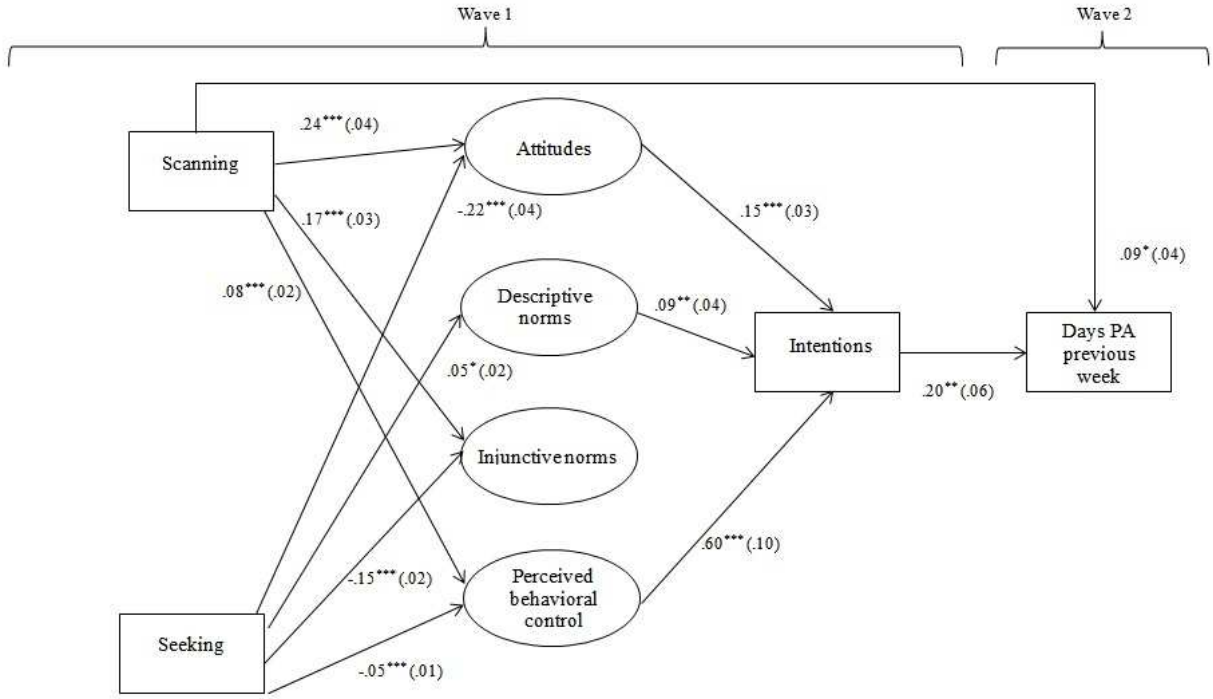
Significant Indirect Effects for Mediation Model

Effect	Estimate
Scanning – Attitudes – Intentions – PA	B = .01, p < .05
Scanning – PBC – Intentions – PA	B = .01, p < .05
Seeking – Attitudes – Intentions – PA	B = -.01, p < .05
Seeking – PBC – Intentions – PA	B = .01, p < .05
Attitudes – Intentions – PA	B = .03, p < .01
Descriptive norms – Intentions – PA	B = .02, p < .05
PBC – Intentions – PA	B = .12, p < .01
Scanning – Attitudes – Intentions (PA)	B = .04, p < .001
Seeking – Attitudes – Intentions (PA)	B = -.03, p < .001
Scanning – PBC – Intentions (PA)	B = .05, p < .001
Seeking – PBC – Intentions (PA)	B = -.01, p < .01

Note. PA = Physical activity, PBC = Perceived behavioral control.

With respect to the indirect effects anticipated in H8-10, they were only supported in the context of physical activity. Table 4.6 presents the estimates for the significant indirect effects of the model. The effect of scanning in Wave 1 on the practice of physical activity in Wave 2 was positive and significantly mediated by attitudes and intentions, and by PBC and intentions. The effect of seeking in Wave 1 on the practice of physical activity in Wave 2 was negative and

significantly mediated by attitudes and intentions and by PBC and intentions. The indirect effects of attitudes, descriptive norms, and PBC on physical activity in Wave 2 were positive and mediated by intentions. Scanning had a positive effect on intentions to be physically active mediated by attitudes and PBC, while seeking had a negative effect on intentions mediated by attitudes and PBC.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized coefficients are shown and standard errors are presented in parenthesis. For visual clarity, control variables (age, body mass index, TV use, grade, and Wave 1 dependent variable) are omitted from the figure. Only significant paths are depicted. Mediated effects for this model are presented in Table 4.6. PA = Physical activity.

Correlation between seeking and scanning was high ($r = .72$). Multicollinearity diagnosis, however, are within acceptable ranges (VIF = 2.25). When attempting to combine the seeking and scanning items into one measure of exposure to health information, the results were confusing, as most of the associations with the predictors of intentions were negative. Based on this information, I decided to keep seeking and scanning as two different, yet correlated, exogenous variables in the model.

Figure 4.3. Mediation model for days of physical activity the week before: All sample.

Table 4.7

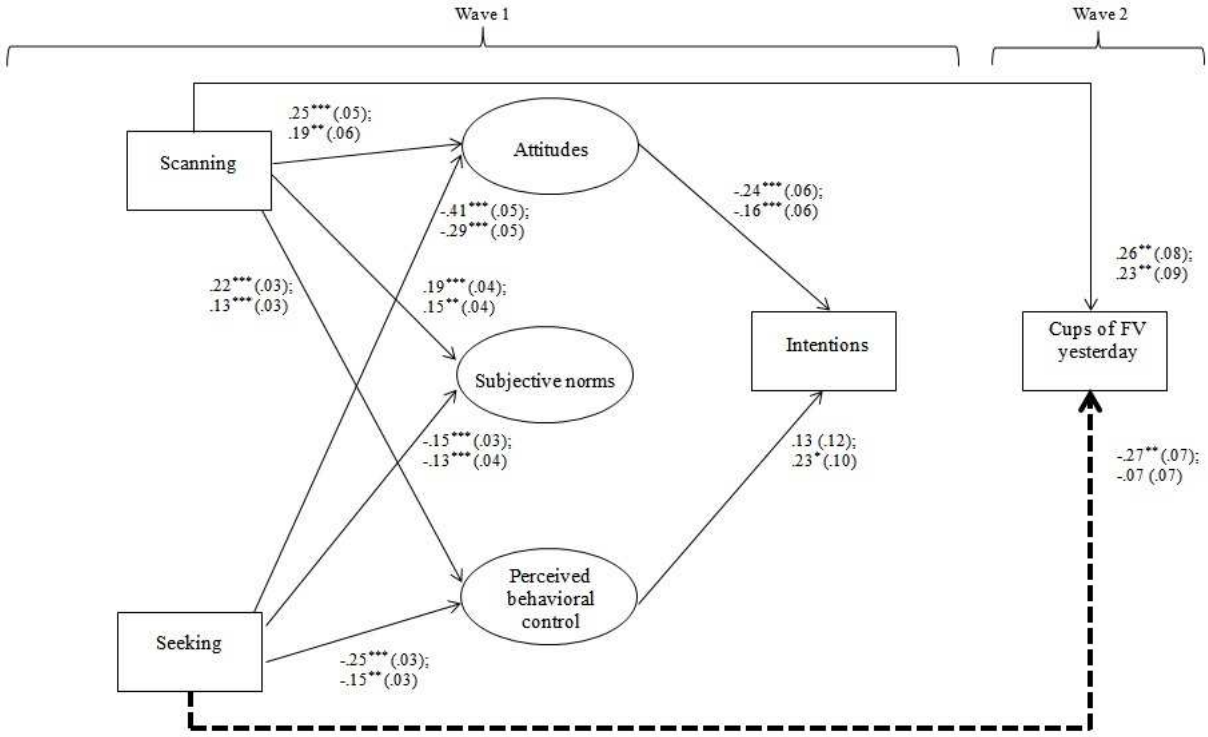
Fit Statistics of Mediation and Moderated Mediation (Configural) Models

N	*N free parameters*	$\chi 2$	df	*p*	AIC	RMSEA	RMSEA 90% CI	CFI	TLI	SRMR
Mediation Cups of fruits and vegetables										
751	59	558.28	136	.00	28953.50	.06	.06, .07	.94	.93	.06
Mediation days of PA previous week										
751	60	688.22	135	.00	30833.48	.07	.07, .08	.90	.87	.07
Configural model Cups of fruits and vegetables: Household income										
361, 390	102	749.27	288	.00	28915.97	.07	.06, .07	.93	.92	.07
Configural model Cups of fruits and vegetables: Maternal education										
430, 321	102	736.49	288	.00	2898.25	.06	.06, .07	.94	.92	.06
Configural model days of PA previous week: Household income										
361, 390	106	875.50	284	.00	30835.49	.07	.07, .08	.90	.87	.08
Configural model days of PA previous week: Maternal education										
430, 321	106	872.03	284	.00	30845.85	.07	.07, .08	.90	.87	.07

Note. PA = Physical activity.

Moderated Mediation Models: Household Income

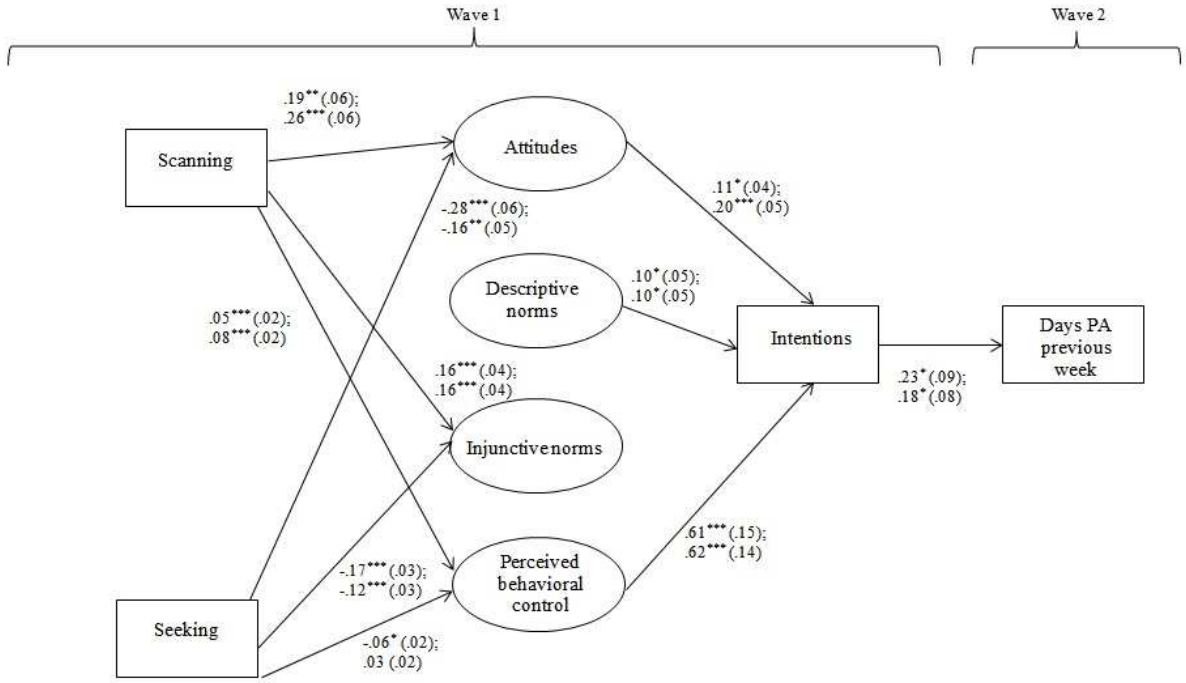
H11a and RQ4a-7a referred to the moderating effect of household income in the path model. Figures 4.4 and 4.5 present the results of the moderated mediation models for household income. In the context of physical activity, no path of the model was moderated by household income, which indicates that no significant differences existed between children from high and low income households.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized estimates for low income (less than US$ 420) are presented first, followed by high income (more than US$421). Standard errors are in parenthesis. The bold dashed line indicates differences between the groups at $p < .10$. For visual clarity, control variables (age, body mass index, TV use, grade, and Wave 1 dependent variable) are omitted from the figure and only significant paths for at least one group are shown. FV = Fruits and vegetables.

Figure 4.4. Moderated mediation model for cups of fruits and vegetables consumed: Income.

In the context of fruits and vegetables, the moderation of household income in the path between information seeking in Wave 1 and fruit and vegetable consumptions in Wave 2 as marginally significant, χ^2_{diff} (1) = 3.50, $p < .10$. In this case, the effect of seeking on behavior was negative and significant only among students from low income households (β = -.27, $p <$ .01), whereas nonsignificant for high income household students (β = -.07, $p > .05$). No moderating effect of household income was found for any of the indirect effects of the model for either of the examined behaviors.

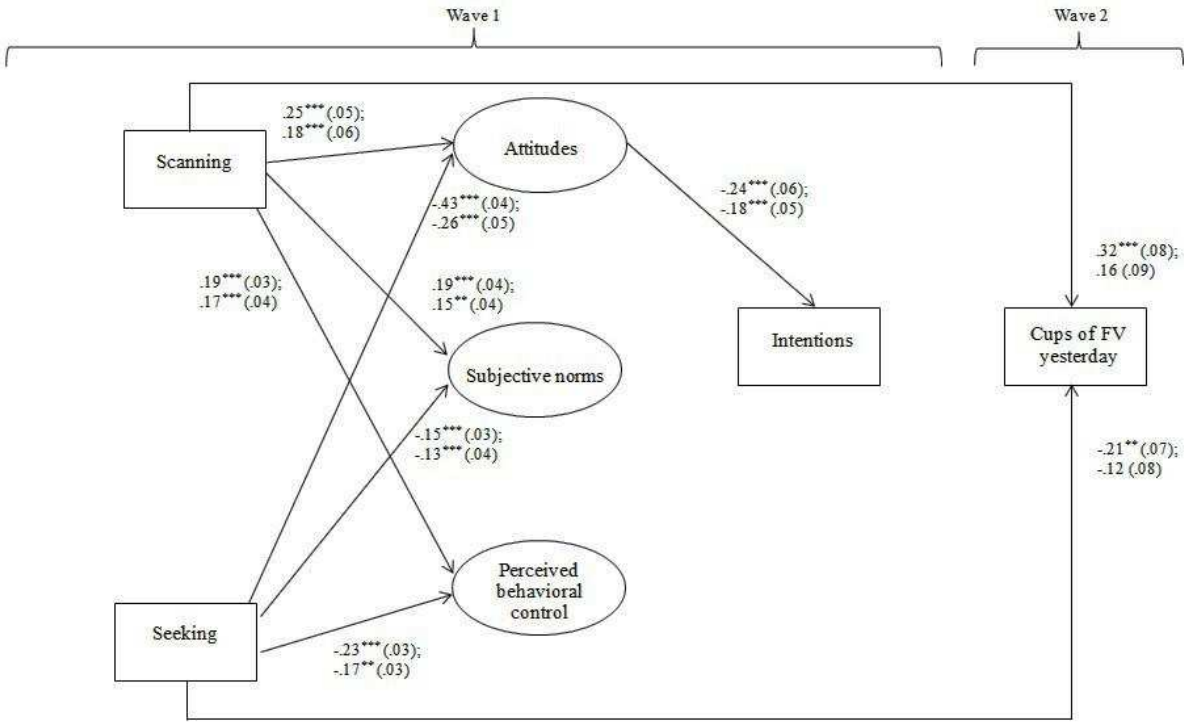


Note. *p < .05, **p < .01, ***p < .001. Unstandardized estimates for low income (less than US$ 420) are presented first, followed by high income (more than US$421). Standard errors are in parenthesis. No differences between the groups were found. For visual clarity, control variables (age, body mass index, TV use, grade, and Wave 1 dependent variable) are omitted from the figure and only significant paths for at least one group are shown. PA = Physical activity.

Figure 4.5. Moderated mediation model for days of physical activity the previous week: Income.

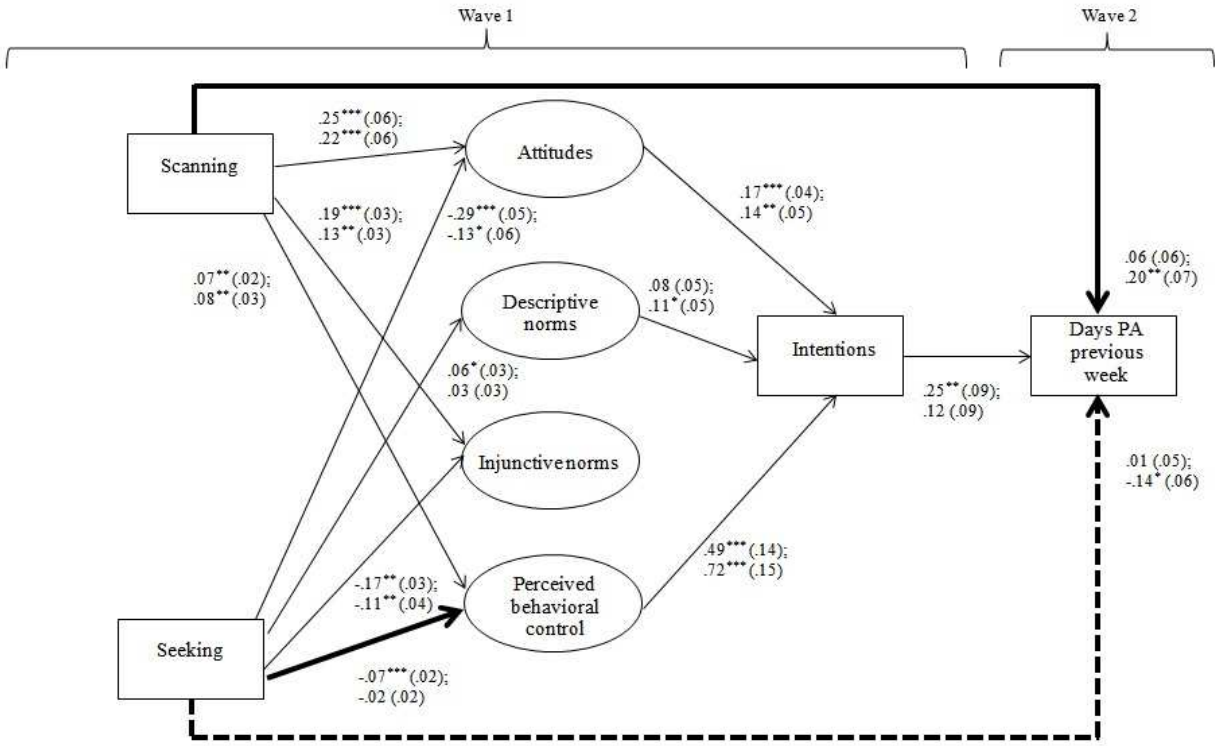
Moderated Mediation Models: Maternal Educational Attainment

Figures 4.6 and 4.7 present the results for the moderated mediation models for maternal educational attainment. No significant differences between children of more or less educated mothers were found for any of the paths of the model in the context of fruit and vegetable consumption. In the context of physical activity, however, significant differences were found in the path linking information seeking and PBC, χ^2_{diff} (1) = 3.97, $p < .05$, and the path linking scanning and the practice of physical activity in Wave 2, χ^2_{diff} (1) = 4.69, $p < .05$. The moderation of the path between seeking in Wave 1 and practicing physical activity in Wave 2 approached significance, χ^2_{diff} (1) = 3.31, $p < .10$. Information seeking led to a decrease in PBC only among children of less educated mothers (β = -.32, $p < .001$). Information scanning significantly predicted physical activity in Wave 1 only among the children of the more educated mothers (β = .20, $p < .01$). Finally, information seeking was negatively associated with behavior only among the children of the more educated mothers (β = -.19, $p < .05$). As with household income, no moderating effect of maternal educational attainment was found for the mediated effects of the models.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized estimates for low maternal educational attainment (primary education to complete high school) are presented first, followed by high maternal educational attainment (technical or university complete or incomplete). Standard errors are in parenthesis. No significant differences between the groups were found in this case. For visual clarity, control variables (age, body mass index, TV use, grade, and Wave 1 dependent variable) are omitted from the figure and only significant paths for at least one group are shown. FV = Fruits and vegetable.

Figure 4.6. Moderated mediation model for cups of fruits and vegetables consumed: Maternal education.



Note. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. Unstandardized estimates for low maternal educational attainment (primary education to complete high school) are presented first, followed by high maternal educational attainment (technical or university complete or incomplete). Standard errors are in parenthesis. The bold lines indicate differences between the groups $p < .05$; the bolded dashed lines indicate differences at $p < .10$. For visual clarity, control variables (age, body mass index, TV use, grade, and Wave 1 dependent variable) are omitted from the figure and only significant paths for at least one group are shown. PA = Physical activity.

Figure 4.7. Moderated mediation model for days of physical activity the week before: Maternal education.

Discussion

This study was designed to integrate the TPB and the concepts of information seeking and scanning to explain the influence of information exposure on the practice of physical activity and fruit and vegetable consumption in a longitudinal survey among female adolescents in Chile. Interestingly, many of the effects of the TPB and the integration of the TPB variables with

information seeking and scanning were supported in this sample, as well as some of the moderating effects of SES throughout the communication for behavioral change model.

Scanning information was a positive and significant predictor of attitudes, norms, and PBC regarding the two examined behaviors, fruit and vegetable consumption and physical activity. Scanning was also a positive and direct predictor of the two behaviors two months later. These results underscore the importance of studying the information that individuals acquire incidentally through their routine exposure to the mass media or interpersonal sources in affecting behavior directly and also playing a role influencing the known predictors of behavior according to sound models of behavioral change. The results regarding scanning are in line with other researchers' findings, such as Hornik and colleagues' (2013) study in which scanning was found to be a predictor of weekly exercise and fruit and vegetable consumption after one year.

Beyond the direct association between scanning and the practice of obesity preventive behavior, this study also finds support for an indirect effect of incidental exposure to information about physical activity on the practice of such behavior two months later. This effect was significantly mediated by attitudes, PBC, and intentions. This finding provides support for the integration of the TPB with a more refined measure of information exposure, such as information scanning.

The main tenets of the TPB are also supported by this study, but mainly in the context of physical activity, where attitudes, descriptive norms, and PBC were positively associated with intentions to be physically active, which in turn predicted weekly exercise two months later. The results in the case of fruits and vegetable consumption are not as consistent with the

expectations. Even though PBC was positively associated with intentions to consume fruits and vegetables, the relationship between attitudes and intentions was negative. This result might be explained by a ceiling effect of the attitude measure, which in turn may be caused by a social desirability bias. Several campaigns and interventions showing the benefits of fruits and vegetable consumption have targeted adolescents in Chile in recent years. All these messages may influence individual's evaluation of the behavior. However, that seemingly positive evaluation may not be profound enough to be consistent with the intentions to consume fruit and vegetables in the near future. Also in the fruit and vegetable model, intentions were not a significant predictor of the practice of the behavior two months later, which is somewhat consistent with previous studies using the TPB framework (e.g., Lee et al., 2016).

Other unexpected results of this study are the negative associations between health information seeking and fruit and vegetable consumption and the main determinants of both examined behaviors, such as attitudes, normative perceptions, and PBC. The positive associations between scanning and the practice of the examined behaviors as well as attitudes, norms, and PBC indicates that the information adolescents are exposed to incidentally leads to positive outcomes. At the same time, the negative association between seeking and the aforementioned variables shows that this active effort is detrimental for behavioral change.

There are no reasons to believe that the information adolescents are encountering via seeking and scanning is by any means different, as the messages are part of the same information environment. Table 4.8 presents the frequencies of seeking and scanning for each of the examined sources. As can be observed in Figures 4.8 and 4.9, the same sources that are more

prevalent for scanning information about a given behavior are, for the most part, the most commonly used for seeking as well.

One thing that could be different, however, is the way subjects judge and process the information acquired via seeking and scanning. Niederdeppe and colleagues (2007) postulated that from an information processing point of view one would expect scanning to be associated with peripheral processing, whereas seeking would be more likely linked with central processing. Peripheral processing is characterized by a quick assessment of the information obtained and a reliance on peripheral cues to accept or reject an argument. In that vein, the information obtained through scanning might not be carefully examined and the arguments and/or the cues presented may be enough to support positive attitudes, norms, and PBC regarding fruit and vegetable consumption and physical activity.

Central processing, on the other hand, consists on a more careful examination of the information found. If students are motivated enough to seek information, it is likely that they would also be motivated to process this information centrally. In this careful processing they might be more severe judges of the information obtained. For example, if the information they encounter presents unrealistic expectations regarding the amount of fruits and vegetables that is recommended to consume or the types of exercises and quantity that are recommended to perform, they may critically judge this information as lacking response efficacy. This later concept is used in emotion-based approaches to persuasion, such as Witte's extender parallel process model (Witte, 1992) to describe the capacity a message has of communicating a response that can overcome the threat presented by the same message. After a careful examination of the

messages obtained via seeking, subjects may believe that the behaviors are hard or even impossible for them to practice, and therefore, their PBC would go down.

According to the elaboration likelihood model (Petty & Cacioppo, 1986), central processing is associated with stronger attitudes, which in turn are more predictive of behaviors. In this study, attitude strength was not assessed, thus future studies testing this explanation should evaluate whether differences in strength exist between attitudes formed by seeking and attitudes formed by scanning health information.

With respect to the ability to predict behavior, this study supports a negative indirect effect from seeking to physical activity two months later, which indicates that the negative attitudes formed after seeking information about physical activity have a negative effect on behavior. This effect is not observed, however, in the context of fruit and vegetable consumption. Yet, this study is limited in the behavioral assessment, because it measured behavior only two months later. Furthermore, this study did not measure information processing or performed a content analysis of the information students were exposed to, so the explanations proposed here are not possible to be tested with these data.

Future studies should consider a longer time frame to assess behavioral change in the long term, and perhaps consider information processing as an additional mediator. More generally, a closer examination of the health information seeking behaviors of adolescents in Chile and the processing of this formation may help elucidate this issue. Finally, it might be plausible that the negative effect of seeking on the predictors of intentions and on behavior is due to unmeasured variables. Future studies should measure other variables that may explain these

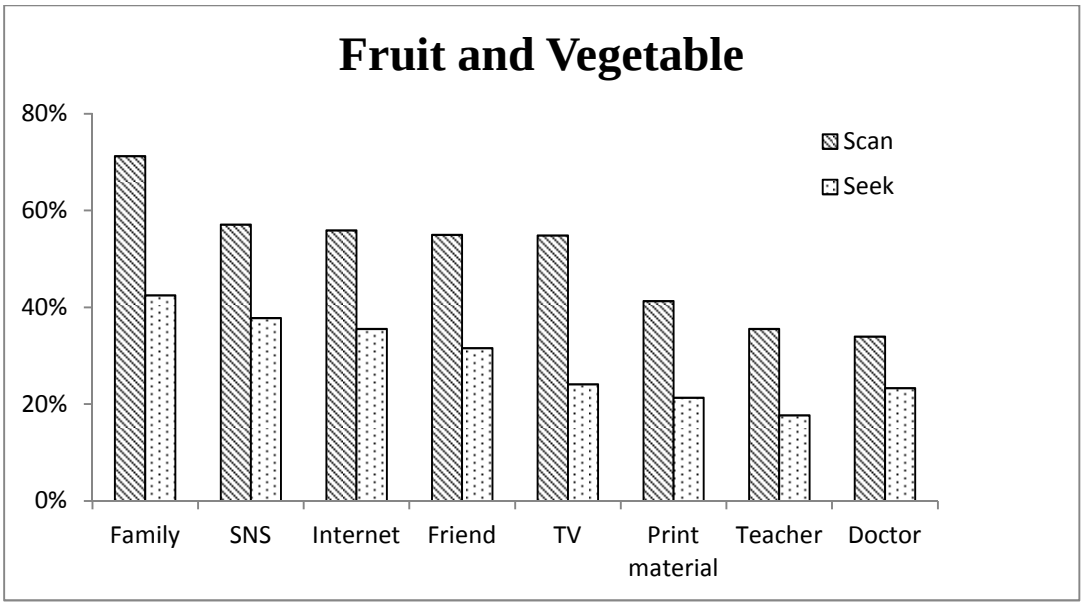
negative associations, for example, motivations to seek information about the examined behaviors or vested interest (Quick, Anker, Feeley, & Morgan, 2016).

Table 4.8

Frequencies Information Seeking and Scanning by Source

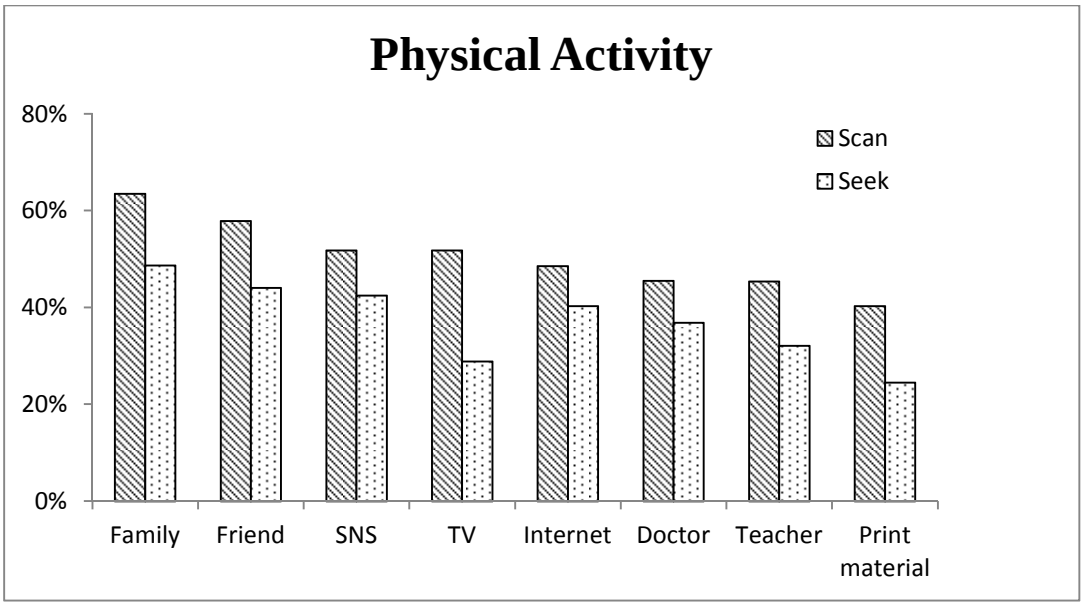
	Fruit and vegetable		Physical activity	
	Yes (%)	No (%)	Yes (%)	No (%)
Scanning doctor	255 (34.0)	496 (66.0)	342 (45.5)	409 (54.5)
Seeking doctor	175 (23.3)	576 (76.7)	277 (36.9)	474 (63.1)
Scanning family	535 (71.2)	216 (28.8)	477 (63.5)	274 (36.5)
Seeking family	319 (42.5)	432 (57.5)	366 (48.7)	384 (51.1)
Scanning teacher	267 (35.6)	484 (64.4)	341 (45.4)	410 (54.6)
Seeking teacher	133 (17.7)	618 (82.3)	241 (32.1)	510 (67.9)
Scanning friends	413 (55.0)	338 (45.0)	435 (57.9)	315 (41.9)
Seeking friends	237 (31.6)	513 (68.3)	331 (44.1)	419 (55.8)
Scanning TV	412 (54.9)	339 (45.1)	389 (51.8)	362 (48.2)
Seeking TV	181 (24.1)	570 (75.9)	217 (28.9)	534 (71.1)
Scanning SNS	429 (57.1)	322 (42.9)	389 (51.8)	362 (48.2)
Seeking SNS	284 (37.8)	467 (62.2)	319 (42.5)	432 (57.5)
Scanning internet	420 (55.9)	331 (44.1)	365 (48.6)	386 (51.4)
Seeking internet	267 (35.6)	483 (64.3)	303 (40.3)	448 (59.7)
Scanning print	310 (41.3)	441 (58.7)	303 (40.3)	448 (59.7)
Seeking print	160 (21.3)	591 (78.7)	184 (24.5)	567 (75.5)

Note. TV = Television, SNS = Social networking sites.



Note. TV = Television, SNS = Social networking sites.

Figure 4.8. Frequency of seeking and scanning for each source: Fruit and vegetable consumption.



Note. TV = Television, SNS = Social networking sites.

Figure 4.9. Frequency of seeking and scanning for each source: Physical activity.

Beyond the overall model, this study aimed to evaluate whether household income and maternal educational attainment moderated the paths of the model. When comparing students from high and low income households, those from more advantaged backgrounds tend to score higher in most predictors of behavior, including information exposure. These differences are not so salient for maternal educational attainment, although only in this case differences were found regarding the practice of physical activity.

Both of the examined social position indicators moderated at least one path of the models that aimed to predict fruit and vegetable consumption and weekly physical activity. It is interesting that the direct path between information scanning and the practice of physical activity two months later was positive and significant only among students with more educated mothers. This result indicates that the information environment in which individuals are embedded may influence the degree to which the information they acquire is good enough to motivate behavioral change. Other moderated paths are not as consistent with the expectations. The link between seeking and behavior two months later was negative and significant only among the children of more educated mothers in the context of physical activity.

Limitations

This study is not without limitations. The most important one is the convenience nature of the sample, which is not representative of a larger population and seems to be more homogeneous than expected. The number of students who could be categorized as migrants or members of an indigenous groups was not sufficient to provide the statistical power needed to conduct the moderated mediation model. The lack of differences in many of the study variables

is also likely due to a sample that is too small and not adequately diverse. All surveyed schools were public schools in which families do not have to pay for their children to attend. Chile's educational system is characterized by severe socioeconomic segmentation, and students from public schools are mostly members of the low SES groups (Valenzuela, Bellei, & Ríos, 2014).

Furthermore, relying on children's report of household income and parental educational attainment is problematic, because many of the students ignore this information and, in consequence, many cases with missing data in the key moderators were present in the dataset. Future studies should replicate this study with a more diverse sample of students, including male and female, and from public as well as private schools. Having parents respond about income and educational attainment would be desirable. Despite these limitations, this study was able to find some moderating effects of SES on the path model that integrated the TPB with the concepts of seeking and scanning health information, and to find support for many of the effects proposed by the TPB in a sample of Chilean female adolescents.

Chapter 5

General Discussion

In this dissertation I aim to make three contributions: (1) to extend the communication inequalities approach by incorporating a behavioral change model and examine how social position indicators influence the communication process, from information exposure to the ability to undertake a behavioral change; (2) to integrate the reasoned action approach, specifically the TPB, with a more refined conceptualization of information exposure to study the effect that access to health information has on known predictors of behavior; and (3) to expand the frontiers of health communication research by testing a communication for behavioral change model across two populations, one in the United States, and one in Chile, where little research aiming to understand the communication for behavioral change process has been conducted. In this chapter I will summarize my findings in light of the three goals of this project and the current scholarly debate regarding the issues it addresses.

The Theory of Planned Behavior, Alive and Well?

Through this dissertation, I found support for the main tenets of the TPB across two studies with very dissimilar samples. In the VERB study, it was found that descriptive norms and perceived behavioral control (PBC) were significantly associated with intentions to exercise, which in turn predicted the practice of physical activity. Furthermore, as anticipated by the TPB, the effect of descriptive norms and PBC were mediated by intentions. In a similar fashion, the study among Chilean adolescents revealed that attitudes, descriptive norms and PBC were direct predictors of intentions, and that indirectly predicted weekly exercise two months later. The role

of PBC in the exercise domain is consistent with previous findings and meta-analysis on the subject (Hausenblas et al., 1997).

The TPB has been the protagonist of recent debates in the health education arena. Some scholars have argued that this theory needs to be retired, because its predictive and explanatory powers were questionable (Sniehotta, Presseau, & Araújo-Soares, 2014). Others have defended the theory saying that it still does a good job predicting behavior (Ajzen, 2015), and that the right call would be to expand the theory with other perspectives that could contribute to increase its predictive power (Conner, 2015). This dissertation supports the latter point of view, as it shows that the TPB is capable of predicting physical activity behaviors in longitudinal studies of very diverse populations, such as children and young adolescents in the United States, and female adolescents in Chile.

It is worth mentioning that not all paths proposed in the TPB were supported in these studies. Interestingly, and consistent with previous studies in the context of exercise and other health behaviors (Armitage & Conner, 2001), PBC is a relevant predictor of intentions in the two studies. Despite the support for the TPB in the context of exercise, the model for fruit and vegetable consumption in the Chilean adolescent study did not hold as well as the one for physical activity. Surprisingly in that case, the link between intention and behavior was null.

Future studies may benefit from incorporating measures of the most recent conceptualizations of the TPB within the RAA framework, which break down key components such as attitudes into instrumental and experiential attitudes, and PBC into capacity and

autonomy (Yzer, 2013). A finer conceptualization may allow for assessing more specifically which of the paths that lead to behavioral change are.

Beyond the overall functioning of the TPB as a model for behavioral prediction, this study shows that the theory works well when integrated with concepts of information exposure. In the Chilean adolescents study, for example, it was found that exposure to information via scanning or incidental exposure was an important antecedent of weekly physical activity and that this effect was mediated by attitudes, PBC, and intentions. In the VERB study, exposure to the campaign leads to an increase in the practice of physical activity two years later though PBC and intentions.

Disparities in the Communication for Behavioral Change Process

Furthermore, and as stated in the first purpose of this dissertation, the studies examined provide evidence to support an integration of the TPB and a communication inequality perspective as a viable extension for both theoretical frameworks. The VERB study supported a moderating effect of the social position indicators on the indirect effects of the model, specifically the one mediated by PBC and intentions. Furthermore, several instances of inequalities throughout the communication for behavioral change process were made evident as I will comment next.

SES and information exposure. Across the two studies, children from high income households have greater levels of exposure to health messages. In the case of the VERB campaign, being from an affluent home was associated with greater exposure to the campaign messages. This difference was also found between children with more and less educated parents,

such that Tweens with more educated parents reported greater levels of exposure to the VERB campaign. In the case of the Chile study, students from affluent households reported greater levels of scanning information about physical activity and about fruit and vegetable consumption. No differences were found for parental educational attainment for Chilean adolescents.

The differences between children from more and less affluent background in exposure to a health campaign and scanning information may have to do with an individual's information environment. It is expected for individuals from affluent backgrounds to be embedded in more information rich environment, so their chances of encountering the campaign message or scanning information about healthy behaviors are greater.

Race/ethnicity and information exposure. A disparity between White and non-White Tweens is observed in the VERB study when examining the levels of exposure to the campaign message in 2004, which is the first year of the assessment. This result indicates that, despite the efforts made by the campaign team (Huhman et al., 2008), at the beginning of the campaign for this cohort it was difficult to equalize the exposure of White and non-White children. A closer examination to the differences in exposure in 2005 and 2006 indicates that these differences did not continue in the subsequent years of the campaign[6].

SES and exposure, attitudes, subjective norms, and PBC. In the VERB study, positive attitudes were significantly predicted by exposure to the campaign among children of low income households and those with less educated parents. In the Chile study, no differences were

[6] No differences in exposure were found in 2005 between White (M = 2.24, SD = 1.30) and non-White children (M = 2.30, SD = 1.41), $t(2771) = -1.25$ $p > .05$, $r = .02$. Similarly, no differences were found in 2006 between White (M = 2.05, SD = 1.27) and non-White (M = 2.05, SD = 1.37), $t(2771) = -.03$ $p > .05$, $r = .00$.

found for household income or parental education in the degree to which exposure to health information influenced attitudes. The same was found across the two studies for norms. No differences in the influence of exposure on PBC were found in the VERB study. In the Chile study, among students with less educated mothers seeking information about physical activity was associated with lower levels of PBC.

Race/ethnicity and exposure, attitudes, subjective norms, and PBC. In the VERB study, exposure to the campaign was associated with a strengthening of descriptive norms regarding physical activities only among White children, whereas no effect was observed for non-Whites. Descriptive norms are defined as the belief regarding the prevalence of a behavior within a specific group of people. One possible explanation for this finding is that non-White children felt less identified with the campaign messages and did not perceive the campaign as telling them what other people like themselves were doing. This explanation, however, would indicate that the previous work undertaken by the VERB team to reach and speak directly to children from minority groups (Huhman et al., 2008) was not sufficient to accomplish those goals. No differences in the effects of attitudes, peer norms, or PBC were found in the case of the VERB campaign.

SES and attitudes, subjective norms, PBC and intentions. Neither of the two studies revealed significant differences for the degree to which attitudes, norms, and PBC were associated with intentions to perform behaviors.

Race/ethnicity and attitudes, subjective norms, PBC and intentions. As in the preceding section, race/ethnicity was found not to moderate the effects of attitudes, subjective

norms, PBC on intentions in the VERB study. Taken together, the absence of a moderation of the social position indicators on the links between intentions and its predecessors indicate that these paths are not dependent on the contextual factors surrounding individuals as much as other paths in the model.

SES, intentions and behavior. In the VERB study a low household income and parental educational attainment were associated with greater intentions to practice physical activity. Greater intentions, however, did not lead to greater practice of physical activity among Tweens of this group. In fact, when examining the link between intentions and the practice of organized time physical activity it was found that only for children of high income households did intentions lead to more physical activity. Levels of organized time physical activity were in fact greater among children from high income household and those with more educated parents, whereas levels of free time physical activity were greater among children from low income households and less educated parents. This result speaks of a disparity in the ability to turn favorable intentions to become physically active into actual behaviors. As argued in chapter 2, this is likely because of environmental constrains that children form less advantaged backgrounds face when trying to pass from the stage of contemplation or preparation to the stage of action.

In the sample of Chilean adolescents no differences between those from more and less advantaged backgrounds were found for intentions to be physically active and to consume fruits and vegetables. Similarly, no differences for household income were found in the practice of such behaviors. In the case of parental educational attainment, it was found that adolescents with

more educated mothers reported greater levels of physical activity. The degree to which intentions lead to fruit and vegetable consumption and physical activity was not different between children of the high and low income households. The same was found in the context of parental educational attainment for fruit and vegetable consumption.

Race/ethnicity, intentions and behavior. Similar to what was observed in the case of household income in the VERB study, race/ethnicity also moderated the influence of intentions on the practice of organized time physical activity. As in the previous case, it is expected that children in the minorities face more challenges when trying to act consistently with their intentions, and therefore, find more difficulties to carry out their plans. It is worth mentioning that the difference between Whites and non-Whites is found exclusively for organized time physical activity sessions and not for free time physical activity. Organized time physical activity requires more resources, for example a coach, some type of gear or equipment, infrastructure, etc., which are probably harder to access for less advantaged segments of society. The absence of differences in free time physical activities is likely because the needs to turn those intentions into action are considerable lower than the needs to turn intentions into the actual practice of organized activities.

SES and indirect effects. Only in the VERB study was a moderating effect of household income found for the indirect effects of descriptive norms and PBC on the practice of organized time physical activity through intentions. In both cases, these paths were positive and significant only for children of high income households. The same argument as the one advanced earlier with respect to the environmental constrains that Tweens from the less advantaged backgrounds

face when trying to practice more organized time physical activity can be made here to explain the differences in the indirect effect of descriptive norms and PBC on behavior.

Race/ethnicity and indirect effects. The VERB study supports a moderation of race/ethnicity on the indirect effects of the campaign, from exposure to the practice of physical activity through descriptive norms, PBC, and intentions, such that these effects were positive and significant only among White Tweens. This result indicated that the logic model that anticipated the campaign effects failed for children from racial or ethnic minorities. One thing to note, however, is that these indirect effects were specifically for organized time physical activity, which was not exactly the target behavior for the VERB campaign. When examining the indirect effect for exposure on the free time physical activity sessions, no effect was found for either White or non-White children. In spite of the fact that disparities in the indirect effects on behavior are observed only for organized time exercise, the differences between White and non-White Tweens are also present in indirect paths that link exposure to the campaign and intentions to be physically active, which does not specify whether it is a free or an organized time activity. This latter finding supports the moderating effect of race/ethnicity beyond the dependent variable that is examined.

Limitations

Several limitations of the two studies have been pointed out in the discussions of chapters 3 and 4. In this section, however, I would like to present the limitations that are common to both studies with ideas of how to overcome them in future studies.

Social position indicators. The original purpose of this dissertation was to examine the moderating role of three social position indicators: SES, race/ethnicity, and social capital. However, in the two empirical studies it was not possible to test the role of this latter variable. In the case of the VERB study, no measure of social capital that was consistent with Bourdieu's definition of the concept was available in the YMCLS instrument. In the case of the Chile study, it was originally planned to measure parental social capital as a way to assess the position in which student's family could be situated with respect to this variable. When planning the survey application, however, schools authorities warned me that it would be very difficult to get parents to respond to the survey in instances such as a monthly parents meeting at the schools, because those were not well attended. Other options were explored, like sending the parental survey home with the students for parents to respond and submit the responded questionnaires later, but the IRB office did not approve such a procedure. Given the impossibility of reaching parents with an instrument to measure social position indicators, the Chile study had to rely on the students' report of parental educational attainment and household income, which may not be as accurate as their parents' report of such information.

The moderating role of race/ethnicity was also impossible to evaluate in the Chile study, mainly due to sample constraints. I decided to recruit students from the Santiago area, because according to recent press reports, there has been an increase in the migrant population in this part of the country, but it is still not clear what proportion of Santiago inhabitants could be categorized as migrants. With respect to being a member of an indigenous group, nationally representative data indicate that about 6% of Chilean people consider themselves as part of an

indigenous group (Corporacion Latinobarometo, 2011). In the Chile study sample the number of students who defined themselves as members of an indigenous group was 13.3%, which is higher than national estimations. The sample, however, was not stratified by race/ethnicity, because the survey application design indicated that the whole classroom had to be surveyed. Therefore, the number of subjects who could be categorized as members of a racial or ethnic minority was too small in the Chile study. Future studies aiming to test the moderating role of race/ethnicity among the same population should consider increasing the total sample size in order to obtain a larger minority group or stratify the sample, as the YMCLS did, in order to have equivalent numbers of race/ethnic majority and minority subjects.

Sample. The two studies presented in this dissertation are focused on children and adolescents. Both studies support that social position indicators moderated at least one path of the communication for behavioral change model in these samples, but it is highly expected that the disparities observed here affect individuals across their lifespans. Future studies should test the models examined in this dissertation in a sample of adults, ideally a nationally representative sample that allows for having a wide diversity of SES and race/ethnicities. Furthermore, a nationally representative sample allows for generalizing findings to a larger universe of individuals, which is not possible in the case of a convenient sample, such as the one from the Chile study.

Causal relationship. When aiming to test a causal hypothesis an experimental or longitudinal design is desirable. Given the characteristics of the hypotheses and research questions that guide this dissertation, an experimental design is unfeasible (social position

indicators and exposure to health information through routine patterns of information consumption cannot be realistically manipulated in an experimental setting), but in both cases longitudinal designs were utilized, which allows for making causal claims based on the findings. However, with longitudinal studies measuring the effect of information exposure on behavioral change it is hard to determine which should be the right amount of time lapse to evaluate lagged effects. In the case of the VERB study, data were collected at three time points, one year apart from each other, which allowed to test for the effect of exposure on behavior up to two years later. In the case of the Chile study, the time frame was only 2 months. In both cases, however, it was found that exposure to health information had an effect on behavior.

Considering the proposed theoretical model, which encompasses the effect of exposure on attitudes, norms, and PBC, and in turn the effect of these variables on intentions and behavior, I believe future studies should have three data points, but the time frame between them should be less than one year.

Self-reported behavioral measures. One common criticism of research in the behavioral change domain is the reliance on self-reported assessments of behavior (e.g., Sniehotta, Presseau, & Araújo-Soares, 2014). Both studies presented in this dissertation utilized self-reported measures of behavior. In the case of the VERB study, the final measure of physical activity is the product of a refined set of questions that asked subjects whether they practiced some physical activity, then to name a few of them, and finally to indicate how much time they spent practicing each physical activity. Given this measurement strategy, it is harder for respondents to engage in social desirability bias when reporting their levels of exercise. The

Chile study used one item to assess fruit and vegetable consumption and one item to measure weekly physical activity. Both behavioral measures were retrieved from the literature on communication for behavioral change process and have been utilized in widely cited survey protocols, such as HINTS. Furthermore, they were pilot tested with members of the target population. However, these measures are not guaranteed to be bias-free. Future studies would benefit from having objectively observed measures of behavior.

Conclusion

This dissertation presented a theoretical argument to support an extension of the communication inequality approach by integrating its concepts with a widely known and cited theory of behavioral change, such as the TPB. Furthermore, it presented results of two longitudinal survey studies that empirically tested disparities throughout the communication for behavioral change process.

The studies presented in this dissertation supported the integration of the CI approach with the TPB as disparities between the more and the less advantaged groups in society were found across the process, from differences in exposure to health information, to differences in the degree to which this exposure influences the known predictors of behavior, and the degree to which individuals turn their intentions into behavioral change. These findings have important theoretical implication, as they provide support to the TPB across very diverse populations. More specifically, these findings show that a natural extension of the TPB is to be integrated with CI notions, such as the moderation of social position indicators that was the focus of the present dissertation. Finally, the findings of this dissertation also have practical implications, particularly

for scholars and practitioners planning health communication campaigns aimed to large and diverse audiences. This dissertation shows that disparities between the more and less advantaged segments of society are expected to be found in all the communication for behavioral change process, and as such, it is necessary for campaigns to plan strategies to address these disparities, for example, making sure the messages have the same likelihood of reaching the less advantaged as they reach the more advantaged, and that the messages speak and make sense to people from more disadvantaged backgrounds.

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