CULTURAL DIFFERENCES ON PLACEBO EFFECTS ELICITED BY PHARMACEUTICAL ADS

BY

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THESIS

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ABSTRACT

Placebo and nocebo effects have been a widely concerning issue, as they describe the psychological factors influencing medication outcomes. Previous research mostly focused on how placebo and nocebo effects occur, offering explanations for their mechanisms. Individual differences, especially at the cultural level, are seldom discussed in relation to placebo/nocebo effects. In this paper I consider how cultural backgrounds might influence placebo and nocebo effects elicited by people’s processing of pharmaceutical advertisements.

I proposed that cultural differences in people’s dialectical thinking propensity would influence their processing of conflicting information about drug effects contained in the ads. And I proposed that differential information processing would cause differences in people’s expectancies about the drugs’ effects. The hypotheses were not supported in the results. Possible reasons were discussed.
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CHAPTER 1: INTRODUCTION

A placebo effect is a psychological or physiological effect resulting from patients’ interpretation and expectations of a substance or procedure, but is not due to the inherent therapeutic power of the drug itself (Stewart-Williams & Podd, 2004; Moerman, 2002; Price, Finniss & Benedetti, 2008; Shapiro & Morris, 1978). Placebo effects have been a concern for a long time, not only as an inert treatment that is administered under controlled conditions to test the true effect of medicine (Geers & Rose, 2011), but also as a component of almost every medical treatment. It refers to the proportion of the effectiveness caused not by the active ingredient in the medicine, but by psychological power that causes a psychophysiological reaction. Placebo effects are not exclusively beneficial; placebos can also cause unintended side effects. This adverse experience induced by placebos is known as a nocebo effect (Barsky, Saintfort, Rogers & Borus, 2002).

As placebo/nocebo effects could influence medical treatments, studies have been done to understand the mechanism underlying these effects (e.g., Montgomery & Kirsch, 1997), as well as variation in the strength of these effects (Geers & Rose, 2011). Most research on placebo/nocebo effects uses expectancies as the key mechanism by which effects occur (Montgomery & Kirsch, 1997). An individual’s expectancy could influence her psychological conditions then induce a psychophysiological reaction; or an expectancy could lead to specific psychological interpretive framing that shifts a neutral experience in the direction of her expectancy (Geers & Rose, 2011).

Many contextual factors can influence placebo/nocebo effects. For example, the information provided about a particular drug could play a major role in the occurrence of
placebo/nocebo effects, as people form their expectancy about a drug’s performance based on the information they get about the drug (e.g., Benedetti, 2008). This information could be seen in ads, verbal as well as written instructions, and in consent forms before medical treatments. An individual’s previous experience could also influence placebo/nocebo effects, as they might expect the previously experienced physical feelings to occur again if they take a similar or the same drug after a few times (Benedetti, Pollo, Lopiano, Lanotte, Vighiti, et al., 2003). Placebo as well as nocebo effects are also believed to be greatly influenced by individual differences. For example, individuals differ in their psychological susceptibility to placebo effects (Horne, Faasse, Cooper, Diefenbach, Leventhal, Leventhal, & Petrie, 2013). However, as a source of collective difference, cultures are seldom studied regarding this issue.

There are many studies showing that Eastern people tend to think holistically, which means that they tend to think of objects and the environment as a whole; Western people tend to think analytically, they tend to decontextualize objects from their original background (Nisbett, Peng, Choi & Norenzayan, 2001). Dialectical thinking propensity, which refers to people’s tendency to attend to change, contradiction, and multiple perspectives when processing information is a related cultural distinction in thinking style (Nisbett et al. 2001). This could possibly affect how people might differ in their processing of double-sided information (both positive and negative effect information) about drugs. However, little has been done examining this cultural difference in the realm of placebo/nocebo effects. A knowledge gap exists regarding how distinctions in people’s dialectical thinking propensity
might lead to diverse drug information comprehension, and differential expectancy
generation. One prominent way drug information is delivered is via advertising.

As a sort of verbal suggestion delivered through mass media, we can view
pharmaceutical advertising as a contextual factor affecting placebo and nocebo effects.
Pharmaceutical ads have been a concern in the health communication industry because
people may misinterpret ad messages and either underestimate or overestimate side effects
conveyed (Avery, Eisenberg & Simon, 2012; Cox, Cox & Mantel, 2010; Maat & Klaassen,
1994). Also, the way pharmaceutical ads convey risk information can influence how people
comprehend the information and may lead them to expect different outcomes (e.g., Cox et al.,
2010; Matt & Klaassen, 1994). Pharmaceutical ads could also be used to observe cultural
influences on how people process drug information, as advertising is a common way to
deliver drug information in many cultures. We can use pharmaceutical ads to explore how
drug information presented in an ad might change placebo/nocebo effects, and how
individuals from different cultures might react differently towards the ads. These possible
influences have not been systematically studied.

In this thesis I will explore whether placebo/nocebo effects elicited by pharmaceutical
ads differ depending on viewers’ cultural backgrounds, and if so, whether this difference
could be influenced by different features of the pharmaceutical ads. In this research,
participants from both Eastern (China) and Western (U.S.) cultures were exposed to
pharmaceutical ads that vary in their specificity and were then asked about the likelihood they
would experience the effects mentioned in the ads. The findings from this study can hopefully
contribute to research on cultural differences, placebo effects and pharmaceutical advertising.
If there really are differences buried in culturally-based cognitive processes that determine different responses to risk information within pharmaceutical ads, we can illuminate how to communicate with patients more effectively, in ways that correspond to different types of cognitive processing.
CHAPTER 2: LITERATURE REVIEW

2.1 Placebo and Nocebo Effects

Medical procedures are always accompanied by psychological factors influencing the therapeutic outcomes (Benedetti, 2002; Price, Finniss, & Benedetti, 2008; Di Blasi et al., 2001; Geers & Rose, 2011). What patients experience may not only come from the objective effect caused by the active ingredient in the medication, but also how they subjectively perceive their experience. This subjective, psychological influence could be affected by contextual factors like verbal suggestions from doctors (Thomas, 1987), behaviors of healthcare providers (Price et al. 2008), or the doctor-patient relationship (Stewart, McWhinney & Buck, 1979). This psychological influence on the therapeutic outcomes, also named placebo effect, has been a concern in medical practice, as well as in research (Moerman, 2002).

Placebo effects were first intentionally applied to clinical treatments to create concurrent controlled conditions, in order to separate what was caused by the active content of the medicine from the whole effect elicited by the treatment, including a specific medication (Diehl et al., 1938). However, placebo effects are not limited to responses to placebo used as a control in clinical trials (Shapiro, 1964); placebo effects are at least partially responsible for beneficial or detrimental outcomes in every medical treatment (Geers & Rose, 2011; Harrington, 1997). The detrimental part of the effects, referred to as nocebo effects, describes the “noxious or distressing effects of a placebo” (Barsky et al., 2002, p. 662. Nocebo effects, like placebo effects, include not only the effects elicited by placebo used in clinical trials, but also those negative feelings contained within the everyday medical treatment.
When studying how placebo effects occur, researchers usually look at patients’ expectancies regarding symptom relief preceding the administration of a placebo, as is demonstrated in both Western and Eastern cultures (e.g., Montgomery & Kirsch, 1997; Price, Milling, Kirsch, Duff, & Montgomery, 1999; Zhang & Luo, 2009). Expectations affect placebo effects as well as their magnitude in several possibly overlapping ways. For example, an expectation of beneficial results from a medical treatment can increase pleasant feelings and trigger biological reward mechanisms in people’s brains (Benedetti, 2008), increasing the level of dopamine (Scott, Stohler, Egnatuk, Wang, Koepppe, & Zubieta, 2008), inducing positive physical feelings. Expectations for symptom relief can also suppress or reduce negative feelings, such as anxiety, through increasing the level of opioid (Petrovic, Dietrich, Fransson, Andersson, & Carlsson, 2005; Scott et al., 2008). In addition, expectations can act as a frame to guide one’s interpretation of their feelings, thus redirecting a patient’s attention, detection, appraisal, and recall of symptoms to be consistent with their expectancies (Geers, Weiland, Kosbab, Landry, & Helfer, 2005; Geers & Rose, 2011).

Like placebo effects, it is widely believed that nocebo effects are also caused by people’s expectations (Faasse & Petrie, 2013; Well & Kaptchuk, 2012). Also, nocebo effects are based on the same biological foundation of dopamine and opioid activity as placebo effects, with the levels of dopamine and opioid increasing in placebo effects and decreasing in nocebo effects (Scott et al., 2008). Empirical studies have demonstrated that as the experience of positive effects rise, the experience of side effects may decrease, and vice versa (Bartley, Faasse, Horne, & Petrie, 2016), supporting the idea that placebo and nocebo effects share the same mechanism, but in opposite directions.
What causes people to form expectancies that induce placebo/nocebo effects? Verbal suggestions from doctors (Gönül, Carter, Petrova, & Srinivasan, 2001), drug instructions and consent forms (Wells & Kaptchuk, 2012) could all influence what patients expect their medical outcomes to be. However, pharmaceutical advertisements, as an important form of drug information, are seldom studied regarding their possible influences on people’s expectancies preceding placebo/nocebo effects. Several factors in pharmaceutical ads could influence people’s perception of the risk and benefit probability, including the amount of information (Mazis, McNeil & Bemhardt, 1985), and the specificity and format of information delivery. An increase in the specificity of risk information can increase consumers’ elaboration on the information, thus cause greater awareness towards the risk (Morris, Mazis & Brinberg, 1989). As well, people’s perception of the positive attributes can be harmed by the warning information contained in the ads (Morris et al., 1989; Maat & Klaassen, 1994). Thus, pharmaceutical ads, as well as their format, could influence how people form expectancies of the drugs’ positive and negative effects, which would later affect placebo/nocebo effects.

In this paper, I will use dietary supplement ads to test placebo/nocebo effects, as they’re both legal and common in most of the world (World Self-Medication Industry, 2008). Risk information specificity (as is frequently used in both ad practice and research) will be manipulated to influence people’s expectations for both the positive and side effects.

Although pharmaceutical advertisements might have an impact on people’s expectancies, the evidence for this idea comes from studies mostly done in the U.S. Research has also been done in Eastern cultures demonstrating the existence of placebo/nocebo effects (Liu, Cui &
Meng, 2003), however, pharmaceutical ad’s influence on this effect is seldom discussed in an Eastern context. People from different cultures are known to differ in their information processing styles (Nisbett et al., 2001). It is possible that when dealing with pharmaceutical ads, people form expectancies for the medicines’ effects differently because of different information processing styles. However, this issue has not yet been studied. In the next section, I will look at the issue of people’s expectancies about drugs’ effects through a lens of cultural differences.

2.2 Comparing Cultural Differences

**Holistic vs. Analytic Thinking Styles.** Cultures are believed to be closely related to many aspects of life, for example how people think and behave (e.g., Peng & Nisbett, 1999). Differences between Eastern and Western people’s cognitive processing styles are likely derived from ancient social practices (Larrick, Nisbett, & Morgan, 1993; Nisbett, Fong, Lehman, & Cheng, 1987; Smith, Langston, & Nisbett, 1992). Ancient China’s civilization valued obligation and the surrender of freedom to the larger social organism, whereas ancient Greek civilization was characterized by personal freedom and an absence of social constraint. These early differences cultivated different psychological attributes and shaped people’s metaphysical beliefs in Eastern versus Western cultures (Lloyd, 1990; Nisbett et al., 2001). Extended from social practices focusing on in-group harmony, Eastern belief is therefore oriented towards the context or field as a whole, while the Western social practice, which treasures individual freedom, emphasizes decontextualizing objects from their original background. This has led to different epistemologies—ways to observe and understand the world.
Eastern people see the relationship between focal objects and the environment as important in their social observation and practice, while Western people focus more on the attributes and use explicit evaluative guidelines when describing an object (Nisbett et al., 2001). These differences in people’s metaphysical beliefs and epistemologies cause them to go through different styles of cognitive processing when confronted with information. People in Eastern cultures tend to be more holistic, while people in Western cultures tend to be more analytic (Peng & Nisbett, 1999).

Holistic processing is more dialectical, which means that there is a tendency to attend to change, contradiction, and multiple perspectives when processing information. Also, there is an inclination to search for a “middle way” when dealing with opposing propositions, and find solutions that are somewhat reasonable (but might not be absolutely right) to both sides at the same time (Nisbett et al., 2001). Being analytic, on the other hand, refers to a preference for viewing the world as “a collection of discrete objects” (Nisbett et al., 2001, p. 293) that can be categorized, explained, and predicted using explicit guidelines (Peng & Nisbett, 1999; Nisbett et al. 2001). Analytic thinkers tend to decontextualize structure from the content and follow formal logic to make inferences about objects or issues, at the same time reducing contradiction to form a more one-sided opinion when making decisions (Witkin, Dyk, Faterson, Goodenough, & Karp, 1974; Witkin, Lewis, Hertzman, Machover, Meissner, & Wapner , 1954). For example, when presented with a mother-daughter conflict that happens in people’s daily life, Chinese participants preferred dialectical resolutions that address the issue from both sides, while American people preferred nondialectical resolutions which attribute the fault to only one side (Nisbett & Peng, 1999).
This distinction in people’s propensity for dialectical thinking becomes more salient in circumstances where people are faced with simultaneously opposing information; dialectical thinking is largely responsible for cultural differences in processing opposing information. In Eastern cultures, as people’s attention is more likely to be concerned with the large picture, complexity, change, and contradiction in the environment are more salient. Therefore, it is not incompatible to simultaneously process opposite information in the same context (as a second step of paying attention to them), and hold the point of view that both A and not-A have merit (Lloyd, 1990), which is a reflection of people’s propensity to think dialectically. This results in a higher tolerance of information from opposite sides (Peng & Nisbett, 1999). On the other hand, Western people’s tendency towards logical rules guides attention directly towards categorizing items into structures and systems, resulting in seeing objects as organized elements without opposing relations between each other. Therefore, Western analytic thinking causes avoidance of a situation where both A and not-A are reasonable, but rather encourages a decision of whether A, or not-A, is the case (Peng & Nisbett, 1999). This strategy towards opposite information can be seen as a reflection of their lower propensity of dialectical thinking, and results in a lower tolerance for contradictory information and a stronger tendency to reduce contradictory information, which leads to the formation of more one-sided opinions. This is generally how the cultural difference in people’s preference for dialectical thinking (Eastern) vs. contradiction avoidance (Western) influences their tolerance for conflicting information (Nisbett et al. 2001; Nordgren, Harreveld, & Pligt, 2006; Spencer-Rodgers Williams, & Peng, 2010). In the next section, I discuss how the feeling of ambivalence could influence people’s information processing and judgment formation, and
how ambivalence tolerance influences how people deal with their ambivalent attitudes in forming judgments.

**Ambivalence Tolerance and Processing Conflicting Information.** The phenomenon of ambivalence describes the “co-existence of positive and negative dispositions towards an attitude object” (Nordgren et al., 2006, p.254). Cultural orientation affects people’s tolerance for ambivalence, which refers to a cognitive tendency to accept contradictions or ambivalent beliefs (Peng & Nisbett, 1999; Peng, Spencer-Rodgers & Nian, 2006). People in Eastern, holistic cultures are more likely to have a higher tolerance for ambivalence in tasks involving the reconciliation of conflicting information, and they also tend to accept contradictory beliefs more readily than Western people (Choi & Choi, 2002; Spencer-Rodgers, Boucher, Mori, Wang, & Peng, 2009; Spencer-Rodgers et al., 2010). On the other hand, people in Western analytic cultures have lower tolerance for ambivalence and hold a stronger motivation to reduce incongruity. The whole process of ambivalence reduction described below is more apparent among Western people (Ng, Hynie & MacDonald, 2012).

For those people who have relatively low tolerance for ambivalence, processing inconsistent information can cause cognitive dissonance (Festinger, 1957; Williams & Aaker, 2002) and aversive feelings (Aaker, Drolet & Griffin, 2008; Nordgren et al., 2006), which leads to efforts to eliminate it by resolving the inconsistency (Festinger, 1957). When the uncomfortable feeling induced by conflicting information is low, people tend to use heuristic cues to make judgments, for example, their previous attitudes (Nordgren et al., 2006) and intrinsic beliefs (Nisbett et al., 1987). When the discomfort caused by the discrepancy increases to a level that motivates them to seriously consider conflicting information, people
tend to process the information in the situation more systematically and rely more on relatively persuasive cues (Morris & Peng, 1994; Aaker & Sengupta, 2000). As a result, they will tend to form unipolar thoughts and attitudes directed at the more persuasive side (Nordgren et al., 2006; Aaker et al., 2008).

As described above, the different cognitive processing styles between Eastern holistic thinkers and Western analytic thinkers could lead to psychological or behavioral consequences, including cognition, comprehension, and behavioral outcomes (e.g., Okazaki & Kallivayalil, 2002; Okazaki, 2002). Perceptions of advertising, too, are influenced by culturally different information processing styles. Pharmaceutical advertisements contain both positive and side effect details: contradictory information. When reading pharmaceutical ads, Eastern and Western people’s different tolerance for ambivalence might trigger different thoughts about the ad information, eliciting different expectancies and attitudes.

2.3 Current Study

In this paper, I studied people from China and the U.S., representing Eastern and Western cultures where people differ in cognitive processing styles, to test how culture influences people’s perceptions of the effectiveness as well as risk information of an advertised supplement. I also studied the influence of risk information specificity on how people perceive as well as expect the benefits and risks associated with taking a supplement.

The risk information was shown in either general terms or specific terms, as a manipulation of its specificity. More specific risk information in pharmaceutical ads leads to more elaboration and higher awareness of the risks (Morris et al., 1989). Also, specificity influences argument quality. More specific information was perceived to be more persuasive
and induced more attitude change (Leventhal, Singer & Jones, 1965). Therefore, the risk information specificity should have an impact on persuasiveness of the risk information, with more specific risk information being more persuasive.

As the supplement’s benefits were described in detail in both conditions, the manipulation of risk information specificity should also affect the relative persuasiveness of side effect information and benefit information. For the general side effect information condition, benefits were described more specifically than side effects, so that benefits should be more persuasive than side effects and people would form higher expectancies for benefits than side effects. In the specific side effect information condition, the benefits and side effects were described in similar specificity, thus the benefit and side effect information should be similarly persuasive. However, as bad information tends to produce larger effects than good information (Baumeister, Bratslavsky, Finkenauer & Vohs, 2001), there should be more expectancies of side effects than benefits. Therefore, I am predicting an expectancy type (benefits v. side effects) by side effect specificity (general v. specific) interaction effect:

H1: When risks are described in general terms, people’s expectancies towards the supplement’s benefits should be higher than their expectancies for side effects; When risks are described in specific terms, people’s expectancies for side effects should be higher than their expectancies for benefits (see Figure 1 for hypothesized results).
Different expectancies of the supplement benefits and side effects should also be influenced by the interaction between cultural backgrounds and the specificity of side effect information. Western people have a lower tolerance for ambivalence than Eastern people, and should have stronger feelings of inconsistency when faced with conflicting information. Thus, Westerners should have a stronger tendency to reduce the inconsistency by deciding that the supplement is either beneficial, or harmful (via side effects). Eastern people, on the other hand, have higher tolerance for ambivalence. They should not have strong aversive feelings caused by inconsistency, and thus have little need to reduce the inconsistency by choosing a single side to take. When confronted with contradictory information, they should consider information from both sides, generate double-sided opinions and expect both benefits and side effects to occur. And information specificity should moderate these effects.

First, I consider participants’ expectancies about benefits. I predict an interaction between cultural backgrounds and the specificity of side effect information on people’s expectancies of the supplement’s benefits. When side effects are described in general terms,
Western participants should find benefit information more convincing. This should cause them to form high expectancy for benefits. Eastern participants should consider information from both sides. And as Eastern participants should have little need to decide on just one single side to take, both positive and negative expectancies would be formed separately. Therefore, people from Eastern and Western cultures should process information about the supplement’s efficacy similarly, and both form high expectancies for benefits.

When the side effect information becomes more specific and convincing, the benefit and side effect information should be similarly persuasive. However, when deciding a single side to take, Western people would be more sensitive to the negative side, because bad information tends to be more impactful than good information (Baumeister et al., 2001). Therefore, Western people should tend to take the negative side and have lower expectancies for benefits to occur, compared to when the side effects are described in general terms. Because Eastern people are more tolerant of contradictory information, an increase in side effect information specificity should not affect their expectancy of a supplement’s benefits. Thus, their expectancies for the supplement’s benefits should remain at the same level as when the side effects are described generally. For expectations about a supplement’s benefits, a cultural difference should emerge in Western and Eastern people’s expectancies only when side-effect information is specific (and therefore more persuasive), as Western people expect less positive effects than Eastern people. I am predicting an interaction between cultural backgrounds (Eastern v. Western) and side effect specificity (general v. specific) on people’s expectancies of the supplement’s benefits:
H2: When seeing pharmaceutical ads where side effects are described in general terms, Eastern people and Western people would expect similar levels of benefit. When seeing pharmaceutical ads where side effects are described in specific terms, Eastern people would expect more benefits to occur, compared to Western people (see Figure 2 for hypothesized results).

Next, I consider participants’ expectancies about side effects. I predict an interaction between culture and side effect specificity on people’s expectancies for the supplement’s side effects. When side effects are described in general terms, Western participants should find side effect information less convincing, causing them to have a lower expectancy for side effects. On the other hand, though the side effect information is not specific, Eastern people should still consider risk information and form expectancies of the possible side effects.

When the side effect information becomes more specific and convincing, the benefit and side effect information should be similarly persuasive. Therefore, Western people should have higher expectancies for negative effects to occur (again, because negative information is more
impactful than positive information; Baumeister et al., 2001), compared to when the risks are described in general terms. Eastern people, on the other hand, should also perceive risk information to be more persuasive compared to when it is described in general, so that they would expect a greater likelihood of side effects. People from Eastern and Western cultures should not differ in their expectancies for side effects to occur, as they should process information about the supplement’s side effects similarly. For negative expectations about a supplement’s side effects, a cultural difference should emerge in Western and Eastern people’s expectancies only when side effect information is general (and therefore less persuasive), as Western people expect lower likelihood of side effects than Eastern people. I am predicting an interaction between cultural backgrounds (Eastern v. Western) and side effect specificity (general v. specific) on people’s expectancies of the supplement’s side effects:

H3: When seeing pharmaceutical ads where side effects are described in general terms, Eastern people would expect more negative effects to occur, compared to Western people. When seeing pharmaceutical ads where side effects are described in specific terms, Eastern people and Western people would expect similar occurrence of side effects (see Figure 3 for hypothesized results).
Taken together, hypotheses 2 and 3 represent a predicted three-way interaction among two between-participants variables (culture and side effect information specificity) and one within-participants variable (expectancies about benefits and side effects).

H4: The interaction between culture and side effect specificity will differ for expectations about benefits and side effects. H2 describes the predicted interaction for expected benefits, and H3 describes the predicted interaction for expected side effects.

I am proposing an asymmetry for positive versus negative expectancies among Eastern people. Eastern people have higher tolerance for ambivalence and little need to decide on a single side to take when processing conflicting information. As the supplement’s benefits and side effects are described separately in the ad, Eastern respondents would process the benefits and side effects separately. They would form their expectancies about benefits based on the benefits mentioned in the ad, and form their expectancies about side effects based on the side effects mentioned in the ad. Therefore, the increase in the risk information specificity and persuasiveness should only influence Eastern respondents’ expectations of side effects, and
not benefits. As benefit information remains the same between two conditions, Eastern people’s benefit expectancies about the supplement should remain the same. This asymmetry should not exist among Western people. Western people tend to decide on a single side to take based on double-sided information. Therefore, as risk information specificity increases, they should switch their side from positive to negative, causing benefit expectancies to decrease and side effect expectancies to increase.

As explained in the Introduction, cultural differences in people’s expectancy over the supplement might be due to differences in people’s information processing style, instead of Western vs. Eastern geographic distinction. Therefore, I am also predicting an interaction between people’s dialectical thinking propensity and side effect information specificity on their expectancies of the supplement.

People with lower dialectical thinking propensity tend to have lower tolerance for ambivalence, and should have stronger feelings of inconsistency when faced with conflicting information, which should result in more single-sided expectancies (in this case, the more persuasive side). As their tendency to engage in dialectical thinking increases, their tolerance for ambivalence should also increase, resulting in less feelings of inconsistency and more double-sided expectancies. Information specificity should moderate this effect.

First, I consider participants’ expectancies about the benefits. When side effects are described in general, the positive information is more persuasive than negative information, and people would generally expect more positive effects. Therefore, people with different dialectical thinking propensity should not differ much in their positive expectancies. When the side effects are described in detail, the positive and negative information are at the same
level of specificity, but negative information should be perceived as more persuasive, as negative information tends to be more impactful than positive information (Baumeister et al., 2001). People with lower dialectical thinking propensity should consider benefits in the ad information to be less likely than people with higher dialectical thinking propensity. This should cause a tendency that the more dialectically people think, the higher positive expectancies they form.

H5: When the side effects are described in general, people different in their dialectical thinking style should have similar positive expectancies of the supplement. When the side effects are described in detail, the more dialectically people think, they will form more positive expectancies of the supplement.

Next, I consider participants’ expectancies about side effects. When side effects are described in general, the side effects are much less persuasive compared to positive effects. Therefore, people who are lower in their dialectical thinking propensity should be influenced by this relative persuasiveness and expect fewer side effects to occur. The more dialectically people think, the less likely they will be influenced by the relative persuasiveness, and will separately process the double-sided information while making judgments. Therefore, the more dialectically people think, the more negative expectancies they will form. When the side effects are described specifically, the side effects are at the same level of specificity as the benefits, but should be more impactful (again, Baumeister et al., 2001) and therefore more persuasive. People should generally expect negative effects from the supplement. Therefore, in this specific side effect situation, people with different dialectical thinking styles should not differ much in their negative expectancies.
H6: When the side effects are described in general, the more dialectically people think, the higher negative expectancies of the supplement they will form. When the side effects are described in detail, people different in their dialectical thinking style should have similar negative expectancies of the supplement.

Taken together, hypotheses 5 and 6 represent a predicted three-way interaction among two between-participants variables (dialectical thinking propensity and side effect information specificity) and one within-participants variable (expectancies about benefits and side effects).
CHAPTER 3: METHODOLOGY

3.1 Pretest

3.1.1 Participants and Design

A pre-test was conducted to select appropriate elements to use in the pharmaceutical ad design for the main study. In the pre-test, 64 participants responded to an online survey, with 30 undergraduate students recruited from a large Midwestern university in the U.S., and 34 undergraduate students recruited from a large university in China.

3.1.2 Procedure

The pre-test used a within-subject design. Two brand names and two photos for the ad were tested regarding their appropriateness and similarity to normal vitamin supplement ads on seven-point scales. Also, ten possible benefits of the vitamin supplement were tested regarding their likelihood of occurrence, helpfulness, and likelihood of taking place in 30 minutes on seven-point scales. Ten possible side effects of the vitamin supplement were also tested regarding their likelihood of occurrence, unfavorability, and the likelihood of taking place in 30 minutes on seven-point scales. Then the formats for side effects were tested. Two versions of how side effect information would be presented were shown to participants. One version vaguely mentioned the possible discomfort using general terms, stating that “if you have any discomfort after taking the supplement,” whereas the other version clearly described

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1 I also collected information about people’s predisposition towards medicine (Moss-Morris, Weinman, Petrie, Horne, Cameron, & Buick, 2002), but for the sake of brevity that information is not discussed in the main body any further. A copy of the pretest questionnaire including all questions asked of participants is in Appendix A.
the specific possible risks like “unnatural flush or swelling of your face, lips, tongue or throat.” (see Appendix A for detail) Participants’ perception of the specificity and appropriateness of the two versions of side effect descriptions were assessed. At the end, their basic demographic information was gathered.

3.1.3 Results

The results of the pre-test are as follows. Paired samples t-tests were conducted on the measures of brand names and photos. The brand name “Natural Lives” (M = 4.71, SD = 1.55) was perceived to be more appropriate than the name “Vegetation” (M = 3.73, SD = 1.58), \( t_{\text{student}}(58) = 4.62, p < .001, d = .60 \). The name “Natural Lives” (M = 3.97, SD = 1.79) was also perceived to be more like other existing vitamin supplement brands on the market than the name “Vegetation.” (M =3.34, SD = 1.68), \( t_{\text{student}}(58) = 2.49, p < .02, d = .32 \). Therefore, “Natural Lives” was chosen as the product name for the main study. The first photo presenting a basket of fruits and vegetables (M = 5.56, SD = 1.42) was rated significantly more appropriate than the second photo presenting a man standing on top of a mountain (M = 4.73, SD = 1.59), \( t_{\text{student}}(58) = 3.15, p = .003, d = .41 \) (see Appendix A for the photos). The first photo (M = 5.73, SD = 1.60) was also significantly more similar to other vitamin supplement ads, compared to the second photo (M =4.34, SD = 1.68), \( t_{\text{student}}(58) = 3.69, p < .001, d = .48 \). Therefore, the first photo was chosen for the main study.

For the ten appeals of the vitamin supplements’ benefits, the mean scores of their likelihood of occurrence, helpfulness and likelihood of occurring in 30 minutes were compared (see Appendix C Table 3 for means and standard deviations). As this paper
concerns placebo/nocebo effects, the seven benefits that were rated highest in the likelihood of occurring in 30 minutes were selected for the main study. The scores of these seven benefits on the other two measures were also checked, and none of them has the lowest score in the other two measures. For the ten side effects, the four side effects that were rated highest in the likelihood of occurring in 30 minutes were selected for the main study. The scores of these four side effects on the other two measures were also checked, and none of them had the lowest score in the other two measures (see Appendix C Table 4 for means and standard deviations).

Paired samples t-tests were conducted to test the perceived specificity of the two versions of side effect descriptions. The specific one (M = 5.83, SD = 1.21) was rated significantly higher in specificity than the general one (M = 2.71, SD = 1.57), \( t_{\text{student}} (58) = -11.72, p < .001, d = -1.53 \). There was no difference between the perception of the appropriateness of the specific (M = 4.95, SD = 1.82) and general (M = 5.27, SD = 1.38) side effect information, \( t_{\text{student}} (58) = 1.29, p = .204, d = 0.17 \).

3.2 Main Study

3.2.1 Participants and Design

One hundred forty-two people participated, 78 of them undergraduate students recruited from a large Midwestern university in the U.S. (representing Western culture), and 64 of them undergraduate students recruited from a large university in China (representing Eastern culture). The study used a 2 (cultural background: Western vs. Eastern) x 2 (side effect information specificity: specific vs. general) (x 2 (expectancy: benefits and side effects))
mixed, quasi-experimental design. The culture and specificity were between-participants variables, and expectancy was a within-participants variable. For both cultural groups, participants were randomly assigned to one of the two side effects information specificity conditions.

### 3.2.2 Procedure

A Chinese experimenter conducted all sessions. Participants were seated in a classroom, gave consent to participate in the study, and were then given a questionnaire booklet. Participants were instructed that they would first read a pharmaceutical ad for a vitamin supplement that was going to be launched to the market soon, then asked to answer some questions about their evaluation of the ad as well as their own information processing styles, then take the advertised vitamin supplements and report their physical feelings. The last two steps in this process (taking a vitamin supplement and reporting physical feelings) did not actually take place; they were intended to make participants immersed into the situation, so that they would consider the information and answer the questions thoughtfully. Following these instructions, everyone read the pharmaceutical ad, which contained the side effect specificity manipulation. Then they were asked about their expectancies for the benefits and side effects of the vitamin supplement to occur, also their expectancy for the supplement’s outcome to be beneficial and harmful\(^2\). Participants then finished the questionnaires indicating their perception of how specific the side effects mentioned in the ads were (a

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\(^2\) Participants were also asked to list their thoughts about these ads then code their thoughts as positive, neutral or negative. However, more than half of the participants from China didn’t code their thoughts themselves, so this measure was abandoned in the analyses. For the sake of brevity that information is not discussed any further.
manipulation check), and completed a measure of their dialectical thinking propensity\(^3\).\(^4\). They were thanked and debriefed about the purpose of this experiment in the end.

### 3.2.3 Independent Variables

**Cultural background.** Western participants were recruited from a large sample pool of undergraduate students majoring in Advertising at the University of Illinois in the U.S.. Eastern participants were recruited from a sample of undergraduate students registering for the class “Advertising Strategies” in Wuhan University in China. This allowed for a quasi-experimental study on the effect of cultural backgrounds on responses to the stimuli.

**Side Effect Information Specificity.** To manipulate the specificity of the side effect information, two versions of vitamin supplement ad were created. For the high specificity condition, side effects were described in detail. For example, “if it causes slight stomach ache due to the acidic ingredient, unusual or unpleasant taste in your mouth, unnatural flush, or appetite loss, please consult your physician for further instruction.” For the low specificity group, side effects were described vaguely without mentioning what exact feelings would people have after taking the supplement. For example, “if you feel uncomfortable with your stomach or mouth, or have any other unpleasant feelings after taking this, please consult your physician for further instruction.” All the other information remained identical in these two conditions, which also includes seven benefits and other necessary elements in an ad. The

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\(^3\) Data were also collected on people’s predisposition towards medicine using the same scale as in the pretest, but for the sake of brevity that information is not discussed any further.

\(^4\) Data were also collected on people’s holistic vs. analytic processing orientation, using the 24-item AHS scale developed by Choi, Koo & Choi (2007), but the four-factor solution presented in Choi et al. (2007) shows poor fit in the confirmatory factor analysis and is therefore not discussed any further in the result section. Please see Appendix D for more detail.
copy of the ads was written in the native language in both cultures, as Chinese participants read a Chinese version and U.S. participants read an English version; the content remained equivalent between two cultures.

3.2.4 Dependent Measures

**Expectancies.** Participants’ expectancies towards the vitamin supplements’ effects were assessed in four questions. Two questions measured the likelihood participants expect to experience the benefits and side effects mentioned in the ads on five-point scales, ranging from *extremely unlikely* to *extremely likely*. For these two questions, higher scores indicate a higher expectancy of experiencing the effects. One question measured participants’ expectancy for the outcome of taking the supplement to be beneficial, using a five-point scale ranging from *beneficial* to *neutral*, and the last one question measured participants’ expectancy for the outcome of taking the supplement to be harmful, using a five-point scale ranging from *harmful* to *neutral*. For the last two questions, the scores were reversed, and higher scores indicate a higher expectancy for the outcome to be beneficial/harmful. The question asking about people’s expectancies of benefits, and the question asking about people’s expectancy for the outcome of taking the supplement to be beneficial, were both intended to measure people’s positive expectancies, and would be collapsed into one in the analysis. The question asking about people’s expectancies of side effects, and the question asking about people’s expectancy for the outcome of taking the supplement to be harmful, were both intended to measure people’s negative expectancies, and would also be collapsed into one in the analysis.
**Dialectical Thinking Propensity.** The Dialectical Self-Scale (DSS) (Spencer-Rodgers, Srivastava, Boucher, English, Paletz, & Peng, 2015) was administered. Participants indicated the extent to which they agreed with each of the statements (e.g., “I am the same around my family as I am around my friends” and “When I hear two sides of an argument, I often agree with both”), rating on a seven-point scale ranging from **strongly disagree** to **strongly agree**. Higher scores on this scale indicate a more dialectical thinking style (See Appendix B for full scale).

**Manipulation Check.** The manipulation check for side effect specificity was measured by asking participants to evaluate the perceived specificity of the side effects mentioned in the ads on a five-point Likert-type scale, ranging from **general** to **detailed**. Higher scores reflect more detailed information. I also checked whether participants stayed in their current cultures for more than 3 years.
CHAPTER 4: RESULTS

4.1 Manipulation Check.

Seven participants from Western culture group were excluded from the results, as they hadn’t yet stayed in their current culture for 3 years, and should not be considered good subjects of the cultural influence. In line with the intended manipulation, participants who saw the specific side effect information (M = 3.09, SD = 1.39) rated the ads as being more specific than participants who saw the general side effect information (M = 1.84, SD = 1.24), \( t_{welch}(128) = -5.51, p < .001, d = 0.95 \) (Delacre, Lakens, & Leys, 2017).

4.2 Descriptive Analyses

Means, standard deviations, ranges, and reliability statistics of the variables measured in the study are presented in Table 1.
### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Possible range</th>
<th>Alpha</th>
</tr>
</thead>
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<tr>
<td>Western</td>
<td>Eastern</td>
<td>Total</td>
<td>Western</td>
<td>Eastern</td>
</tr>
<tr>
<td>Positive effect expectancy</td>
<td>3.38</td>
<td>3.12</td>
<td>3.26</td>
<td>1.03</td>
</tr>
<tr>
<td>Negative effect expectancy</td>
<td>2.59</td>
<td>2.46</td>
<td>2.53</td>
<td>0.92</td>
</tr>
<tr>
<td>Beneficial outcome</td>
<td>3.00</td>
<td>2.69</td>
<td>2.85</td>
<td>1.40</td>
</tr>
<tr>
<td>Harmful outcome</td>
<td>1.69</td>
<td>1.66</td>
<td>1.68</td>
<td>0.95</td>
</tr>
<tr>
<td>Dialectical thinking propensity</td>
<td>4.15</td>
<td>4.31</td>
<td>4.23</td>
<td>0.47</td>
</tr>
</tbody>
</table>

4.3 Relationships Among Variables

Relationships among participants’ dialectical thinking propensity and dependent variables of participants’ expectancies towards the nutritional supplement are in Table 2. The correlation matrix shows that participants’ expectancy of the supplement having benefits was significantly correlated with the extent to which participants expected taking the supplement.
to be beneficial \((r = 0.375, p < 0.001)\). Participants’ expectancy of supplements having side effects was significantly correlated with belief about the supplement being harmful \((r = 0.297, p = 0.001)\). Given that the two questions of participants’ positive expectancies, and the two questions of participants’ negative expectancies were significantly correlated (although not as high as hoped), I collapsed them into two measures: one reflecting positive expectancies, and the other reflecting negative expectancies.

<table>
<thead>
<tr>
<th></th>
<th>Positive effect expectancy</th>
<th>Negative effect expectancy</th>
<th>Beneficial outcome expectancy</th>
<th>Harmful outcome expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative effect expectancy</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beneficial outcome expectancy</td>
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<td>0.088</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harmful outcome expectancy</td>
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<td><strong>0.297</strong></td>
<td>0.161</td>
<td></td>
</tr>
<tr>
<td>Dialectical thinking propensity</td>
<td>0.150</td>
<td>0.076</td>
<td>0.136</td>
<td>-0.033</td>
</tr>
</tbody>
</table>

Note:  
*p<.05  
**p<.01

Table 2

4.4 Tests of Hypotheses

4.4.1 Three-way mixed ANOVA: effect of Culture by Side Effect Information Specificity by Expectancy Type on Expectancies

Participants’ expectancies of the supplement’s effects were examined using a* Title each appendix with a title that describes its contents and add the title to the table of contents. 2 (Culture: Western or Eastern) x 2 (Side Effect Information Specificity: General or Specific) (x (2 Expectancy Type: Positive or Negative)) mixed three-way ANOVA; culture and specificity were between-participants variables, and expectancy type was a within-
participants variable. This analysis revealed a main effect for expectancy type. People expected more positive effects (M = 3.05, SD = .99) than negative effects (M = 2.11, SD = .81), F(1, 118) = 67.701, p < .001, $\eta^2 = .365$. There was no main effect for culture: Western people (M = 2.66, SD = .64) and Eastern people (M = 2.49, SD = .67) did not differ in mean expectancy scores, F (1, 118) = 1.99, p = .16, $\eta^2 = .017$. This main effect is relatively uninterpretable, though, as the dependent measure is the combined mean of positive and negative expectancies, which theoretically reflects how much people expect the supplement have an effect in either positive or negative directions. Hereafter, similarly uninterpretable dependent measures, where positive and negative expectancies are combined into a single dependent measure, will be noted, “(uninterpretable).” There was no main effect for side effect information specificity: Participants who saw general side effect information (M = 2.57, SD = .68) and participants who saw specific side effect information (M = 2.59, SD = .65) did not differ in mean expectancy scores (uninterpretable), F (1, 118) = .004, p = .95, $\eta^2 = .000$

H1 proposed an expectancy type by side effect information specificity interaction, that people would have higher expectancies of benefits than side effects in the general condition, and higher expectancies for side effects than benefits in the specific condition. However, according to the results, there was no interaction between expectancy type and side effect information specificity, F (1, 118) = .21, p = .65, $\eta^2 = .002$. People who saw specific side effect information and people who saw general side effect information did not differ in either positive or negative expectancies for the supplement. H1 was not supported. Besides the testing of H1, there was no interaction between expectancy type and culture, either, F (1, 118)
People from Western and Eastern cultures did not differ in either positive or negative expectancies for the supplement. There was no interaction between cultures and side effect information specificity on participants’ expectancies for the supplement (uninterpretable), $F(1, 118) = 2.05, p = .16, \quad \eta^2 = .017$.

H4 predicted that there should be a three-way interaction of culture by side effect information specificity by expectancy type. However, culture by side effect information specificity by expectancy type three-way mixed ANOVA analysis was not significant, $F(1, 118) = .11, p = .75, \quad \eta^2 = .001$ (see Figures 4 and 5). H4 was not supported.

In order to test H2 and H3, which predicted how people from Western vs. Eastern cultures should be influenced by side effect information differently and form positive and negative expectancies differently, I decomposed the three-way into separate two-way culture by side effect information specificity interactions: one for positive expectancies, and another for negative expectancies.

4.4.2 Two-way ANOVA: effect of Culture by Side Effect Information Specificity on Expectancies

H2 predicted a culture by side effect information specificity interaction on positive expectancies, such that cultural difference on people’s positive expectancies should only emerge when the side effects are described in detail, but not when they are described in general. In order to test H2, I conducted a two-way factorial ANOVA with culture and side effect specificity as the independent variables and participants’ positive expectancies of the supplement as the dependent measure (see Figure 4). There was no main effect of participants’ cultural backgrounds: American ($M = 3.19, SD = .98$) and Chinese ($M = 2.91, SD = .98$).
SD = .96) participants did not differ in their positive expectancies of the supplement, F(1, 130) = 2.99, p < .09, \( \chi^2 = .022 \). There was no main effect of the side effect information specificity, either: participants who saw general side effect information (M = 3.08, SD = 1.00) and participants who saw specific side effect information (M = 3.03, SD = .96) did not differ in their positive expectancies of the supplement, F(1, 130) = .11, p = .74, \( \chi^2 = .001 \). There was no significant interaction between cultural background and side effect information specificity, \( F(1, 130) = 0.67, p = .41, \), \( \chi^2 = .005 \). In either general risk information condition or specific risk information condition, there was no difference between American and Chinese people’s positive expectancies for the supplement’s effects. H2 was not supported.
Figure 4. Mean positive expectancy as a function of culture and side effect information specificity. Standard errors are represented in the figure by the error bars attached to each column.

H3 predicted a culture by side effect information specificity interaction on negative expectancies, such that cultural differences in people’s negative expectancies should only emerge when the side effects are described in detail, but not when they are described in general. In order to test H3, I conducted another two-way factorial ANOVA with cultural background and side effect specificity as the independent variables and participants’ negative expectancies of the supplement as the dependent measure (see Figure 5). There was no main
effect of participants’ cultural background: American (M = 2.14, SD = 0.77) and Chinese (M = 2.08, SD = .85) participants did not differ in their negative expectancies of the supplement, F (1, 120) = 0.19, p = .67, \( \frac{2}{p} = .002 \). There was no main effect of the side effect information specificity: Participants who saw general side effect information (M = 2.08, SD = .77) and participants who saw specific side effect information (M = 2.15, SD = .84), did not differ in their negative expectancies of the supplement, F(1, 120) = 0.11, p = .74, \( \frac{2}{p} = .001 \). There was no significant interaction between cultural background and side effect information specificity, F (1, 120) = 2.07, p = .15, \( \frac{2}{p} = .017 \). In either general risk information condition or specific risk information condition, there was no difference between American and Chinese people’s negative expectancies for the supplement. H3 was not supported.
As discussed in the Introduction, culture is an insensitive measure of processing differences. A more sensitive measure of processing differences in the current contradictory information situation, is a measure that directly assesses dialectical thinking propensity, such as the DSS (Spencer-Rodgers et al., 2015). I identified and removed seven outliers that ranged above and below the 1.5 times interquartile (IQR) of people’s mean score on DSS scale, using Tukey’s method (Dhana, 2016). After the outliers were removed, the result
showed that American participants (M = 4.16, SD = .32) were less dialectical than Chinese participants (M = 4.29, SD = 0.38), \( t_{\text{Welch}} (123) = 2.09, \ p < .04, \ d = -0.370. \) (Delacre et al., 2017). However, this difference was not very large; many American participants had higher dialectical thinking scores than Chinese participants (see Figure 6). To use this more sensitive measure of dialectical thinking, I replaced cultural background with people’s dialectical thinking propensity and conducted regression analyses to test whether the dialectical thinking propensity by side effect information specificity interacted to predict participants’ positive and negative expectancies of the supplement’s effects.

![Distribution of Dialectical Thinking Propensity Scores](image)

Figure 6
4.4.3 Regression Analysis: effect of Dialectical Thinking Propensity by Side Effect Information Specificity on Expectancies

H5 predicted a dialectical thinking propensity by side effect information specificity interaction on people’s positive expectancies, such that higher dialectical thinking propensity should be correlated with higher positive expectancy only when the side effects are described in detail, but not when they are described in general. In order to test H5, multiple regression was conducted to test if participants’ dialectical thinking propensity together with the side effect information specificity predicted their positive expectancies for the supplement (see Figure 7). People’s dialectical thinking propensity was not significantly related to their positive expectancies of the supplement, $\beta = .50$, $p = .18$. There was no main effect of side effect information specificity on positive expectancies, either: $\beta = 1.04$, $p = .62$. There was no interaction between dialectical thinking propensity and side effect information specificity on positive expectancies: $\beta = -.25$, $p = .61$. The two predictors were not significantly related to positive expectancies, and they explained 1.9% of the variance of people’s positive expectancies for the supplement ($F(3,122) = .80$, $p = .50$, $R^2 = .019$, $R^2_{adj} = .005$). H5 was not supported.
H6 predicted a dialectical thinking propensity by side effect information specificity interaction on people’s negative expectancies, such that higher dialectical thinking propensity should be correlated with higher positive expectancy only when the side effects are described in general, but not when they are described in detail. In order to test H6, a multiple regression was conducted to test if participants’ dialectical thinking propensity together with the side effect information specificity predicted their negative expectancies for the supplement (see Figure 8). There was no main effect of people’s dialectical thinking propensity: $\beta = -0.29$, $p = 0.35$, meaning that people’s dialectical thinking propensity was not significantly related to their negative expectancies of the supplement. There was no main effect of side effect
information specificity either: \( \beta = -1.69, p = .35 \), meaning that people from different specificity groups did not differ in their negative expectancies. There was no interaction between dialectical thinking propensity and side effect information specificity on positive expectancies: \( \beta = .39, p = .36 \). The two predictors were not significantly related to people’s negative expectancies, and they explained 1% of the variance of people’s negative expectancies for the supplement \( (F(3,113) = 0.37, p = .78, R^2 = .01, R^2_{\text{adjusted}} = -.017) \). H6 was not supported.

Figure 8
5.1 Findings

This paper focuses on a potential cultural difference: people from different cultures might experience placebo/nocebo effects differently. I used people’s expectancies of the supplement’s effects as a measure to reflect the possible magnitude of placebo/nocebo effects, because expectancy is demonstrated to be a determinant of the placebo/nocebo effects (Montgomery & Kirsch, 1997). I hypothesized that a cultural difference in tolerance for inconsistency might influence the way people process inconsistent information contained in a pharmaceutical ad. I found that Chinese participants are more dialectical than American participants in their cognitive processing style, indicating that Chinese participants tend to have higher tolerance for ambivalence when processing conflicting information, compared to American participants.

However, none of the hypotheses were supported. In the three-way interaction of culture by side effect information specificity by expectancy type, the only significant result is the main effect of expectancy type, as people have higher expectancies for positive effects than negative effects. An interaction emerged between participants’ cultural backgrounds and the specificity of side effect information on the combined score of their positive and negative expectancies. However, this is uninterpretable, because it can only be seen as a reflection of the general level of how participants were persuaded that the supplement had an effect, instead of how they expect of positive and negative effects.

In addition to the failure to find a cultural difference on people’s expectancies towards the supplement under both general and specific risk information conditions, I didn’t find any
relation between people’s dialectical thinking propensity and their expectancies towards the drug.

Besides dialectical thinking propensity, holistic vs. analytic thinking style was also measured in the experiment as a proxy to reflect cultural differences. The original 24-item scale was developed on four factors, causality, attitude toward contradiction, perception of change, and locus of attention (Choi & Choi, 2007). The second factor, “attitude toward contradiction” is the most relevant one to the current problem of contradictory information processing, and was meant be the cultural trait that is responsible for people’s behavioral outcome of pharmaceutical ad information processing.

There are several possible reasons why my hypotheses were not supported. It is possible that cultural differences might not extend into people’s pharmaceutical information processing. People from Eastern and the Western cultures scored differently on their dialectical thinking style. However, this might only reflect the difference in people’s declarative knowledge of how much they believe they can tolerate ambivalence, but not in how they systematically process conflicting information. People from both Eastern and Western cultures might process information similarly (if not identically), and thus form similar expectancies towards the drug.

Besides the faulty hypotheses, another possibility is that the stimuli failed to elicit the effects as intended. For example, it is possible that participants’ previous knowledge about vitamin supplements already provides them with a prediction that vitamin supplements are not “risky.” Therefore, regardless of what was mentioned in the ad, they might feel that it was not easy to experience the effects, causing floor effects in the results. This being the case,
even if they processed the double-sided information differently and went through different levels of ambivalent feelings, there was still not much room for them to diversify in their expectancies of how benefits and harms would occur.

In this study, I also measured people’s predisposition toward medicine in general. It is possible that what people believe about benefits and harms of medicine, in general, could influence how they form expectancies about the vitamin supplement after reading the ad. Similarly, I also measured people’s thoughts generated after reading the ad. This could later be used as an index of how dialectical they thought before forming expectancies. Also, I measured people’s cultural orientations of holistic versus analytic processing styles as a supplement to the dialectical thinking propensity. It is possible that the “attitude toward contradiction” sub-scale in the holistic versus analytic thinking scale is a more influential predictor of people’s expectancies than dialectical thinking style. However, as the measure showed poor fit in the confirmatory factorial analysis, future research and data collection is needed in testing its predictive power on people’s expectancies.

There might be concern that pharmaceutical ad information represents a form of refutational information. Research has demonstrated that when faced with refutational information with one side more persuasive than the other, the stronger side could be perceived to have even greater credibility and persuasiveness, at a sacrifice of the perceived credibility and persuasiveness of the weaker side. However, a meta-analysis showed that it only exists when the information is on a non-advertising topic (O’Keefe, 1999). Therefore, this factor was not taken into consideration in the current study.
One of the implications of this study is that it enlarges the scope of the study of cultural differences by addressing the possibility that people from different cultures may widely differ in their ways of information processing, which could then lead to various behavioral consequences. Specifically, in this paper, I studied the cultural difference in people’s processing of conflicting information in pharmaceutical ads, which is supposed to lead to placebo/nocebo effects (Montgomery & Kirsch, 1997). Though people’s differences in tolerance for ambivalence didn’t lead them to process the pharmaceutical information differently and thereby form different expectations towards supplements, this research opens a door to more explorations on behavioral outcomes of cultural influence. Also, in this study I looked into this issue from the perspective of information processing, instead of directly linking general cultural traits (for example, geographic Eastern versus Western) to the final behavioral outcomes. Therefore, I made an attempt to provide a deeper explanation of why people in different cultures form expectancies differently. However, possibly due to the inappropriate use of stimuli or cultural orientation scales, the attempt was not successful.

Another contribution of this paper is that it addresses the need to consider placebo and nocebo effects (the proportion of the effects caused by individual’s psychological influences) when doing drug ad design or instruction design. The pharmaceutical advertising industry might also need to consider how cultural background functions in this ad induced placebo/nocebo effects. If further research shows that people process the ad information differently and generate different levels of expectations, different ways of communication might be needed to suit different cultures. When the aim is to minimize consumers’ worries about side effects, practitioners may need to convey side effects in more general terms in
markets where people have higher tolerance for ambivalence because they are more sensitive to both positive and negative sides of the information. Therefore they might need a milder alert to mitigate excessive worries. If the purpose is to alert users about the possible side effects, more specific side effect information might be needed for markets where people have lower tolerance for ambivalence and are relatively insensitive to side effects information, because they might need a stronger strike to be alert.

5.2 Limitations and Future Research

However, there are some limitations of this study. First, choosing vitamin supplements among all the drugs to elicit placebo/nocebo effects might limit the power of those effects. Though categorized as a type of drug, vitamin supplements usually have mild effects and people are familiar with them as a daily dietary supplement. This could cause people’s expectancies for benefits and side effects to remain at a mild level. In future study, researchers could change the drug type in order to elicit more polarized expectancies about benefits and harms.

Second, the manipulation of the side effect information specificity needs improvement. The influence of side effect information specificity might be confounded with the influence of the number of side effects listed in the ad. The specific condition has four side effects described in detail, while the general condition only has the first two side effects vaguely mentioned, and a general sentence stating “discomfort” instead of a specific part of the body where discomfort might take place. It is possible that it is the number of side effects that cause the difference between the two side effect information conditions, that more side effects lead to the possible effects, instead of the intended manipulation of information specificity.
Third, the measurement of two pairs of dependent variables – people’s expectancy about the supplement’s benefits and side effects, and the extent to which people expect the outcome of taking the supplement to be beneficial and harmful, failed to show high correlation. Though I combined them into one pair of measures as there were significant correlations, with the two measures of positive expectancies correlated at 0.38, and the two measures of negative expectancies correlated at 0.30, it is possible that participants comprehended the two measures in the same direction differently. I might have sacrificed the validity of the measures for brevity and comprehensibility of the paper by collapsing them. However, as it remains unclear how people understand two pairs of measures differently, I don’t know which one pair would be a better reflection of what I want to measure, thus there might be a problem with construct validity of the measures.

Fourth, the measure of people’s dialectical thinking style using the DSS scale is still in a developmental stage (Spencer-Rodgers et al., 2015). Though it has been adopted in many studies (e.g., Chen, Benet-Martínez, Wu, Lam, & Bond, 2013; Spencer-Rodgers et al., 2009), the validity is still not guaranteed especially in predicting people’s information processing style, as the scale was originally developed in the domain of self-perception (Spencer-Rodgers et al., 2015).

Fifth, cultural differences in response to the ad, which I did not control for or measure, could be responsible for the expectancy difference between Eastern and Western participants. There are several things included. First, there might be a difference in vitamin supplement consumption between the U.S. and China. This might cause people from these two cultures to have different familiarity with, as well as feelings toward, vitamin supplements. Thus the
difference in expectations as well as feelings towards the ad might be due to people’s familiarity with the ad. Second, the design of ads are usually different between two cultures. To remain equivalent, here in this study I adopted a single style in the two cultural groups. However, the style adopted in this study might be more in line with the Western style, which is relatively simple, and might cause different feelings among Western participants compared to Eastern participants. Third, pharmaceutical advertisement regulations are different between two countries, as the U.S. allows direct-to-consumer (DTC) drug ads while China doesn’t, reflecting a higher tolerance for drug advertisements in the U.S. than in China. This could result in a difference in participants’ familiarity with pharmaceutical ads, causing their sensitivity to benefit and side effect information to be different. Fourth, people from Western and Eastern cultures are also believed to have different levels of uncertainty avoidance, which results in different sensitivity to risk information (e.g., Bontempo, Bottom, & Weber, 1997). Therefore, in this study, the same expression of risks in two cultural groups might have caused different levels of alertness among people from different cultures, influencing their perception and inferences of the information. Fifth, most studies testing information specificity’s influence on persuasiveness were done in Western cultures (e.g., Leventhal, Singer & Jones, 1965). However, Eastern people are believed to be more holistic, so that they don’t necessarily perceive the persuasiveness of the information based on its specificity in the same ways as Western people do. For example, they might not rely on the information’s specificity to evaluate its persuasiveness the same way as Western people do, as they have lower need to use explicit rules and structures to make inferences about things or information (Peng & Nisbett, 1999). Therefore, the observed cultural difference in people’s expectancies
of the supplement may be due not only to the difference in how people deal with
contradictory information, but also to the difference in perceived persuasiveness of the two
sides of the information. Finally, as mentioned by Faasse and Petrie (2013), there is another
factor influencing nocebo effects that I didn’t include: the individual sensitivity to side
effects. It refers to a general belief of being particularly sensitive to medications, usually
caused by previous negative experiences of side effects. For future study, researchers can test
whether the perceived sensitivity differs across cultures, and how it could affect how people
form their expectations and experience placebo/nocebo effects.

For further exploration on this topic, research could also be done to let participants take
the placebo, so that we can test how this potential cultural difference in people’s information
processing could also affect people’s physical feelings, as a full demonstration of placebo and
nocebo effects.
REFERENCES


APPENDIX A: PRE-TEST QUESTIONNAIRE

We are testing the elements for a vitamin supplement ad. Please answer the following questions.

1. How appropriate is "Natural Lives" as the name for a vitamin supplement?
   | Extremely inappropriate | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely appropriate |

2. How familiar is "Natural Lives" as the name for a vitamin supplement?
   | Extremely unfamiliar | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely familiar |

3. How appropriate is "Vegetation" as the name for a vitamin supplement?
   | Extremely inappropriate | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely appropriate |

4. How familiar is "Vegetation" as the name for a vitamin supplement?
   | Extremely unfamiliar | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely familiar |

Consider using the picture below as the visual in the ad.

5. How appropriate is using this visual in a vitamin supplement ad?
   | Extremely inappropriate | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely appropriate |
6. How similar is this visual to other vitamin supplement ad visuals you have seen?

| Extremely unfamiliar | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely familiar |

Consider using the picture below as the visual in the ad.

7. How appropriate is using this visual in a vitamin supplement ad?

| Extremely inappropriate | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely appropriate |

8. How similar is this visual to other vitamin supplement ad visuals you have seen?

| Extremely unfamiliar | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely familiar |

Consider the following information about the side effects in the ad:

If you have any discomfort after taking the supplement, please consult your

**physician for further instruction.**

9. How appropriate is the information about the side effects?

| Extremely inappropriate | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely appropriate |

10. How detailed is the information about the side effects?
Consider the following information about the side effects in the ad:

If it causes unnatural flush or swelling of your face, lips, tongue or throat, please consult your physician for further instruction.

11. How appropriate is the information about the side effects?

12. How detailed is the information about the side effects?

13. How likely is it that vitamin supplements in general can provide following benefits?

1) Provide essential nutrients that are important for proper retinal function

2) Helps to filter harmful blue light

3) Aids in the conversion of food into energy

4) Aid metabolism of fats, carbohydrates and proteins

5) Enhance immune defense

6) Help maintain healthy appearance

7) Protect the body’s cells from potential oxidative damage

8) Helps with mental clarity and focus

9) Helps support blood flow to the brain
10) Helps support neurotransmitters used by the body to improve healthy brain function

14. How useful is the vitamin supplement for helping the following medical issues?

| Extremely useless | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely useful |

(the same items as Question 13)

15. How likely is it that vitamin supplements in general will cause following side effects?

| Extremely unlikely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Extremely likely |

1) Causing slight stomachache due to the acidic ingredient

2) Difficulty breathing

3) Swelling of your face, lips, tongue or throat

4) Nausea

5) Headache

6) Unnatural flush

7) Fast or irregular heartbeat

8) Unusual or unpleasant taste in your mouth

9) Appetite loss

10) Feeling of fever

16. What do you think of the following risks of the vitamin supplement?

| Extremely unfavorable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Not unfavorable |

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17. In general, how likely is it that following effects occur within 30 minutes of taking vitamin supplements?

(\text{the same items as Question 13 + 15})

\begin{center}
\begin{tabular}{l|ccccccc}
& 1 & 2 & 3 & 4 & 5 & 6 & 7 \\
\hline
Extremely unlikely & | & | & | & | & | & Extremely likely |
\end{tabular}
\end{center}

18. Using the scale below, select the number that best matches your level of agreement or disagreement with each statement. There are no right or wrong answers.

\[1\rightarrow 2\rightarrow 3\rightarrow 4\rightarrow 5\rightarrow 6\rightarrow 7\]

Strongly disagree \hspace{1cm} Neither agree nor disagree \hspace{1cm} Strongly agree

There is very little that a medicine can do to improve health condition

\begin{enumerate}
\item Medicine will be effective in curing illness
\item Medicine can control illness
\item There is nothing which can help with sick condition
\item Health, at present, depends on my medicines
\item Life would be impossible without medicines
\item Without medicines people would be very ill
\item People’s health in the future will depends on medicines
\item Medicines protect people from becoming worse
\item People who take medicines should stop their treatment for a while every now and again
\item Most medicines are addictive
\end{enumerate}
11) Medicines do more harm than good

12) All medicines are poisons

13) Having to take medicines worries me

14) I sometimes worry about long-term effects of medicines

15) Medicines are a mystery to me

16) Medicines disrupt my life

17) I sometimes worry about becoming too dependent on medicines
APPENDIX B: MAIN STUDY QUESTIONNAIRE

Please read the following vitamin supplement ad and answer the following questions.

Detail Group-English version

General Group-English version
1. If you take this vitamin supplement, how likely is it that you will experience benefits?

| Extremely unlikely | 1 | 2 | 3 | 4 | 5 | Extremely likely |

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2. If you take this vitamin supplement, how likely is it that you will experience side effects?

| Extremely unlikely | 1 | 2 | 3 | 4 | 5 | Extremely likely |

3. Choose the number on each scale that best describes your expectation for the outcome of taking this vitamin supplement.

| Harmful | 1 | 2 | 3 | 4 | 5 | Neutral |

| Beneficial | 1 | 2 | 3 | 4 | 5 | Neutral |

4. Please list all the thoughts you have regarding the effect of the vitamin supplement while reading the ads just now. You will have 3 minutes to list your thoughts.

1) ________________________________

2) ________________________________

3) ________________________________

4) ________________________________

5) ________________________________

6) ________________________________

7) ________________________________

8) ________________________________

9) ________________________________

10) ________________________________
5. Please categorize your thoughts in the last question into 3 categories: favorable, neutral and unfavorable. Place a plus (+) next to the thoughts that are favorable, a minus (-) next to the thoughts that are unfavorable, and a zero (0) next to the thoughts that are neutral or irrelevant.

6. How detailed is the information in the ad about side effects of the vitamin supplement?

| General | 1 | 2 | 3 | 4 | 5 | Detailed |

7. Using the scale below, select the number that best matches your level of agreement or disagreement with each statement. There are no right or wrong answers.

1-2-3-4-5-6-7

Strongly disagree Neither agree nor disagree Strongly agree

1) There is very little that a medicine can do to improve health condition

2) Medicine can control illness

3) There is nothing which can help with a person’s sick condition

4) I sometimes worry about long-term effects of medicines

5) My health, at present, depends on my medicines

6) Life would be impossible without medicines

7) Without medicines people would be very ill

8) I sometimes worry about becoming too dependent on medicines

9) People’s health in the future will depend on medicines

10) Medicines protect people from becoming worse
11) People who take medicines should stop their treatment for a while every now and again

12) Most medicines are addictive

13) Medicines do more harm than good

14) Medicine will be effective in curing illness

15) All medicines are poisons

16) Having to take medicines worries me

17) Medicines are a mystery to me

18) Medicines disrupt my life

8. Using the scale below, select the number that best matches your level of agreement or disagreement with each statement. There are no right or wrong answers.

1-------------------2-------------------3-------------------4-------------------5-------------------6-------------------7

Strongly disagree Neither agree nor disagree Strongly agree

1) I am the same around my family as I am around my friends.

2) When I hear two sides of an argument, I often agree with both.

3) I believe my habits are hard to change.

4) I believe my personality will stay the same all of my life.

5) I often change the way I am, depending on who I am with.

6) I often find that things will contradict each other.

7) If I’ve made up my mind about something, I stick to it.

8) I have a definite set of beliefs, which guide my behavior at all times.
9) I have a strong sense of who I am and don’t change my views when others disagree with me.

10) The way I behave usually has more to do with immediate circumstances than with my personal preferences.

11) My outward behaviors reflect my true thoughts and feelings.

12) I sometimes believe two things that contradict each other.

13) I often find that my beliefs and attitudes will change under different contexts.

14) I find that my values and beliefs will change depending on who I am with.

15) My world is full of contradictions that cannot be resolved.

16) I am constantly changing and am different from one time to the next.

17) I usually behave according to my principles.

18) I prefer to compromise than to hold on to a set of beliefs.

19) I can never know for certain that any one thing is true.

20) If there are two opposing sides to an argument, they cannot both be right.

21) My core beliefs don’t change much over time.

22) Believing two things that contradict each other is illogical.

23) I sometimes find that I am a different person by the evening than I was in the morning.

24) I find that if I look hard enough, I can figure out which side of a controversial issue is right.

25) For most important issues, there is one right answer.

26) I find that my world is relatively stable and consistent.

27) When two sides disagree, the truth is always somewhere in the middle.

28) When I am solving a problem, I focus on finding the truth.
29) If I think I am right, I am willing to fight to the end.

30) I have a hard time making up my mind about controversial issues.

31) When two of my friends disagree, I usually have a hard time deciding which of them is right.

32) There are always two sides to everything, depending on how you look at it.

9. Using the scale below, select the number that best matches your level of agreement or disagreement with each statement. There are no right or wrong answers.

1------------2------------3------------4------------5------------6------------7

Strongly disagree    Neither agree nor disagree     Strongly agree

1) Everything in the universe is somehow related to each other.

2) Nothing is unrelated.

3) Everything in the world is intertwined in a causal relationship.

4) Even a small change in any element of the universe can lead to significant alterations in other elements.

5) Any phenomenon entails a numerous number of consequences, although some of them may not be known.

6) It is more desirable to take the middle ground than go to extremes.

7) When disagreement exists among people, they should search for ways to compromise and embrace everyone’s opinions.

8) It is more important to find a point of compromise than to debate who is right/wrong, when one’s opinions conflict with other’s opinions.
9) It is desirable to be in harmony, rather than in discord, with others of different opinions than one’s own.

10) Any phenomenon has numerous numbers of causes, although some of the causes are not known.

11) Choosing a middle ground in an argument should be avoided.

12) We should avoid going to extremes.

13) Every phenomenon in the world moves in predictable directions.

14) A person who is currently living a successful life will continue to stay successful.

15) An individual who is currently honest will stay honest in the future.

16) If an event is moving toward a certain direction, it will continue to move toward that direction.

17) Current situations can change at any time.

18) Future events are predictable based on present situations.

19) The whole, rather than its parts, should be considered in order to understand a phenomenon.

20) It is more important to pay attention to the whole than its parts.

21) The whole is greater than the sum of its parts.

22) It is more important to pay attention to the whole context rather than the details.

23) It is not possible to understand the parts without considering the whole picture.

24) We should consider the situation a person is faced with, as well as his/her personality in order to understand one's behavior.
Please answer the following questions regarding your daily vitamin supplement usage, your fitness condition, and your personal information.

10. Are you currently taking any vitamin supplement?

| Yes | No |

11. How familiar are you with vitamin supplement?

Very familiar | 1 | 2 | 3 | 4 | 5 | Not familiar at all

12. How knowledgeable are you about vitamin supplements?

Very knowledgeable | 1 | 2 | 3 | 4 | 5 | Not knowledgeable at all

13. Please indicate any other health/wellness behavior you do and how you do it in your daily life, such as exercise, meditation, health diet, etc.

__________________________________  ______________________________________

14. Please indicate your gender.

A. Female   B. Male   C. Prefer not to answer

15. How old were you on your last birthday?  _________________

16. Please indicate your ethnicity.
A. Hispanic or Latino or Mexican / Mexican-American

B. White / European-American

C. Black / African-American

D. Asian / Asian American

E. American Indian / Alaska Native

F. Other (Please specify)

17. Have you been living in U.S. for more than 3 years?

| Yes | No |

18. Which country are you originally from? ________
## APPENDIX C: PRETEST RESULTS

<table>
<thead>
<tr>
<th>Occurrence in 30 min</th>
<th>Occurrence</th>
<th>Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td><strong>SD</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>Aid metabolism of fats, carbohydrates and proteins*</td>
<td>3.95</td>
<td>1.547</td>
</tr>
<tr>
<td>Aids in the conversion of food into energy*</td>
<td>3.88</td>
<td>1.589</td>
</tr>
<tr>
<td>Helps with mental clarity and focus*</td>
<td>3.72</td>
<td>1.628</td>
</tr>
<tr>
<td>Helps support blood flow to the brain*</td>
<td>3.69</td>
<td>1.582</td>
</tr>
<tr>
<td>Helps support neurotransmitters used by the body to improve healthy brain function*</td>
<td>3.47</td>
<td>1.553</td>
</tr>
<tr>
<td>30min-Provide essential nutrients that are important for proper retinal function*</td>
<td>3.17</td>
<td>1.528</td>
</tr>
<tr>
<td>Enhance immune defense*</td>
<td>3.16</td>
<td>1.683</td>
</tr>
<tr>
<td>Protect the body’s cells from potential oxidative damage</td>
<td>3.13</td>
<td>1.579</td>
</tr>
<tr>
<td>Help maintain healthy appearance</td>
<td>3.03</td>
<td>1.699</td>
</tr>
<tr>
<td>Help to filter harmful blue light</td>
<td>2.94</td>
<td>1.500</td>
</tr>
</tbody>
</table>

Table 3
<table>
<thead>
<tr>
<th>Occurrence in 30 min</th>
<th>Occurrence</th>
<th>Unfavorability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Unusual or unpleasant taste in your mouth*</td>
<td>4.77</td>
<td>1.942</td>
</tr>
<tr>
<td>Causing slight stomachache due to the acidic ingredient*</td>
<td>4.27</td>
<td>1.556</td>
</tr>
<tr>
<td>Unnatural flush*</td>
<td>4.00</td>
<td>1.737</td>
</tr>
<tr>
<td>Appetite loss*</td>
<td>3.77</td>
<td>1.697</td>
</tr>
<tr>
<td>Headache</td>
<td>3.69</td>
<td>1.859</td>
</tr>
<tr>
<td>Nausea</td>
<td>3.67</td>
<td>1.791</td>
</tr>
<tr>
<td>Fast or irregular heartbeat</td>
<td>3.61</td>
<td>1.796</td>
</tr>
<tr>
<td>Swelling of your face, lips, tongue or throat</td>
<td>3.61</td>
<td>1.814</td>
</tr>
<tr>
<td>Feeling of fever</td>
<td>3.33</td>
<td>1.746</td>
</tr>
<tr>
<td>Difficulty breathing</td>
<td>3.31</td>
<td>1.661</td>
</tr>
</tbody>
</table>

Table 4
APPENDIX D: HOLISTIC VS. ANALYTIC THINKING STYLE ANALYSES

Six outliers that ranged above and below the 1.5 times interquartile (IQR) of people’s mean score on Holistic vs. Analytic Thinking Scale were identified and removed, using Tukey’s method (Dhana, 2016). After the outliers were removed, the result showed that American participants (M = 4.36, SD = .43) were more analytic than Chinese participants (M = 4.64, SD = 0.54), t_welch (118) = -3.19, p = .002, d = -0.571. (Delacre et al., 2017) (see Figure 9). I replaced cultural background with people’s holistic vs. analytic thinking style and conducted regression analyses to test whether the holistic vs. analytic thinking style by side effect information specificity interacted to predict participants’ positive and negative expectancies of the supplement’s effects.

Figure 9
A multiple regression was conducted to test if participants’ holistic vs. analytic thinking style, together with the side effect information specificity, predicted their positive expectancies for the supplement (see Figure 10). There was no main effect of people’s holistic vs. analytic thinking style: $\beta = -.001$, $p = 1.0$, meaning that people’s holistic vs. analytic thinking style was not significantly related to their positive expectancies of the supplement. There was no main effect of side effect information specificity either: $\beta = -1.61$, $p = .28$, meaning that people from different specificity groups did not differ in their positive expectancies. There was no interaction between holistic vs. analytic thinking style and side effect information specificity on positive expectancies: $\beta = .38$, $p = .25$. The two predictors were not significantly related to people’s positive expectancies, and they explained 2.1 % of the variance of people’s positive expectancies for the supplement ($F(3,125) = 0.89$, $p = .49$, $R^2 = .021$, $R^2_{\text{adjusted}} = -.003$).
A multiple regression was conducted to test if participants’ holistic vs. analytic thinking style together with the side effect information specificity predicted their negative expectancies for the supplement (see Figure 11). There was no main effect of people’s holistic vs. analytic thinking style: $\beta = .09$, $p = .65$, meaning that people’s holistic vs. analytic thinking style was not significantly related to their negative expectancies of the supplement. There was no main effect of side effect information specificity either: $\beta = .05$, $p = .97$, meaning that people from different specificity groups did not differ in their negative expectancies. There was no interaction between holistic vs. analytic thinking style and side
effect information specificity on positive expectancies: $\beta = -0.03$, $p = .92$. The two predictors were not significantly related to people’s positive expectancies, and they explained 0.5% of the variance of people’s negative expectancies for the supplement (F(3,116) = 0.20, $p = .90$, $R^2 = .005$, $R^2_{\text{adjusted}} = -.021$).