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Health risk cognitions: An empirical examination of the effects of heuristic versus

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Health risk cognitions: An empirical examination of the effects of heuristic versus reasoned information processing

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ABSTRACT

This research examined adolescent health risk behaviors from the perspective of dual-process theories. Specifically, assumptions underlying dual-processing theories were empirically examined in two experiments in which processing route was manipulated and subsequent measures of behavioral willingness and behavioral intentions to engage in casual sex and to drink alcohol were examined. The primary goals of Study 1 were two-fold. One goal was to demonstrate that processing route can be varied via an external factor, such as the instructional set used in the current study. The second goal was to examine the effect that the induced route of processing style had on health risk decisions. Overall, the results of Study 1 indicated that the between-subjects processing manipulation was successful in shifting participants' reliance on either reasoned or experiential processing relative to a control condition. This result supports dual-process theory assumptions that riskier behavior is the result of less reasoned information processing. In addition, the results support predictions expected from the prototype willingness model that behavioral willingness reflects more experiential processing, and is more malleable than behavioral intentions (Gibbons, Gerrard, & Lane, 2003). The goals of Study 2 were to further examine whether external factors influence route of processing and to examine whether those effects were mediated by shifts in motives and outcome expectancies. These goals were addressed with an experiment in which participants received the same between-subjects manipulation of processing route as in Study 1 before assessing behavioral willingness, behavioral intentions, motives for engaging in sex, and outcome expectancies for drinking alcohol. The hypothesized effects of route of processing on behavioral willingness and not on behavioral intentions, as specified by the prototype willingness model, were supported. Partial support was found for the hypothesized mediated effects of processing condition through outcome expectances and motives on behavioral willingness to engage in casual sex and to drink

alcohol. Overall, results from the two experiments suggest that the between-subjects manipulation of processing route used in these studies was an effective way to induce reasoned and experiential processing, and that the effects of this manipulation on health risk cognitions were mediated by changes in motives or perceived outcome expectancies. Implications of these results for dual-process theories in general, the prototype willingness model specifically, and adolescent health risk behaviors are discussed.

CHAPTER 1: OVERVIEW

Traditional models of information processing are built upon the assumption that behavior is the result of a deliberate decision making process (Gibbons, Gerrard, Reimer, & Pomery, 2006). This process includes consideration of viable options, and potential consequences associated with each alternative. According to the theory of reasoned action (Ajzen, 1985), the end result of this process is the formation of behavioral intentions, which is the proximal predictor of all behavior. Research has supported the predictive validity of the construct of behavioral intentions, particularly for behaviors that have identifiable costs and benefits associated with them (Armitage & Conner, 2001). Uni-process information processing models, such as the theory of reasoned action, have been criticized, however, for failing to account for behaviors that are unintentional or irrational (Rise, 1994).

In contrast, dual-process models of information processing propose that while people are capable of engaging in thoughtful and deliberate information processing, they often rely on a more efficient, heuristic based forms of information processing (Evans, 2007). Experiential processing reflects the fact that people often make decisions quickly, even automatically. This form of processing can account for errors and biases typically observed in studies of judgment and decision making that traditional approaches cannot (Evans, 2003). Factors associated with experiential processing include individual differences, affect, and non-conscious influences.

Because dual-process theories are able to account for behaviors that are irrational, or impulsive, they can better explain the health risk behaviors of adolescents. Most dual-process models are not designed specifically to address health risk behaviors. The prototype-willingness model is a modified dual-process model that proposes that there is not one, but two distinct routes to health risk behaviors (Gibbons, Gerrard, & Lane, 2003). The behavioral intentions route represents the reasoned route, and is supported by the fact that people do at times intend, or specifically plan to engage in risk behaviors. In contrast, the

behavioral willingness route reflects an openness to risk opportunities and represents the route characterized by experiential information processing.

The primary scientific objective of this dissertation was to advance current knowledge regarding dual-process theories of decision making, particularly as it pertains to health risk related decisions. This dissertation will make the following contributions to the literature. First, it will demonstrate that individuals' route of processing can be influenced by external factors in the environment by establishing and validating a between-subjects manipulation of processing route, which has not yet been done. Second, it will examine how the effects of the manipulated route of processing are mediated by motives and outcome expectancies. Third, it will examine these issues in the context of health decisions, which is an important and theoretically relevant domain in which to do so.

CHAPTER 2: INTRODUCTION

Behavioral decision making processing can occur in different ways. Sometimes people process information rationally[1]. This type of processing, referred to as reasoned processing, is characterized by analytical responding, effortful processing, and utilizing abstract symbols and concepts (Epstein & Pacini, 1999). Reasoned processing is done slowly and deliberately and is generally associated with planfulness, delay of gratification, and reduced risk taking (for a complete review, see Reyna & Farley, 2006). Other times, people process information heuristically. This type of processing, referred to as experiential processing, is characterized by a reliance on judgmental shortcuts, or rules of thumb. Experiential processing[2] is done quickly and efficiently and is associated with stereotypical thinking, prototypes, and holistic responding (Epstein & Pacini, 1999). The experiential system is often conceptualized as being passive and preconscious, which serves to put minimal strain on people's available cognitive resources. As a result, the experiential system is thought to be a highly efficient processing system that functions quickly, sometimes even automatically. Theoretical models describing these different types of processes can be categorized into two distinct classes: Uni-process models and dual-process models. I next discuss these models and review research relevant to each.

Uni-Process Models

Uni-process models propose that people use reasoned thought processes to make decisions. Two of the most prominent uni-process models of decision making are the theory of reasoned action (Fishbein & Ajzen, 1975) and the theory of planned behavior (Ajzen, 1985, 1991). These theories both posit that the proximal predictor of a behavior is one's behavioral intentions to engage in that specific behavior. Behavioral intentions are based on one's attitudes toward the specific behavior and perceived norms about the specific behavior, including consideration of the potential positive and negative consequences of

engaging in that behavior (Ajzen & Fishbein, 1980). The theory of planned behavior is an extension of the theory of reasoned action and includes the construct of perceived behavioral control to account for the fact that one's behavioral intentions can only predict behavior to the extent that an individual feels that he or she has control over his or her behavior (Ajzen, 1991).

Both of these theories have received a great deal of support in the literature. For example, a recent meta-analysis of the theory of planned behavior revealed that behavioral intentions explain approximately 30% of the variance in people's subsequent self-reported behavior, and 20% of the variance in their subsequent observed behavior (Armitage & Conner, 2001). These theories are most successful at predicting rational or socially appropriate behaviors such as seat-belt use and exercise behaviors. In sum, these findings provide evidence that uni-process models are well-suited to explaining how people make rational decisions about a variety of behaviors, particularly those that have identifiable costs and benefits associated with them (Gibbons, Gerrard, Reimer, & Pomery, 2006).

Nonetheless, uni-process models have also been criticized in two respects. First, they fail to take into account other influences on behavior, such as cooperation and the influence of other people (Rise, 1994). Second, uni-process models are based on the assumption that people consistently make decisions in a reasoned fashion. Considerable research has demonstrated, however, that people do not always make decisions in this way (e.g., Tversky & Kahneman, 1974). Decisions pertaining to behaviors that are socially undesirable, impulsive, or that have a significant affective component do not appear to arise from reasoned information processing (Beck & Ajzen, 1991; Ingham, Woodcock, & Stenner, 1992; Eiser, Eiser, & Pauwels, 1993).

Dual-Processing Models

The limitations associated with uni-process models prompted researchers to develop dual-process models of decision making. Unlike uni-process models that propose that people make decisions solely on the basis of effortful reasoned processing, dual-process models propose that people make decisions on the basis of a combination of reasoned and experiential processing (Evans, 2006; Chen & Chaiken, 1999). That is, dual-process models propose that people will sometimes engage in effortful, reasoned processing but other times will engage in resource efficient, heuristic processing. According to dual-process models, the experiential system enables people to process information efficiently and quickly, which is beneficial given people's limited cognitive capacity to process information.

The premise that decision making is sometimes governed by reasoned processing but other times governed by experiential processing has been demonstrated with a variety of tasks. One popular task used for this purpose is the ratio-bias task (Epstein & Pacini, 1999). The ratio-bias effect refers to the fact that participants asked to make ratio-bias judgments reliably report higher subjective judgments of probability, when the probability is presented with ratios of larger numbers (Pacini & Epstein, 1999; p. 466). For example, if a person were given a choice between 1 in 10 odds or 10 in 100 odds of winning, logic suggests that there should be no consistent difference in which option the person would choose because the odds are equal. However, people consistently choose the option with 10 in 100 chances over the option with 1 in 10 chances (Epstein & Pacini, 2001). Similar results are found even when 9 in 100 odds or even 7 in 100 odds are used as the alternative (Denes-Raj & Epstein, 1994; Pacini, Muir, & Epstein, 1998). Participants often report that even though they might "know better," they "feel" like they have better chances with 10 in 100 or 9 in 100 odds rather than 1 in 10. The ratio-bias effect illustrates a general phenomenon commonly found in the decision making literature; people often experience

conflict when trying to make decisions and will sometimes choose to make decisions on heuristics rather than logic (Evans, 2008; Stolarz-Fantino, Fantino, Zizzo, & Wen, 2003; Epstein, Donovan, Denes-Raj, 1999).

Empirical studies testing dual-process models, such as those using the ratio bias task, are important because they have provided clear evidence that people do not rely solely on reasoned processing when making decisions, but instead sometimes rely on reasoned processing but other times rely on experiential processing.[3] The tendency for people to make decisions on the basis of experiential processing has led researchers to hypothesize that the experiential system is a major determinant of overt behavior (Stolarz-Fantino, Fantino, Zizzo, & Wen, 2003; Epstein, Donovan, Denes-Raj, 1999; Reyna, 2004).

Although dual-process models have important strengths, the methods used to test their predictions have been limited in two respects. First, most of the relevant research testing dual-process models has been non-experimental (Reyna & Farley, 2006). Researchers often conclude post-hoc that participants were engaging in either reasoned processing or experiential processing based on outcome differences, such as age differences in performance on the ratio bias task, or response latency differences (Reyna & Farley, 2006; De Neys, 2006). The primary drawback of this kind of research is that although statistically significant differences can be revealed, those can be achieved without a full understanding of the mechanisms that produce them. Experimental research designed to systematically manipulate factors hypothesized to influence processing is necessary to gain a more accurate understanding of the nature of reasoned and experiential information processing, and the differential consequences associated with each type of processing. The literature's reliance on non-experimental methods to test dual-process models also raises concerns about the generalizability of the conclusions. For example, developmental differences in performance on laboratory gambling tasks may not represent the same

developmental shifts in reasoning about real-world decisions (Reyna & Farley, 2006; Kershaw, Niccolai, Ethier, Lewis & Ickovics, 2003). More research is needed to examine the degree to which people are able to adopt either a reasoned or an experiential processing style on the basis of situational factors, and the subsequent effects that such processing styles have on their decisions.

A second limitation to methods used to test dual-process theories is that, the little experimental research that has been done is often done using a within-subjects design (e.g., Epstein, Donovan, & Denes-Raj, 1999). The most commonly utilized dual-process research paradigm involves asking participants to report what decision they think "a rational person" would choose, what "most people" would choose, and what "they themselves" would choose. Participants consistently report that "rational people" would choose the rational option (e.g., the 1/10 vs. 9/100), but they themselves would choose the more appealing yet heuristic-based solution (e.g., 9/100 or 7/100; Denes-Raj & Epstein, 1994). Findings from these paradigms have led researchers to conclude that the ratio bias phenomenon is the result of experiential processing (Pacini & Epstein, 1999b). Although the findings that arise out of this design show that people are able to predict the choices that a "rational person" would make, they do not show that utilizing either a reasoned processing style or an experiential processing style leads to different subsequent outcomes. Experimental work that identifies the environmental and individual factors that are associated with reliance upon different styles of information processing, and their different outcomes is needed.

Factors that influence route of processing

Research addressing the reasoned and experiential processing routes has shown that several factors influence which processing route people use during decision making, including individual abilities and preferences, affect, non-conscious effects, and their combination. These factors are discussed next.

Individual differences. Research on decision making and heuristics has revealed that when positioning the reasoned and experiential processing modes in conflict with one another, there are some people who consistently make decisions based on reasoned processing (Pacini & Epstein, 1999), though most people tend to respond based on compromises between the two systems (i.e., admit that their decisions are being influenced to some degree by components of the experiential processing route). In order to examine individual differences in reasoned and experiential processing styles researchers have developed the rational-experiential inventory (Epstein, Pacini, Denes-Raj, & Heier, 1996; Pacini & Epstein, 1999). The rational-experiential inventory is a self-report instrument that includes two sub-scales: the rationality subscale (e.g., “I am not a very analytical thinker”, “I enjoy intellectual challenges”) and the experiential subscale (e.g., “I like to rely on my intuitive impressions”, “I think it is foolish to make important decisions based on feelings”) which are designed to assess individual differences in reasoned and experiential processing, respectively.

Multiple studies, some performed by the scale’s creators and others performed by independent researchers, support the idea that reasoned and experiential processing styles reflect two distinct constructs, and that each independently predicts both personality attributes and overt behavior (e.g., Lindeman & Aarnio, 2006; Pacini & Epstein, 1999). Moreover, the correlation between the rationality and experientiality scales is not significant, and each is independently associated with Big Five personality characteristics, basic beliefs (e.g., favorable self), and emotional expressivity (Pacini & Epstein, 1999). For example, the rationality sub-scale is not significantly related to emotional expressivity, whereas the experientiality subscale is. The experientiality subscale is also significantly positively correlated with extraversion, whereas the rationality subscale is not. Moreover, others have found that endorsing superstitious beliefs is related to lower scores on the rationality

subscale of the rational experiential inventory (Lindeman & Aarnio, 2006). Furthermore, it has been argued that the rational experiential inventory measures unique aspects of personality not captured by the Big Five scales (Pacini & Epstein, 1999; Zang, 2002). Because individual differences on the rational experiential inventory have been shown to be reliable and predictive of personality characteristics, as well as reasoned and experiential processing, studies attempting to manipulate route of processing should include participants' scores of rationality and experientiality from the rational experiential inventory as covariates.

Affective versus effortful processing. Emotion is proposed to be one factor associated with experiential processing (Epstein, 1994; Slovic, Finucane, Peters, & MacGregor, 2002). The effects of emotion have received a great deal of research, particularly as it relates to judgment and decision making. Based on this research, there is evidence that being in an affective state relative to a more neutral state, is associated with changes in decision making and behavior (Slovic, Finucane, Peters, & MacGregor, 2002). Affect can be described as an emotional state (ranging from negative to positive) that one experiences in response to some stimulus (Slovic et al, 2002). As Epstein (1994) describes, "If the activated feelings are pleasant, they motivate actions and thoughts anticipated to reproduce the feelings. If the feelings are unpleasant, they motivate actions and thoughts anticipated to avoid the feelings (p.716)." What is being hypothesized, therefore, is that judgment and decision making can be guided by affective feelings. Indeed, studies of health risk behavior have found that participants in negative moods reported greater behavioral intentions and behavioral willingness to engage in risky sexual behaviors (MacDonald and Martineau 2002; Pomery, 2004). Furthermore, others have found that participants in negative moods are more likely to utilize heuristics and are more likely to take risks (Mittal & Ross, 1998). However, other studies have shown that when a risk is hypothetical and the potential loss is small, participants who are in a positive mood are more willing to place risky

bets than participants who are in a neutral mood (Arkes et al., 1988; Isen & Geva, 1987; Nygren, Isen, Taylor, & Dulin, 1996). The authors suggest that positive mood promotes a shift from rule based decisions to utility based decisions, and this shift is responsible for greater risk taking behavior in positive mood participants. Although these two sets of findings appear to be contradictory, it has been proposed that people in positive moods are motivated to behave in ways that will maintain their current positive mood state, whereas those in negative mood states are motivated behave in ways that will improve their mood (Wegener & Petty, 1994; Wegener, Petty, & Smith, 1995). This explanation is consistent with happy participants being more risky when the potential cost is low but being less risky when the potential cost is high, and negative mood participants being more risky when the potential gain is high. Thus, it appears that people selectively rely on heuristics consistent with their current mood state and motivation. Taken together, these findings suggest that there may not be a simple and clear relation between affect and decision making, but consistent with dual-process theories, it is clear that affect does influence decision making.

Preconscious influences on decision making. Dual-process theories unanimously propose that the experiential processing system is said to operate at a preconscious level (Evans, 2003, 2006; Chaiken & Trope, 1999; Epstein, 1998; Pacini & Epstein, 1999; Stanovich, 1999). Preconscious thoughts and memories are those that are not currently undergoing deliberate cognitive elaboration, but which are available to the conscious mind for retrieval (Epstein, 1998). This aspect of the experiential system is important because it accounts for the finding that individuals' decision making and overt behaviors can be influenced by factors in the environment that they are not currently devoting cognitive attention to, but that they could if they chose to (Bargh & Chartrand, 1999). For example, when participants were primed with exemplars of hostility, they interpreted a target's ambiguous behavior as more hostile than participants who were not primed with hostility

(Herr, 1986). Additionally, when participants are asked to think about a prototype (e.g., the elderly), those participants later reported attitudes that were more similar to the previously primed group's attitudes (e.g., more conservative; Kawakami, Dovidio, and Dijksterhuis, 2003). These results demonstrate that when individuals rely on images or prototypes to make decisions, rather than devoting deliberate cognitive effort, their subsequent decisions are influenced by those subtle environmental factors.

Health Risk Behaviors

Adolescent health risk behavior is a serious concern in the United States, particularly with respect to sexual risk behavior and risky alcohol consumption (USDHHS, 2001). Recent data suggest that although teenage pregnancy and STD rates have decreased over the last 10 years (CDC, 2002a), teen pregnancy rates are still four times higher in the United States than in other industrialized nations (CDC, 2002b), and a disproportionate number of teens are infected with STD's every year compared to other demographic groups (USDHHS, 2001). With various birth control and STD protection methods widely available to the public, how is it that teens arrive at the decision to put themselves at risk by engaging in risky sexual behaviors? In addition, approximately 90% of the alcohol consumed by youth under the age of 21 in the United States occurs in the form of binge drinking (4+ or 5+ drinks in a single setting for females and males respectively) and the proportion of binge drinkers is highest among the 18- to 20-year-old age group (OJJ, 2005). Although no single study can address these public health issues, the current research is aimed at gaining a better understanding of the decision making processes that are associated with adolescent health risk behaviors, particularly as it pertains to casual sex and to alcohol consumption.

Outcome expectancies and motives predicting health behavior. Extensive research has been devoted to understanding the factors that predict health risk behavior. For example personality characteristics (e.g., Sher & Trull, 1994), peers (Prinstein, Boergers, &

Spirito, 2001), parenting characteristics (e.g., monitoring; Borawski, Levers-Landis, Lovegreen, & Trapl, 2003), and community qualities (e.g., neighborhood violence; Brady, 2006), have all been associated with adolescent health risk behaviors. Individuals' anticipated consequences of a particular health risk behavior have also been extensively researched. Outcome expectancies represent one's specific associations of engaging in the behavior and its anticipated effects (Annis & Davis, 1988; Goldman, Brown, & Christiansen, 1987; Kushner, Sher, Wood, & Wood, 1994). Outcome expectancies have most often been examined with respect to alcohol consumption, though research on motives for engaging in sexual behaviors has also been conducted (e.g., Davis, Shaver, & Vernon, 2004; Fromme & D'Amico, 2000; Impett, Peplau, & Gable, 2005; Meston & Buss, 2007).

Alcohol outcome expectancies are an important predictor of alcohol consumption, and have been shown to be a better predictor than demographic variables, or parental drinking, (Brown, 1985, Wall, Hinson, & McKee, 1998) and to differentiate high and low risk drinkers (Mann, Chassin, & Cher, 1987; Christiansen, Smith, Roehling, & Goldman, 1989). Although most of this research has been of a cross-sectional nature, outcome expectancies have been shown to predict alcohol consumption in longitudinal designs as well (e.g., Zamboanga, Horton, Leitkowski, & Wang, 2006).

There is far less research on examining motives for sexual behaviors (Gillath, Mikulincer, Birnbaum, & Shaver, 2008) and most of the existing literature focuses on biological motives for engaging in sexual behaviors rather than psychological motives (e.g., Filippi et al., 2003) . It appears, however, that individuals engage in sexual behaviors as a means of initiating and maintaining romantic relationships (Birnbaum & Gillath, 2006). In addition, lower intimacy outcome expectancies have been associated with riskier (unprotected) sexual behaviors (Gebhardt, Kuyper, Gruensven, 2003). Overall, this body of research suggests that one's motives for engaging in sexual behaviors and one's outcome

expectancies for dinking alcohol are predictive of their current and future health risk behaviors. Therefore, research examining health risk cognitions would be improved by also including these constructs.

Dual-processing models and adolescent health risk behavior

There is a wealth of evidence suggesting that as children age they become more adept at making thoughtful and well-reasoned decisions (e.g., Kokis, Macpherson, Toplak, West, & Stanovich, 2002). For example, as children age they make fewer cognitive errors, leading researchers to believe that the reasoned system is becoming a stronger determinant of overt behavior. These empirical findings are supported by incidence data suggesting that as adolescents age, they gradually reduce the amount of risk taking (Reyna & Farley, 2006). One shortcoming of dual-process research, however, is that most dual-process models are not designed to address health risk behaviors in particular. Specifically, decision making processes that involve in making artificial "gambling" decisions in the laboratory may not be parallel to those involved in making personal health risk decisions. Furthermore, those models fail to account for the social nature inherent in much adolescent health risk decision making.

Prototype-Willingness model. There are obvious circumstances in health in general, and specifically in adolescent risk behaviors, that demonstrate how the experiential system often "wins out" in the decision making process. Most teens are aware of the dangers of having unprotected sex (Gerrard & Luus, 1995) or having sex with someone with whom they are unfamiliar. Despite this rational knowledge, however, teens are still getting STDs and unwanted pregnancies. The prototype-willingness model of adolescent health risk behavior is a modified dual-processing model that is designed specifically to explain and predict adolescent health risk behavior. The model maintains that behaviors are not always intentional, but are oftentimes the result of reactions to risk-conducive situations (Gibbons &

Gerrard, 1995, 1997). Like other dual-processing models, the prototype-willingness model proposes that there are two pathways to adolescent risk behavior that involve different types of information processing. The first is the reasoned or intentional pathway that reflects the fact that sometimes adolescents intend to engage in risk behaviors, such as binge drinking and unprotected sex. This route (referred to as the reasoned route) involves some degree of pre-contemplation, not only of the behavior, but also of the potential outcomes, and reflects a more deliberate processing system. Because of this reasoned approach, behavioral intentions is more stable and less influenced by outside factors (e.g., social comparison; Gibbons, Gerrard, & Lane, 2003; Gibbons & Gerrard, 1995). This reasoned route is based upon behavioral intentions as described in the theory of reasoned action (Ajzen, 1985) and the theory of planned behavior, and is similar to the reasoned route of processing described in other dual-process theories (e.g., the cognitive experiential self theory; Epstein & Pacinin,1999).

The second pathway described in the prototype-willingness model is the social reaction path, which is akin to the experiential path described by other dual-process models. This route reflects the fact that although adolescents may not plan to or intend to engage in a risky behavior, they often do so in response to social circumstances. This idea is captured in the construct of behavioral willingness, which reflects an openness to risk opportunity that involves less pre-contemplation of the behavior and its consequences (Gibbons, Gerrard, Ouellette, & Burzette, 1998). Because behavioral willingness is more influenced by outside factors (e.g. context, affect, social comparison) than behavioral intentions, it has been shown to be important for predicting adolescents' risk taking behavior, and more predictive than behavioral intentions up to a certain age (Gibbons et al., 2004; Gibbons et al., 2003; Gibbons & Gerrard, 1995, Gibbons, Gerrard, Blanton, & Russell, 1998; Gibbons, Gerrard, Reimer, & Pomery, 2006). As adolescents age and gain additional experience with risk

behaviors, behavioral willingness becomes less predictive of their future risk behavior, relative to behavioral intentions. Furthermore, research using the prototype-willingness model has demonstrated that both behavioral willingness and behavioral intentions are significant, yet independent, predictors of health risk behavior (Gibbons et al., 2006).

Because research has shown that adolescents utilize both the reasoned and experiential processing routes when making decisions about health, research paradigms based upon dual-process theories of decision making should include both the behavioral willingness and behavioral intentions constructs in order to more fully understand factors that influence processing via the two different routes. The prototype-willingness model has been successful in predicting and accounting for adolescent health risk behaviors, particularly with respect to longitudinal and prospective correlational data. However, there is relatively little laboratory research examining the constructs of this model. The current research will expand the existing literature by using an experimental design in the laboratory to test the assumptions of dual-process models in general, with the constructs specified by the prototype-willingness model.

Dual-processing theories and outcome expectancies.

There has been little published research examining the specific relations between dual-process theories and motives or outcome expectancies for health risk behaviors. Three factors, however, have been shown to affect both peoples' route of processing and their motives or outcome expectancies; these include personality characteristics, affect, and preconscious influences, these relations are described next.

Individual differences. Many research studies have explored the relations between personality traits and health risk behaviors (see Hoyle, Fejfar, & Millar, 2000 for a meta-analytic review). There have been fewer studies examining personality characteristics and motives for having sex or outcome expectancies, although it appears that extraversion is

associated with significantly higher positive outcome expectancies for alcohol, whereas neuroticism is associated with significantly higher negative outcome expectancies for alcohol (Read & O'Connor, 2005). In addition, it has been shown that the relation between extraversion and sexual risk taking behavior is mediated through motives for sex (Ingledew & Ferguson, 2007). Therefore, personality characteristics, such as extraversion that have been shown to predict more experiential processing (Pacini & Epstein, 1999), have also been shown to predict individuals' outcome expectancies for drinking alcohol and individuals' sex motives related to both risky sexual and drinking behaviors, respectively. Therefore, it is possible that the factors that predict individuals' route of information processing also predict their outcome expectancies for alcohol and motives for having sex. Thus, outcome expectancies and motives may be an important mediator between personality characteristics, such as processing style, and health risk behaviors.

Affect. Researchers have recently begun to explore the associations between affect and outcome expectancies for alcohol use, and to a lesser degree the relation between affect and motives for sexual behaviors. This research has demonstrated that negative affect is predictive of greater endorsement of positive alcohol expectancies in both correlational and experimental research designs (Hufford, 2001, Demmel, Nicolai, Gregorzik, 2006). In addition, positive mood states were correlated with more negative outcome expectancies (e.g., more negative evaluation of alcohol-induced sedation effects). Although there are only a few studies that examine the relation between affect and outcome expectancies for alcohol use, there is evidence to suggest that one's perceived outcomes of drinking alcohol are related to one's current mood state. The relation between affect and sex motives has been most elaborately detailed in a large panel study of over 1,600 young adults (Cooper, Agocha, & Sheldon, 2000). The results suggest that mood enhancement motives associated with sex, are significantly associated with both risky sexual behaviors

(i.e., lack of condom use, many partners) and with risky alcohol consumption (i.e., frequent heavy drinking, problems associated with heavy drinking). In sum, although there has been far more research on the association between affect and risk behavior, there appears to be evidence that affect influences outcome expectancies for alcohol and sex motives as well. Because affect appears to influence both route of processing and outcome expectancies and motives, it is possible that outcome expectancies and motives may mediate the effects of route of processing on risk cognitions.

Preconscious effects. Several studies have documented that preconscious factors influence alcohol consumption in the laboratory (Roehrich & Goldman, 1995; Stein, Goldman & Del Boca, 1997). Three such studies, each using a modified Stroop task to present words related to alcohol outcome expectancies document this association (Roehrich, & Goldman, 1995). Individuals exposed to positive outcome expectancy related words consumed significantly more alcohol than did individuals presented with neutral words. Other researchers have also documented that individuals primed with positive outcome expectancies subsequently drink more alcohol than participants in a control group who are not primed with outcome expectancies; similarly participants primed with negative outcome expectancy words subsequently drink less alcohol than participants in a control group who are not primed with outcome expectancies (Carter et al., 1998) These findings provide evidence that activating concepts related to outcome expectancies, even when people are not devoting full cognitive attention to those concepts, can influence alcohol consumption (Jones, Corbin, & Fromme, 2001). Much less research has been conducted examining preconscious influences on sexual behaviors. Five studies were conducted in which participants were primed (for 30 milliseconds) with sexual images (Gillath, Mikulincer, Birnbaum, & Shaver, 2008). Results of these studies indicated that participants receiving those primes showed increases in relationship enhancing motives (e.g., preference for using

positive conflict resolution strategies). Thus, there is substantial evidence that preconscious factors influence outcome expectancies for alcohol use. There is less, although consistent, evidence for a similar relationship for sex motives. The fact that individual differences in personality, current mood state, and preconscious factors, predict both experiential processing and alcohol outcome expectancies and sex motives suggests that these factors may be important mediating variables between processing style and behavioral willingness to engage in health risk behaviors. Addressing this possibility was a primary goal of the current research.

CHAPTER 3: STUDY 1 OVERVIEW AND HYPOTHESES

Conceptual Overview

The current study had two primary goals. Researchers have often claimed that risky behavior is the result of experiential processing rather than reasoned processing. As mentioned previously, these conclusions are drawn in a post-hoc fashion. Therefore, the goals of Study 1 were to 1) induce either experiential or reasoned processing and 2) then examine the effect that these processing styles had on both analytical reasoning task performance and adolescent health risk decisions. Because processing styles were experimentally manipulated, any resulting differences in analytical reasoning task performance and health risk decisions, particularly participants' behavioral willingness to engage in casual sexual behaviors and drink alcohol, could be attributed to differences in induced processing style; such differences, if found, would represent the first known successful between-subjects manipulation of route of processing in the laboratory to examine health risk decision making.

Study 1 used a 3 (Processing route: reasoned, control, vs. experiential) X 2 (Questionnaire order: behavioral willingness first vs. behavioral intentions first) mixed model experimental design. The processing route condition was between-subjects, while questionnaire order was a within-subjects manipulation. This design allowed for examination of the effect of an induced route of processing on participants' health risk decisions. Participants were asked to answer a variety of questions, and instructed to do so in one of three ways. The processing manipulation was delivered by asking participants in the reasoned processing condition to answer using strictly logical responding (note that "reasoned" refers to participants in the reasoned processing condition, while "rational" or "rationality" is used to refer to self-reported trait measures of reliance on rational processing) . Participants in the experiential processing condition were asked to respond using gut level,

intuitive responding while participants in the control condition were asked to respond to the questionnaire items as they normally would. The participants in the current study who were in the reasoned processing condition were given similar instructions as a way to strengthen the manipulation (Appendix A). Because previous work has demonstrated that responses to health risk items are often influenced by the order of the questions (e.g., Reimer, 2006), participants received one of two questionnaire orders, either behavioral willingness to engage in casual sex, or behavioral intentions to engage in casual sex was asked first. This manipulation is important because it is hypothesized that the act of answering the behavioral intentions items first may induce more reasoned processing. Consistent with this reasoning, behavioral willingness tends to be significantly lower when participants respond to behavioral intentions beforehand.

Study 1 Hypotheses

Study 1 was designed to test three hypotheses related to the route of processing. I next discuss these hypotheses in detail.

Route of processing. According to the validation hypothesis, it was predicted that processing condition would influence participants' self-reported rationality, odd-ratio task performance, and response times. Results would support this hypothesis, and offer validation of the processing manipulation if a) a main effect route of processing condition emerged, and b) if the pattern of means were consistent with the patterns described below. First, participants were asked to report the degree to which they used rational or experiential processing during the experimental session. It was expected that participants in the reasoned condition would report significantly higher levels of rationality than participants in the control condition, who were expected to report significantly higher levels of rationality than the experiential condition. Second, as a reflection of greater reliance on heuristics, it was expected that participants in the experiential processing condition would report significantly higher levels of confidence for the 10/100 and 9/100 ratio bias options than the

1/10 option. In contrast, it was hypothesized that participants in the reasoned processing condition would report significantly lower confidence with 9/100 odds than the 1/10 and 10/100 options. Finally, a main effect of processing route is expected to influence response times to questionnaire items. Those in the experiential condition are expected to respond quicker to all questionnaire items than participants in the other conditions, and those in the reasoned condition are expected to respond slower relative to the other two conditions. These findings would support the contention that experiential processing is characterized by less processing time, and reasoned processing is marked by greater processing time. In sum, results supporting these predictions would suggest that the manipulation used in this study was a valid procedure for inducing reasoned or experiential processing.

The hypothesis that people's use of a particular route of processing influences their behavioral willingness to engage in health risk behaviors was examined next. Specifically, it was predicted that people using experiential processing would be more willing than those using reasoned processing to engage in a variety of health risk behaviors. Results would support this hypothesis if, a) there was a main effect of processing condition on participants' reported behavioral willingness to engage in risky sexual behaviors or alcohol use, and b) the patterns of means indicated the greatest behavioral willingness among participants in the experiential condition, and the lowest behavioral willingness among participants in the reasoned condition. Because behavioral intentions are more stable than behavioral willingness, behavioral intentions were not expected to shift as a result the processing manipulation; therefore, a main effect of processing route manipulation was not expected on behavioral intentions items

It was also hypothesized that participants' behavioral willingness would be influenced by the order in which behavioral willingness was assessed relative to behavioral intentions. Specifically, it was predicted that the significant main effect of the processing manipulation on behavioral willingness would be moderated by questionnaire order. Results would

support this hypothesis if, a) a significant interaction between processing condition and questionnaire order emerged, and b) if the pattern of means revealed that participants in the experiential condition who answered behavioral willingness first reported the highest behavioral willingness, and if those who were in the reasoned condition and answered behavioral intentions first reported the lowest behavioral willingness.

CHAPTER 4: STUDY 1 RESEARCH METHODS

Experimental Design

Participants were randomly assigned to a 3 (route of processing: reasoned, vs. experiential vs. control) X 2 (Question order: behavioral willingness first vs. behavioral intentions first) mixed-model experimental design. Route of processing was the between-subjects factor whereas question order was the within-subjects factor. Participants assigned to the reasoned processing condition were asked to respond to the items using logical reasoning. Participants assigned to the experiential processing condition were asked to respond to the questionnaire items using intuition and their gut level reactions. Finally, participants in the control condition were asked to respond to the questionnaire items as they themselves normally would (Appendix A).

Participants

The sample included 139 undergraduate students at Iowa State University who were enrolled in an introductory level psychology course and who also participated in the psychology department's mass testing sessions (see Table 1 for participant distribution by experimental condition).. Each participant earned research credits in partial fulfillment of a research requirement for their course. The sample was 58% female and 87% Caucasian. The average age of participants was 20.1 years. The participants in this study were representative of the geographical area and university community from which they were drawn.

Table 1
Study 1 Cell Counts by Experimental Condition

	Reasoned	Control	Experiential
BW first questionnaire	29	25	23
BI first questionnaire	27	26	19

Note. Reasoned refers to reasoned processing condition. Control refers to control processing condition. Experiential refers to experiential processing condition. BW refers to behavioral willingness. BI refers to behavioral intentions.

Measures

A questionnaire assessed participants' past behavior, individual differences in processing style, and participants' behavioral willingness and behavioral intentions to engage in risky sexual and alcohol consumption behaviors. Each of these measures is described next.

Past behavior. Participants completed a series of items that asked about their previous sexual experiences and previous alcohol consumption (Appendix C). Participants responded to these items on 10-point Likert type scales with anchors 1 (*zero casual sexual partners)* and 10 (*10 or more casual sexual partners)* for previous sexual behaviors, and 1 (*never)* and 10 (*12 or more times this month*) for previous drinking behaviors.

Individual differences in processing style. The Rational-Experiential Inventory (Appendix B; Pacini & Epstein, 1999) was used to measure individual differences in participants' tendency to rely on either reasoned or experiential processing when making decisions in everyday life. The full version of the Rational-Experiential Inventory includes 40 items that make up the rationality and experientiality subscales, each of which include an ability and engagement subscale; totaling four 10-item subscales. The rationality scale includes items such as "I enjoy intellectual activities", and "I am not a very analytical thinker". The experientiality scale includes items such as "I like to rely on my intuitive impressions" or "I believe in trusting my hunches". Participants responses to these subscales were assessed on 5-point Likert type scales with anchors 1 (*definitely not true of myself)* and 5 *(definitely true of myself)*. Items were reverse scored per coding instructions, such that higher scores on the experientiality scale reflect a stronger self-reported affinity toward intuitive or gut-level responding. Similarly, higher scores on the rationality scale reflect a stronger self-reported tendency toward reasoning and logic-based decision making. Five items from each of the four subscales that have been shown in previous research (Pacini & Epstein, 1999) to have the strongest factor loadings were used. Space limitations during measurement required

that participants responded to a subset of 20 of the original 40 items from the Rational Experiential Inventory. These items showed high internal reliability for both the rationality subscale (α= .81) and experientiality subscale (α= .79) with the current sample. These reliability scores are comparable[4] (although slightly lower) to the reliability scores observed by researchers using the full Rational Experiential Inventory (Pacini & Epstein, 1999).

Ratio-bias. As an indicator of the degree to which participants processed rationally or experientially during the experimental session, they were asked to respond to a ratio-bias task similar to what has been used in other research (Pacini & Epstein, 1999). The problem asks participants to decide which of two different lotteries they would rather participate in: Lottery A, where there is one red jelly bean out of 10 total jelly beans, versus Lottery B, where there are 10 red jelly beans out of 100 total jelly beans, versus Lottery C, where there are 9 red jelly beans out of 100 total jelly beans. Participants reported how confident they would feel about their chances of drawing a red jelly bean from each lottery on a 7-point scale with anchors 1 (*not at all confident*) and 7 (*extremely confident*). Significantly lower reported confidence in Lottery A, than in Lottery B or C is suggestive of more experiential processing (Pacini & Epstein, 1999).

Behavioral intentions. Participants completed a series of items designed to assess their intentions to engage in risky health behaviors (Appendix C). Some of these questions focused on risky sexual behaviors (e.g., sex with a casual partner) whereas others focused on risky alcohol consumption (e.g., going out with the intention of getting drunk). Participants responded to these items on 7-point Likert type scales with anchors 1 (*definitely will not*) and 7 (*definitely will*). The items assessing behavioral intentions and behavioral expectations to have casual sex showed high internal reliability at both Time 1 (α = .94) and Time 2 (α = .91). Behavioral intentions and behavioral expectation to drink alcohol were reliable at both Time 1 (α = .99) and Time 2 (α =.98). Participants completed the behavioral intentions items twice, once during mass testing and then again during the experimental session. All

behavioral intentions items were standardized and combined into an overall index of behavioral intentions to engage in health risk behaviors.

Behavioral willingness. Participants were asked to read a series of hypothetical situations in which they encounter the opportunity to engage in health risk behaviors (e.g., the participant meets an attractive person at a party who wants to go home with him / her; the participant is at a party and is feeling they have had enough alcohol to drink; Appendix C) and asked to rate how willing they would be to do each of several different behaviors (e.g., "have oral sex" with the target, "stay at the party and continue to drink") on a 7-point Likert type scale with anchors 1 (*not at all willing)* and 7 (*very willing*). Responses to these items were aggregated into an index by taking the sum of each individual item for that particular risk behavior (i.e., casual sex or alcohol use). Participants completed the behavioral willingness items twice, once during mass testing and then again during the experimental session. Internal reliabilities for behavioral willingness to have casual sex at Time 1 (α = .90) and Time 2 (α =.89) were quite high. Similarly, behavioral willingness to drink measures at Time 1 and Time 2 showed excellent internal reliabilities (αs =.88 & .86 respectively). All behavioral willingness items were standardized and combined into an overall index of behavioral willingness to engage in health risk behaviors.

Response time. Response time, in milliseconds, was collected for all questionnaire items. Response times were aggregated into separate indices reflecting separate average response time for behavioral willingness and behavioral intentions to engage in health risk behaviors. Because response times were negatively skewed, raw scores were inverse transformed. This procedure is recommended when response times are negatively skewed, but the overall range of response times is relatively small (Weisberg, 1985). Accordingly, there were outliers are present in the data, but there were few of them, and they were not extreme, therefore, an inverse transformation was the most appropriate transformation.

Procedure

Data collection occurred at two time points. Time 1 occurred during mass testing, a large-scale survey session organized by the department of psychology, in which all undergraduate students enrolled in introductory level psychology courses have the opportunity to gain research credit. Students who participated in mass testing responded to the past behavior questions, the Rational Experiential Inventory, and the behavioral willingness and behavioral intentions questions. Only undergraduates who participated in mass testing were eligible to participate in the subsequent experimental session during which time they individually participated in a single laboratory session. At this session, they were told that they were participating in an experiment designed to examine decision making processes. The experimenter informed participants that for this task they would be asked to make a series of decisions regarding situations typically faced by college students. After participants read and signed an informed consent form, they were each led to a private room and seated at a computer screen and keyboard, and the task was begun. MediaLab software was used to present the questionnaire items and record the responses for all dependent measures. Route of processing was manipulated at this point in the sessions. Specifically, participants were informed that they would be asked to respond to a series of questions regarding situations frequently faced by college students. Although all participants were given instructions on how to respond to these questions, the instructions they received were varied in order to manipulate route of processing. Participants in the reasoned condition were instructed to respond to the items using logical reasoning. Participants in the experiential condition were instructed to respond by using intuition and gut level reactions. Participants in the control condition were instructed to respond how they would normally (Appendix A). Additionally, after the experimenter gave the instructions to the participants in the reasoned and experiential conditions, the experimenter placed a sign on the desk reading, “Think logically” or “Go with your gut”, respectively to serve as a continuous reminder of the processing instructions. Immediately after the processing manipulation was

delivered, participants began the questionnaire (Appendix C). All participants responded to all of the same questionnaire items; however participants were randomly assigned to respond to these questions in a particular order. Because the order of assessment of behavioral intentions and behavioral willingness has been shown to influence responses to behavioral willingness (Reimer, 2006), questionnaire order was counterbalanced in the current study. Participants assigned to the behavioral willingness first condition answered the behavioral willingness items first followed by the behavioral intentions items. Participants assigned to the behavioral intentions first condition answered the behavioral intentions items first followed by the behavioral willingness items. In both conditions, questions pertaining to risky sexual behavior always preceded questions pertaining to risky alcohol use behaviors. After completing the questionnaire, participants were fully debriefed, and the experimental session was concluded.

CHAPTER 5: STUDY 1 RESULTS

Preliminary Analyses

Descriptive statistics. The means, standard deviations, and correlations for all Time 1 and Time 2 variables are presented in Table 2. Tables D1, D2, and D3, in Appendix D present the means, standard deviations, and correlations for all Time 1 and Time 2 variables for the reasoned, experiential, and control conditions separately. Participants at Time 1 reported low to moderate behavioral willingness to have casual sex (M = 5.5) and very low intentions to have casual sex in the future (M = 4.0). Specifically, 66% of the sample reported ever having been sexually active. These participants reported between 1 and 12 or more lifetime sexual partners (M = 3), and less than 2 casual sexual partners, on average. Participants also reported relatively low behavioral willingness to drink alcohol (M = 6.7) and moderate behavioral intentions to drink in the future (M = 13.9). Specifically, 64% of the sample reported some alcohol use in the past month. Within this time frame, these participants reported between 1 and 12 or more servings of alcohol (M = 4), and between 1 and 12 or more episodes of binge drinking. Although there was a large range of previous sexual partners and drinking behavior, the majority of participants reported minimal risk taking behavior. Furthermore, the participants in this sample reported lower behavioral willingness and behavioral intentions than participants in other studies using similar questions in similar samples (e.g., Houlihan, 2008). In sum, the participants in this study appear to be relatively representative of the young college population they were recruited from in terms of having relatively little past health risk behavior, and low behavioral intentions and behavioral willingness to engage in health risk behavior in the future.

Testing for random assignment to condition. Prior to hypothesis testing, preliminary analyses were performed to examine whether random assignment to the processing and

question order conditions had been achieved. These analyses tested whether processing condition and questionnaire order had significant effects on any of the Time 1 measures.

Table 2
Study 1 Correlations and Descriptive Statistics.

Variable	1	2	3	4	5	6	7	8	9	10
1. Rational	--	.051	-.13	-.09	-.02	-.10	-.24*	-.00	-.12	-.12
	92	90	87	92	71	92	72	92	72	92
2. Experiential		--	-.00	.12	-.19	-.05	-.20†	.03	-.08	.08
		92	87	92	71	92	73	92	72	92
3. Casual sex BW (Time 1)			--	.77***	.36**	.37***	.72***	.52***	.43***	.41***
			88	88	71	88	73	88	72	88
4. Casual sex BW (Time 2)				--	..34**	.39***	.55***	.67***	.45***	.47***
				139	71	139	73	139	72	139
5. Drinking BW (Time 1)					--	.70***	.36**	.31**	.75***	.66***
					71	71	71	71	70	71
6. Drinking BW (Time 2)						--	.42**	.30***	.63***	.60***
						139	73	139	72	139
7. Casual sex BI (Time 1)							--	.65***	.47***	.35**
							73	73	73	73
8. Casual sex BI (Time 2)								--	.41***	.41***
								139	72	139
9. Drinking BI (Time 1)									--	.85***
									73	72
10. Drinking BI (Time 2)										--
										139
Mean	33.7	33.9	5.52	6.36	6.65	8.76	4.03	4.42	13.91	17.53
(SD)	(6.48)	(5.91)	(4.15)	(3.77)	(3.62)	(3.34)	(3.18)	(3.49)	(9.72)	(9.66)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.
†p < .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001.

The potential effects of these variables were assessed separately in a series of one-way ANOVAs in which the following Time 1 measures served as the dependent variables: rationality, experientiality, behavioral willingness to have casual sex, behavioral willingness to drink alcohol, behavioral intentions to have casual sex, and behavioral intentions to drink alcohol. Results that examined the effect of processing condition yielded a single significant finding: There was a main effect of processing condition on the Time 1 measure of behavioral willingness to drink alcohol, F (2, 68) = 3.72, p < .05, such that participants in the reasoned condition showed greater Time 1 behavioral willingness (M = 7.96) than did

participants in the experiential (*M* = 6.23) or control (*M* = 5.18) conditions. No other significant effects emerged, *F*s $\leq$ 2.24, *p*s > .05. Results that examined the effect of question order yielded no significant effects on any of the Time 1 measures, *F*s $\leq$ 1.9, *p*s > .17. In general, therefore, it appears that random assignment was achieved, except for the higher behavioral willingness to drink alcohol present among participants in the reasoned condition at Time 1. Ideally, there would be no significant effects of condition on any Time 1 measures; however, this significant difference is in the opposite direction of the hypothesized relations, thereby suggesting that analyses involving this variable will most likely produce conservative estimates

Manipulation check: Processing condition. To test the effectiveness of the route of processing manipulation, three sets of analyses were performed, with follow-up contrasts that used the LSD (Least Significant Difference) method. First, the influence of route of processing on participants' self-reported rationality was examined with a 3 (processing condition) X 2 (question order) between subjects ANCOVA in which Time 1 measures of participants' trait rationality and trait experientiality served as covariates. Results revealed a significant main effect of processing condition on self-reported rationality, F (2, 82) = 17.55, $p < .001$, $\eta_p^2 = .25$. Follow-up contrasts revealed that participants in the reasoned condition reported greater rationality than participants in the experiential and control conditions, *p*s <.001 (Table 3). Participants in the experiential and control conditions, however, did not significantly differ from one another, $p > .10$. Neither the main effect of question order nor the interaction between processing condition and question order were significant, *p*s > .15.

Second, the influence of route of processing on participants' performance on the ratio bias task was examined with three separate 3 (processing condition) X 2 (question order) between subjects ANCOVAs in which Time 1 measures of participants' trait rationality and trait experientiality served as covariates. The dependent variables were participants' confidence estimates for the 1/10, 10/100, and 9/100 odds questions. Results revealed

Table 3
Study 1 Raw and Adjusted Means of Self-reported Rationality During Experimental session

	Reasoned	Control	Experiential
Raw means (SD)	5.06 (1.37)	3.52 (1.48)	2.81 (1.23)
Adjusted Means (95% CI)	4.99 (4.51 – 5.47)	3.56 (3.06 – 4.05)	2.84 (2.30 – 3.39)

Note. Self-reported rationality among participants assigned to the reasoned, control, and experiential processing conditions. Higher values indicate greater self-reported use of rational processing, whereas lower values indicate greater self-reported use of experiential processing.

no significant main effects of route of processing condition or of question order, and no significant processing condition by question order interactions on participants' confidence estimates for either the 1/10 or the 10/100 odds questions, all *p*s $\geq$ .07, η_p^2s < .03 (see Table 4). Results also did not yield a significant main effect of route of processing or of question order on the 9/100 odds ratio, *p*s > .07, but did yield a significant processing condition by question order interaction, F (2, 82) = 4.62, p < .05, η_p^2 = .06. Examination of the means (Table 3) indicated that participants in the reasoned processing condition reported less confidence for the 9/100 odds question in comparison to all other groups, but only when they answered the behavioral willingness items first. When they answered the behavioral intention items first, all groups reported similar levels of confidence for the 9/100 odds question.

The final set of analyses were conducted to examine the influence of route of processing and question order on participants' response times with two separate 3 (processing condition) X 2 (question order) between subjects ANOVAs. For these analyses, participants' response times to the behavioral willingness and behavioral intention items served as the dependent variables. Response times reflected the average amount of time it took participants to read and respond to all questions within a set (i.e., all behavioral willingness questions or all behavioral intentions questions). As indicated in the Methods,

prior to performing these analyses, participants' response times were inverse transformed to normalize the distribution.

Table 4
Study 1 Adjusted Descriptive Statistics of Confidence in Ratio-Bias Task by Processing Condition and Question Order

		Reasoned	Control	Experiential
1/10 Odds ratio	BW first	2.77 (2.11 – 3.43)	3.99 (3.3 – 4.68)	3.57 (2.85 – 4.29)
	BI first	3.22 (2.50 – 3.95)	2.76 (2.02 – 3.51)	2.97 (2.11 – 3.83)
10/100 Odds ratio	BW first	2.87 (2.25 – 3.48)	3.67 (3.04 – 4.31)	3.71 (3.04 – 4.38)
	BI first	3.41 (2.74 – 4.07)	3.57 (2.88 – 4.25)	3.30 (2.51 – 4.09)
9/100 Odds ratio	BW first	1.95 (1.34 – 2.56)	3.22 (2.59 – 3.85)	3.72 (3.06 – 4.39)
	BI first	3.03 (2.36 – 3.69)	2.99 (2.31 – 3.67)	2.73 (1.94 – 3.52)

Note. 95% confidence intervals reported in parentheses. Higher values reflect higher estimated confidence in each of the ratio bias lotteries.
Covariates include rationality and experientiality from Rational Experiential Inventory.
Means with different superscripts differ significantly at $p < .05$, $^{\dagger}p < .10$.

The analysis that examined response times to the behavioral willingness items yielded a significant main effect of processing condition, F (2, 133) = 7.50, $p < .01$, $\eta_p^2 = .10$. Follow-up contrasts that used the LSD method revealed that participants in the reasoned condition (M= 6.21, SD = 3.39) responded significantly slower than participants in the experiential (M = 4.59, SD = 1.91) or control (M = 4.26, SD = 1.354) conditions, ps < .01. Participants in the experiential and control conditions did not significantly differ, $p > .80$. Results indicated no significant main effect of question order, nor a significant processing condition by question order interaction, ps > .07. The analysis that examined response times to the set of behavioral intentions items yielded no significant main effects of route of processing, of question order, and no significant route of processing by question order interaction, all ps > .06. The response times for the reasoned condition (M = 7.85, SD = 3.51), experiential condition (M = 7.14, SD = 3.04) and the control conditions (M = 6.61, SD

= 2.00) were, however, mostly in the expected directions, except for participants in the control condition responding slightly faster than participants in the experiential condition. Overall, these findings are partially consistent with hypotheses, and suggest that the processing manipulation successfully affected the amount of time participants spent considering their behavioral willingness to engage in health risk behaviors but did not affect the amount of time participants spent considering their intentions to engage in risk behaviors.

Main Analyses

Effect of processing condition and order on behavioral willingness: Having demonstrated that route of processing was effectively induced in participants, I next tested the hypothesis that people's use of reasoned versus experiential processing influences their behavioral willingness to engage in health risk behaviors. I first tested this hypothesized relation with two separate 3 (route of processing) X 2 (question order) ANCOVAs – one that used participants' behavioral willingness to engage in health risk behaviors as the dependent variable and another that used participants' behavioral intentions to engage in health risk behaviors as the dependent variable (Table 7). In both analyses, Time 1 measures of rationality and experientiality were included as covariates. As reported below, the results from these analyses were consistent with the hypothesis that route of processing influenced behavioral willingness more strongly than behavioral intentions.

The analysis that focused on behavioral willingness yielded a significant main effect of processing condition, F (2, 78) = 6.33, $p < .01$, $\eta_p^2 = .14$ (Table 8), but no significant main effect of question order, F (1, 78) = 1.34, $p > .25$, $\eta_p^2 = .02$, nor a significant interaction between processing condition and question order, F (2, 78) = 2.93, $p > .05$, $\eta_p^2 = .07$. Follow-up contrasts that examined the significant main effect of processing condition revealed that participants in the reasoned condition reported significantly lower behavioral willingness to engage in health risk behaviors than participants in the control and experiential conditions,

*p*s < .05. Participants' behavioral willingness to engage in health risk behaviors in the experiential condition did not significantly differ from participants in the control condition, *p* > .05.The analysis that focused on behavioral intentions did not yield any significant effects, *p*s > .05, η_p^2 < .02 (Table 8). These results provide the first empirical evidence that externally induced shifts in people's route of processing affects their behavioral willingness to engage in health risk behaviors more than their behavioral intentions to engage in health risk behaviors, and that this effect may be strongest for people who are engaged in reasoned processing.

Table 5
Study 1 ANCOVA Table for Effect of Processing Condition and Question Order Response times for Behavioral Willingness

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	.125	5	.03	4.07	.01	.13
Condition	.092	2	.05	7.50	< .001	.90
Order	.02	1	.02	3.33	.07	.10
Condition by order	.01	2	.01	1.06	.35	.02
Error	.81	133	.01			
Corrected Total	.94	138				
R square = .13						

Note. T1 BW refers to Time 1 behavioral willingness. Rational refers to the rationality score from Rational Experiential Inventory. Experiential refers to the experientiality score from the Rational Experiential Inventory. Condition refers to processing manipulation condition.

The previous findings suggested that the route of processing manipulation influenced participants' behavioral willingness to engage in health risk behaviors more than their behavioral intentions. To examine whether this difference was significant, a 3 (route of processing) X 2 (questionnaire order) between-subjects ANCOVA. The dependent variable was the difference between participants' behavioral willingness and their behavioral intentions to engage in health risk behaviors (i.e. BW – BI). For this analysis, Time 1 measures of rationality and experientiality were included as covariates as was the difference

Table 6
Study 1 ANCOVA Table for Effect of Processing Condition and Question Order Response times for Behavioral Intentions

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	.02	5	.00	1.26	.29	.05
Condition	.01	2	.00	.99	.37	.02
Order	.01	1	.01	3.62	.06	.03
Condition by order	.00	2	.00	.03	.97	.00
Error	.33	133	.01			
Corrected Total	.35	138				
R square = .13						

Note. T1 BW refers to Time 1 behavioral willingness. Rational refers to the rationality score from Rational Experiential Inventory. Experiential refers to the experientiality score from the Rational Experiential Inventory. Condition refers to processing manipulation condition.

Table 7
Study 1 Adjusted Descriptive Statistics of Behavioral Willingness and Behavioral Intentions by Processing Condition and Questionnaire Order

Dependent Variable	Condition	BW first	95% CI	BI First	95% CI
Behavioral Willingness	Reasoned	-.27	-.60 - .06	-.34	-.68 - .01
	Control	.12	-.16 - .40	.51	.12 - .90
	Experiential	-.04	-.38 - .30	.04	-.33 - .40
Behavioral Intentions	Reasoned	-.98	-1.52 - -.45	-.50	-1.06 - .06
	Control	-.50	-1.03 - .03	-.62	-1.26 - .02
	Experiential	-.42	-.92 - .08	-.45	-1.06 - .16

Note. BW refers to behavioral willingness. BI refers to behavioral intentions.
Values adjusted for Time 1 measures of trait rationality and experientiality, and behavioral willingness and behavioral intentions (respectively).

between behavioral willingness and behavioral intentions at Time 1. Results did not yield a significant main effect of route of processing, F (2, 63) = .64, p > .50, η_p^2 = .02 (Table 10). There was, however, a significant main effect of question order, F (2, 63) = 12.77, p < .01, η_p^2 =.12, such that participants who answered the behavioral willingness items first reported a significantly greater difference between behavioral willingness and behavioral intentions (M = .47) than participants who answered the behavioral intentions items first (M = -.38). That is, participants who answered behavioral willingness first reported greater behavioral

willingness than behavioral intentions, whereas participants who answered behavioral intentions first reported greater behavioral intentions than behavioral willingness. Finally, the results did not yield a significant route of processing by question order interaction, F (2, 63) = .64, $p > .50$, $\eta_p^2 = .01$. In sum, the previously reported significant influence of route of processing on behavioral willingness to engage in health risk behaviors was not significantly different from the influence of route of processing on behavioral intentions to engage in health risk behaviors.

Table 8
Study 1 ANCOVA Table for Effect of Processing Condition and Question Order on Behavioral Willingness

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	76.292	8	9.54	60.76	< .001	.86
T1 BW	65.57	1	65.57	417.78	< .001	.84
Rational	.04	1	.04	.27	.60	<.01
Experiential	.27	1	.27	1.69	.20	.02
Condition	1.99	2	1.99	6.33	<.01	.14
Order	.21	1	.21	1.34	.25	.02
Condition by order	.92	2	.46	2.93	.06	.07
Error	12.24	78	.16			
Corrected Total	88.53	86				
R square = .68						

Note. T1 BW refers to Time 1 behavioral willingness. Rational refers to the rationality score from Rational Experiential Inventory. Experiential refers to the experientiality score from the Rational Experiential Inventory. Condition refers to processing manipulation condition.

Table 9
Study 1 ANCOVA Table for Effect of Processing Condition and Question Order on Behavioral Intentions

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	124.44	8	15.55	17.84	<.001	.69
T1 BI	112.58	1	112.58	129.09	< .001	.67
Rational	.4.26	1	4.28	4.91	.03	.07
Experiential	10.78	1	10.78	12.36	<.001	.16
Condition	1.07	2	.54	.61	.55	.02
Order	.21	1	.21	.24	.63	<.01
Condition by order	1.19	2	.60	.68	.51	.02
Error	54.94	63	.87			
Corrected Total	179.38	71				
R square = .69						

Note. T1 BI refers to Time 1 behavioral intentions. Rational refers to the rationality score from Rational Experiential Inventory. Experiential refers to the experientiality score from the Rational Experiential Inventory. Condition refers to processing manipulation condition.

Table 10
Study 1 ANCOVA Table for Effect of Processing Condition and Questionnaire Order on Behavioral Willingness minus Behavioral Intentions

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	47.92	8	5.99	4.10	<.001	.34
T1 BW-BI	30.31	1	30.31	20.75	<.001	.25
Rational	4.57	1	4.57	1.10	.08	.05
Experiential	1.59	1	1.59	1.09	.30	.02
Processing Condition	1.86	2	.93	.64	.53	.02
Order	12.78	1	12.78	8.75	<.01	.12
Processing condition by order	1.24	2	.62	.43	.66	.01
Error	92.01	63	1.46			
Corrected Total	139.93	71				
R square = .34						

Note. T1 BW refers to Time 1 behavioral willingness. Rational refers to rationality score from the Rational Experiential Inventory. Experiential refers to experientiality score from the Rational Experiential Inventory. Condition refers to processing condition.

CHAPTER 6: STUDY 1 DISCUSSION

The primary goals of Study 1 were to 1) establish that route of processing can be effectively induced in a laboratory situation and 2) examine the effect that route of processing had on both analytical reasoning task performance and on health risk decisions. These goals were addressed by conducting an experiment in which a between-subjects manipulation of processing route was used, and participants' behavioral willingness and behavioral intentions to engage in risky sexual and drinking behaviors was assessed. Overall, results of Study 1 suggest two conclusions: First, the between-subjects processing manipulation was successful in shifting participants' reliance on either reasoned or experiential processing relative to a control group. Second, the findings supported dual-process theory assumptions that riskier decisions reflect higher degrees of experiential processing. In addition, the findings supported the predictions expected from the prototype willingness model that the construct of behavioral willingness reflects experiential processing and is more malleable than the construct of behavioral intentions. The following sections provide elaboration on the findings and implications of Study 1.

Efficacy of processing manipulation. Because there have been no other experimental between-subjects manipulations of processing route, it was first necessary to examine the hypothesized effects of participants' route of processing on three separate manipulation checks, including self-reported rationality during the experimental session, responses to the odds-ratio task, and finally differences in response times. First, participants' self-reported reliance on reasoned or experiential processing was assessed with a single item question at the end of the experimental session. It was predicted that participants in the reasoned condition would report significantly higher levels of rationality than participants in the control and experiential conditions, and that the control condition participants would report significantly higher levels of rationality than the experiential condition participants. Results revealed a significant main effect of processing condition on self-reported rationality, while

controlling for trait measures of rationality and experientiality. In fact, effect size estimates (η^2) reveal that approximately 28% of the total variance of self-reported rationality was attributable to the processing manipulation. This suggests that the processing manipulation had a relatively large effect on self-reported rationality during the experimental session. Pair-wise processing condition comparisons revealed that the reasoned condition participants reported significantly higher rationality scores than the experiential condition and the control condition participants; however, the difference between the experiential and control conditions was marginally significant ($p < .10$).

These findings have two implications; first, they suggest that participants' reliance on reasoned vs. experiential processing is in fact malleable. Second, the pairwise comparisons suggest that the processing manipulation was more effective in inducing reasoned processing than experiential processing, although because the difference between the experiential and control group was marginally significant, replication is needed before firm conclusions can be drawn. Overall, examination of participants' self-reported use of rationality or experientiality during the experimental session supported the hypothesis that route of processing can be experimentally manipulated, and suggested that the processing manipulation used in this study was effective, especially for participants who received the reasoned processing instructions.

The odds-ratio task was included in the present study because it is often used as an indicator of the degree to which participants are engaging in heuristic based decision making. Participants in other studies are often told to choose which task they would pick (1/10 vs. 10/100) or (1/10 vs. 9/100) and participants in those studies consistently chose the ratio with largest absolute values (Pacini & Epstein, 1999). Participants in the current study were not told to choose which option they would prefer, but rather they were told to report their perceived confidence given those two odds ratios. It was hypothesized that participants in the experiential condition would report significantly higher confidence levels for the higher

absolute value ratios. There was partial support for this hypothesis. Although there were no significant differences across the processing conditions when examining the 1/10 or 10/100 odds, there was a significant main effect of processing condition on confidence for the 9/100 odds. Participants in other studies are reported to convey knowledge that the odds are equal (in the 1/10 vs. 10/100 scenario) or even worse (in the 9/100) scenario, but that they "feel" that the odds are better given higher absolute numbers. This effect was partially found in the current study, and offer support for the claim that participants in the reasoned condition were making less heuristically based decisions than the experiential condition.

Finally, the hypothesized effects of the processing manipulation on response times were examined. It was predicted that participants in the reasoned condition would respond to the questionnaire items significantly slower than the control and experiential conditions, and that participants in the control condition would respond significantly slower than participants in the experiential condition. Examining response times is an important determinant of route of processing because every dual-processing theory of which I am aware argues that analytic responding is much slower than experiential processing (Evans, 2007). This hypothesis was partially supported in the current study. As predicted, there was a significant main effect of processing condition for participants' behavioral willingness to engage in risky health behaviors, but unexpectedly, no significant effect of processing condition on behavioral intentions to engage in risky health behaviors. Furthermore, the predicted significant differences between the control and experiential conditions were not found. Participants in the reasoned condition did respond significantly slower than the other two conditions, but only when answering the behavioral willingness items. One possible explanation for these findings is that because behavioral intentions is less affected by situational factors than behavioral willingness, the main effect of route of processing on response times is only evident for the behavioral willingness measures (Gibbons, Gerrard, & Lane, 2003). It is possible that manipulating route of processing only affects response times

when considering novel scenarios, and not when reporting behavioral intentions that have likely already been established. In sum, the hypothesized effect of processing route on processing time was partially supported.

Effect of processing condition on risk cognitions. It was hypothesized that the processing manipulation would significantly affect willingness to engage in casual sex and alcohol consumption. Because behavioral intentions is proposed to be a more stable construct, no main effect of processing manipulation on behavioral intentions was expected. Overall, there was support for this hypothesis. There was a significant main effect of processing condition on behavioral willingness to engage in health risk behaviors when controlling for trait measures of rationality and experientiality. Examination of results (Table 8) indicated that even though the baseline measures of behavioral willingness was the strongest predictor of behavioral willingness, the processing condition also significantly affected behavioral willingness, accounting for an additional 11% of the variance. Follow-up contrasts revealed that participants given the reasoned processing instructions reported significantly lower behavioral willingness than participants given the experiential processing or control instructions. Participants in the experiential and control groups, however, did not significantly differ. This finding is important because it offers empirical support for the assumption that less risky decisions are the result of more reasoned decision making, while more risky decisions are the result of less reasoned decision making. It was also expected that the processing manipulation would not significantly affect behavioral intentions to engage in health risk behaviors. As hypothesized there was not a significant effect of processing condition on behavioral intentions to engage in health risk behaviors.

Effect of question order on health risk cognitions. Previous research has demonstrated that participants' responses to behavioral willingness and behavioral intentions are influenced by the order in which participants are presented with the questions. Specifically, behavioral willingness tends to be higher when it is answered before behavioral

intentions are assessed (Reimer, 2006). It is proposed that considering the behavioral intentions items can induce more reasoned processing. Therefore, the presentation of the behavioral willingness and behavioral intentions items in the current study were counterbalanced. It was hypothesized that participants who responded to the behavioral willingness items first would report significantly higher behavioral willingness than participants who answered the behavioral intentions items first. Analyses revealed there was not a consistent significant main effect of question order on behavioral willingness. There was one significant finding, such that participants who answered the behavioral willingness items first (always sex before alcohol) reported higher behavioral willingness to drink, than participants who answered the behavioral intentions items first. Therefore, this hypothesis was only partially supported. It is possible that the order effects expected in this study were not found because the explicit processing instructions given to participants were more powerful than any questionnaire order effects.

Effect of processing condition and question order. A significant interaction between processing manipulation condition and questionnaire order was expected, such that participants given the reasoned processing manipulation and who answered the behavioral intentions items first were expected to report the lowest behavioral willingness while participants who were given the experiential processing instructions and who answered behavioral willingness first, were expected to report the highest behavioral willingness to engage in health risk behaviors. Overall, there was only partial support for this hypothesis. There was a nearly significant interaction effect on behavioral willingness to engage in health risk behavior. Follow up contrasts between processing conditions revealed that participants in the experiential condition who answered the behavioral willingness items first reported the highest behavioral willingness whereas participants in the reasoned condition who answered behavioral intentions first reported the lowest behavioral willingness. Therefore, while there was not a consistent significant main effect of order, there did appear

to be a nearly significant interaction effect between processing manipulation and questionnaire order.

CHAPTER 7: STUDY 2 OVERVIEW AND HYPOTHESES

Study Two Overview

The goals of Study 2 were to replicate the effects of the processing condition found in Study 1, and to examine if these effects were mediated by other theoretically relevant factors. Specifically, Study 2 examined whether participants' motivation to have sex and outcome expectancies related to alcohol use mediated the influence of route of processing on their subsequent health risk decisions. These hypotheses were tested with a 3 (Processing condition: reasoned vs. experiential vs. control) X 2 (question order: BW then BI first vs. Outcome expectancy first) factorial design. The processing manipulation was a between-subjects factor, while questionnaire order was a within-subjects factor. Processing route was manipulated following the procedures described in Study 1: participants were instructed to answer a variety of questions in one of three ways 1) strictly logical responding 2) gut level intuitive responding or 3) as they themselves would normally respond. Additionally, participants were randomly assigned to receive one of two questionnaire orders. Half of the participants answered all BW and BI items (with BW always preceding BI) prior to answering the questions related to motives and outcome expectancies whereas the other half of participants answered the questions related to motives and outcome expectancy prior to the BW and BI items.

Study Two Hypotheses

Study 2 was designed to examine four specific hypotheses. I describe these hypotheses in the following sections.

Route of processing. It was first hypothesized that the route of processing manipulation would influence participants' behavioral willingness to engage in health risk behaviors more so than behavioral intentions. These two hypothesized main effects of processing route are the same as in Study 1; therefore they will not be reiterated here.

Mediated effects. The third hypothesis of study 2 addresses the expected mediation of route of processing by outcome expectancies for drinking and motives to engage in sex. Specifically, it was hypothesized that participants in the reasoned condition would report significantly lower behavioral willingness than participants in either the control or experiential conditions, and that this effect would be mediated by participants' motives to have sex and outcome expectancies for alcohol use. In addition it was expected that those in the experiential condition would report significantly greater behavioral willingness than participants in the reasoned and control conditions, and that this effect would be mediated by participants' motives to have sex and outcome expectancies for alcohol use.

CHAPTER 8: STUDY 2 RESEARCH METHODS

Experimental Design

Participants were randomly assigned to a 3 (Processing condition: reasoned, vs. experiential vs. control) X 2 (Order: BW first vs. outcome expectancies first) mixed model experimental design. The three route of processing conditions were the same as in Study 1. Participants randomly assigned to the behavioral willingness first condition were presented with the behavioral willingness and behavioral intentions items (always BW prior to BI) before the motives and outcome expectancy items. Participants randomly assigned to the expectancy first condition were presented with the motives and outcome expectancy questions (sexual outcome expectancy always preceding alcohol outcome expectancy) prior to the behavioral willingness and behavioral intentions items.

Participants

Participants, (N = 204, 70% female) were recruited from introductory level psychology courses at Iowa State University. Participant eligibility, recruitment, and sign-up procedures were the same as in study one (see Table 13 for cell count by experimental condition). Eighty seven percent of the participants were Caucasian, and reported a mean age of 19.4 years.

Table 11
Study 2 Cell Counts by Experimental Condition

	Reasoned	Control	Experiential
Behavioral willingness First	36	33	48
Outcome expectancies First	31	32	24

Note. Reasoned refers to the reasoned processing condition, Control refers to the Control condition, and Experiential refers to the experiential processing condition.

Measures

The questionnaire assessed participants' past sexual and alcohol use behaviors, individual differences in processing style, and participants' behavioral willingness and behavioral intentions to engage in risky sexual and alcohol consumption behaviors in the future. Each of these measures is described next.

Past behavior. Participants completed a series of items that assessed their previous sexual experiences and previous alcohol consumption. Participants respond to these items on 10-point Likert type scales with anchors 1 (*zero casual sexual partners*) and 10 (*10 or more casual sexual partners*), or 1 (*never*) and 10 (*12 or more times this month*) for sexual and drinking behaviors, respectively.

Individual differences in processing style. The Rational-Experiential Inventory (Appendix B; Pacini & Epstein, 1999) was used to measure individual differences in the tendency to rely on either reasoned or experiential processing when making decisions in everyday life. These measures were the same as in Study 1. These measures showed high levels of internal reliability for the rationality (α= .85) and experientiality (α = .87) scales.

Behavioral intentions. Participants completed a series of six items designed to assess their behavioral intentions to engage in risky health behaviors. Two of these items focused on risky sexual behaviors (e.g., sex with a casual partner) whereas the remaining 4 items focused on risky alcohol consumption (e.g., going out with the intention of getting drunk). These measures were the same as in Study 1 (Appendix C). Internal reliabilities for Time 1 (α = .98) and Time 2 (α = .97) drinking behavioral intentions were quite high. Behavioral intentions to engage in casual sex items also showed high internal reliability at Time 1 (α = .96) and Time 2, (α = .96). All behavioral intentions measures were combined to reflect an overall measure of behavioral intentions to engage in health risk behaviors.

Behavioral willingness. Participants were asked to read a series of hypothetical scenarios in which they encounter the opportunity to engage in health risk behaviors. These scenarios were the same as in Study 1 (Appendix C). Behavioral willingness to engage in

casual sex at Time 1 (α = .89) and Time 2 (α = .88) were reliable indices. Behavioral willingness to drink also showed high internal reliabilities at both time points (α = .87 and α = .91 respectively). All behavioral willingness measures were combined to reflect an overall measure of behavioral willingness to engage in health risk behaviors.

Motives and outcome expectancies. Participants' motives to have sex and their outcome expectancies for drinking alcohol were also measured (Appendix C). A series of 12 reasons why one may want to engage in sexual activity, and 10 reasons why one may not choose to engage in sexual activity were presented. Participants reported the degree to which they would consider each when deciding to engage in hypothetical sexual behavior in the future on a 5-point Likert type scale with anchors 1 (*No, definitely would not*) and 5 (*Yes, it definitely would*). These items were adapted from an extensive survey of why humans have sex (Meston & Buss, 2007). Alcohol outcome expectancies were also assessed. Participants responded to 12 positive for, and 10 negative expectancies associated with drinking alcohol, on the same scale as above. These items were adapted from previous work examining outcome expectancies for alcohol consumption (Brown, Christiansen, & Goldman, 1987). Items were combined to represent total values (i.e., the sum) for both motives for engaging in, and for not engaging in sexual behaviors, and positive and negative alcohol outcome expectancies. The total values for motives for not engaging in sex were then subtracted from the total value of motives for engaging in sex. Likewise, the total values for negative alcohol outcome expectancies were subtracted from the total value of positive alcohol outcome expectancies. Therefore positive values reflect more positive motives and outcome expectancies. The motives for engaging in (α = .80), and for not engaging in sexual behavior (α = .73) had acceptable levels of internal reliability. Positive alcohol outcome expectancies were highly reliable (α = .91), as were the negative alcohol outcome expectancies (α = .87).

Response time. Response time in milliseconds was collected for all questionnaire items. Response times were aggregated into indices reflecting average response time for behavioral willingness and behavioral intentions to engage in health risk behaviors.

Procedure

The procedures used in Study 2 were almost identical the procedures used in Study 1. Data collection occurred at two time points, during the psychology departments' mass testing session (Time 1) and during the experimental session (Time 2). It should be noted, however, that due to the timing of mass testing for Study 2, many participants completed mass testing *after* participating in the experiment. Potential participants were told that the experiment was designed to examine decision making processes and that they would be asked to make a series of decisions related to college students' attitudes and behaviors. If they agreed to participate, they were led to a private room and seated at a computer screen and keyboard and the experimental session began. MediaLab software was used to present the questionnaire items and record the responses, including response times, for all questionnaire items. The processing manipulation was delivered at the beginning of the experimental session in the same fashion as Study 1. Participants were randomly assigned to one of the same three processing conditions, reasoned, experiential, or control. After the processing manipulation was delivered, participants began to the questionnaire. All participants responded to all of the same questionnaire items; however participants were randomly assigned to one of two questionnaire order conditions, the behavioral willingness first condition versus the expectancies / motives first condition. Participants assigned to the behavioral willingness first condition answered the behavioral willingness and behavioral intentions items first (always behavioral willingness before behavioral intentions, and always sex before alcohol), whereas those assigned to the expectations first condition answered the motives and outcome expectancy items first followed by the behavioral willingness and behavioral intentions items. Sex motives were always presented first, followed by the

alcohol outcome expectancies, however, the order of the positive and negative qualities within each behavior was randomly presented (i.e., randomized within groups).

CHAPTER 9: STUDY 2 RESULTS

Preliminary Analyses

Descriptive statistics. The means, standard deviations, and correlations for all Time 1 and Time 2 variables are presented in Table 12. Tables E1, E2, and E3 in Appendix E present the means, standard deviations, and correlations for all Time 1 and Time 2 variables for the reasoned, experiential, and control conditions separately. Overall, participants at Time 1 reported low to moderate behavioral willingness to have casual sex (M = 5.4) and very low behavioral intentions to have casual sex in the future (M = 3.9). Specifically, 69% of the sample reported ever having been sexually active. These participants reported between 1 and 12 or more lifetime sexual partners (M = 2), and less than 1 casual sexual partner. Participants also reported relatively low behavioral willingness to drink alcohol (M = 7.5) and low to moderate intentions to drink in the future (M = 7.8). Specifically, 73% of the sample reported some alcohol use in the past month. Within this time frame, these participants reported between 1 and 12 or more servings of alcohol (M = 4), and between 1 and 12 or more episodes of binge drinking. Based on these descriptive statistics, the sample for Study 2 appears to be similar to the sample for Study 1.

Table 12
Study 2 Correlations and Descriptive statistics

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Rational	1	.09	-.01	.09	-.13†	-.20**	-.05	-.06	-.08	-.14†	-.01	-.19*
	193	186	192	193	191	193	189	193	191	193	193	193
2. Experiential		1	-.03	-.06	.16*	.13†	-.08	-.07	.17*	.14*	.10	.11
		192	191	192	190	192	188	192	191	192	192	192
3. Casual sex BW (Time 1)			1	.81***	.37***	.30***	.69***	.61***	.37***	.24***	.59***	.27***
			198	198	196	198	195	198	196	198	198	198
4. Casual sex BW (Time 2)				1	.25***	.24***	.56***	.59***	.27***	.20**	.62***	.22**
				204	197	204	195	204	197	204	204	204
5. Drinking BW (Time 1)					1	.73***	.40***	.43***	.73***	.66***	.35***	.53***
					197	197	193	197	195	197	197	197
6. Drinking BW (Time 2)						1	.35***	.33***	.64***	.68***	.32***	.58***
						204	195	204	197	204	204	204
7. Casual sex BI (Time 1)							1	.81***	.44***	.31***	.42***	.31***
							195	195	193	195	195	195
8. Casual sex BI (Time 2)								1	.37***	.35***	.45***	.34***
								204	197	204	204	204
9. Drinking BI (Time 1)									1	.81***	.34***	.60***
									197	197	197	197
10. Drinking BI (Time 2)										1	.30***	.70***
										204	204	204
11. Sex expectancies											1	.42***
											204	204
12. Alcohol expectancies												1
												204
Mean	35.43	34.4	5.42	5.97	7.54	7.84	3.93	3.97	7.75	16.6	5.43	4.14
(SD)	(6.82)	(6.31)	(3.93)	(3.81)	(3.52)	(3.65)	(3.45)	(3.38)	(4.81)	(9.28)	(10.51)	(12.40)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions. $^{\dagger}p < .10$, *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Testing for random assignment to condition. Preliminary analyses were performed to examine whether random assignment to the processing and question order conditions had been achieved. These analyses tested whether processing condition and question order had significant effects on any of the Time 1 measures. These potential effects were assessed separately in a series of one-way ANOVAs in which the following Time 1 measures served as the dependent variables: rationality, experientiality, behavioral willingness to have casual sex, behavioral willingness to drink alcohol, behavioral intentions to have casual sex, and behavioral intentions to drink alcohol. Results that examined the effect of processing condition yielded one significant finding. There was a significant main effect of processing condition on the Time 1 measure of behavioral willingness to drink alcohol, F (2, 194) = 3.05, p = .05. Participants in the experiential condition showed higher behavioral willingness (M = 8.37) than did participants in the reasoned (M = 6.84) or control (M = 7.51) conditions. No other significant effects emerged, Fs < .50, ps > .10. Results that examined the effect of question order yielded no significant effects on any of the Time 1 measures, Fs (1, 196) $\leq$ 1.7, ps > .20. Although these results suggest that random assignment to the conditions had been achieved, the one significant difference between the processing conditions with respect to behavioral willingness to drink alcohol suggests that controlling for Time 1 measures is advisable in order to draw firm conclusions about the effects of route of processing on changes in participants' behavioral willingness to drink alcohol.

Manipulation check: Processing condition. To test the effectiveness of the route of processing manipulation, two analyses were performed, with follow-up contrasts that used the LSD method. First, the influence of route of processing on participants' self-reported rationality was examined with a 3 (processing condition) X 2 (question order) between subjects ANCOVA in which Time 1 measures of participants' trait rationality and trait experientiality served as covariates. Results revealed a significant main effect of processing condition on self-reported rationality, F (2, 185) = 38.10, p < .001, η_p^2 = .30. Follow-up

contrasts revealed that all of the means significantly differed from one another, *p*s < .01. Thus, self-reported rationality differed in the expected direction for all three groups, and those differences were statistically significant. Neither the main effect of question order, nor the interaction between processing condition and question order were significant, *p*s > .32. These results, which replicate the findings of Study 1, show that the processing condition manipulation shifted participants' reliance on reasoned versus experiential processing thereby suggesting that people's reliance on route of processing is in fact malleable.

Table 13
Study 2 Raw and Adjusted Descriptive Statistics of Self-reported Rationality during Experimental session

	Reasoned	Control	Experiential
Raw means (SD)	4.79 (1.29)	3.42 (1.44)	2.75 (1.38)
Adjusted Means (95% CI)	4.78 (4.45 – 5.12)	3.46 (3.13 – 3.78)	2.65 (2.29 – 3.0)

Note. Self-reported rationality among participants assigned to the reasoned, control, and experiential processing conditions. Higher values indicate greater self-reported use of rational processing, whereas lower values indicate greater self-reported use of experiential processing.

Second, I examined the influence of the route of processing manipulation on participants' response times with two separate 3 (processing condition) X 2 (question order) between subjects ANOVAs. In these analyses, participants' response times to the behavioral willingness and behavioral intentions items served as the dependent variables. As in Study 1, response times reflected the average amount of time it took participants to read and respond to all questions within a set, which were inverse transformed prior to analysis.

The analysis that examined response times to the set of behavioral willingness measures yielded a significant main effect of processing condition, F (2, 198) = 13.57, p < .001, η_p^2 = .12 (see Table 14). Follow-up contrasts that used the LSD method revealed that participants in the reasoned (M = 6.79, SD = 5.365) condition responded significantly slower than participants in the experiential (M = 4.76, SD = 1.87) and control conditions (M = 4.24,

SD = 1.25), *p*s < .001. Participants in the experiential and control conditions did not significantly differ, *p* > .30. Results indicated no significant main effect of question order nor a significant processing condition by question order interaction, *p*s > .07.

Table 14
Study 2 ANCOVA Table for Effect of Processing Condition and Question Order on Response Times for Behavioral Willingness

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	.19	5	.04	6.15	<.001	.13
Condition	.16	2	.08	13.57	<.001	.12
Order	.02	1	.02	3.31	.07	.02
Condition by Order	.00	2	.00	.11	.90	.00
Error	1.20	198	.01			
Corrected Total	1.38	203				
R square = .15						

The analysis that examined response times to the set of behavioral intentions items yielded a significant main effect of processing condition, F (2, 198) = 6.09, p < .01, η_p^2 = .09, a significant main effect of question order, F (1, 198) = 7.21, p < .01, η_p^2 = .04, but no significant interaction between these variables, F (2, 198) = .61, p > .50, η_p^2 = .01 (see Table 15). Follow-up contrasts that examined the significant main effects with the LSD method revealed that (a) participants in the reasoned condition (*M* = 7.51, *SD* = 2.87) responded significantly slower than participants in the experiential (*M* = 6.31, *SD* = 1.90) and control conditions (*M* = 6.54, *SD* = 3.13), *p*s < .01; (b) participants in the experiential and control conditions did not significantly differ, *p* > .90, and; (c) participants who answered the behavioral willingness items first (*M* = 7.18, *SD* = 2.98) responded significantly slower than participants who answered the behavioral intentions items first (*M* = 6.26, *SD* = 2.20) , *p* < .01. This main effect of question order is not in the hypothesized direction. Overall, the findings for response times are consistent with hypotheses, and suggest that the route of processing manipulation successfully affected the amount of time participants spent making decisions during the questionnaire, and perhaps more so for participants in the reasoned conditions.

Main Analyses

Effect of processing condition and order on behavioral willingness: Having provided evidence that route of processing was effectively induced in participants, I next tested the hypothesis that people's use of reasoned versus experiential processing influences their behavioral willingness to engage in health risk behaviors. This hypothesized relation was first tested with two separate 3 (route of processing) X 2 (question order) ANCOVAs, one that used participants' behavioral willingness to engage in health risk behaviors as the dependent variable the second that used participants' behavioral intentions to engage in health risk behaviors as the dependent variable. In both analyses, Time 1 measures of rationality and experientiality were included as covariates. The results from these analyses were consistent with the hypothesis that route of processing influences behavioral willingness more strongly than behavioral intentions (Table 16). Specifically, the analysis

Table 15
Study 2 ANCOVA Table for Effect of Condition and Order on Response Time to Behavioral Intentions

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	.06	5	.01	3.79	<.01	.09
Condition	.04	2	.02	6.09	<.01	.06
Order	.02	1	.02	7.21	<.01	.04
Condition by Order	.00	2	.00	.61	.54	.01
Error	.57	198	.00			
Corrected Total	.63	203				
R square = .08						

that examined behavioral willingness yielded a significant main effect of processing condition, F (2, 177) = 6.56, p < .01, η_p^2 = .07 (Table 17), but no significant main effect of question order, F (1, 177) = 6.0, p > .30, η_p^2 < .01, nor a significant interaction between processing condition and question order, F (2, 177) = .89, p > .40, η_p^2 < .01. Follow-up contrasts that examined the significant main effect of processing condition with the LSD method revealed that participants in the reasoned condition reported significantly lower

Table 16
Study 1 Adjusted Descriptive Statistics of Behavioral Willingness and Behavioral Intentions by Processing Condition and Questionnaire Order

Dependent Variable	Condition	BW first	95% CI	Expectancies first	95% CI
Behavioral Willingness	Reasoned	-.27	-.60 - .06	-.34	-.68 - .01
	Control	.12	-.16 - .40	.51	.12 - .90
	Experiential	-.04	-.38 - .30	.04	-.33 - .40
Behavioral Intentions	Reasoned	-.13	.-47 - .21	-.13	-.49 - .22
	Control	-.04	-.33 - .25	.28	-.12 - .68
	Experiential	-.20	-.55 - .16	.32	-.06 - .69

Note. BW refers to behavioral willingness. BI refers to behavioral intentions.
Values adjusted for Time 1 measures of trait rationality and experientiality, and behavioral willingness and behavioral intentions (respectively).

behavioral willingness to engage in health risk behaviors than participants in the control condition, $p < .001$. No other contrasts were significant, *p*s > .05. The analysis that focused on behavioral intentions did not yield any significant effects, *ps* > .05, η_p^2 s < .02 (Table 18). In sum, these results indicate that there was a significant effect of the processing condition on participants' behavioral willingness to engage in health risk behaviors, but not their behavioral intentions to engage in these behaviors, thereby replicating the results of Study 1.

The above findings indicated that route of processing influenced participants' behavioral willingness to engage in health risk behaviors, but not behavioral intentions. To examine whether these differential effects were significant, one final analysis was performed: A 3 (route of processing) X 2 (questionnaire order) between-subjects ANCOVA. The dependent variable was the difference between participants' behavioral willingness and their behavioral intentions (i.e. BW – BI). For this analysis, Time 1 measures of rationality and experientiality were included as covariates as was the difference between behavioral willingness and behavioral intentions at Time 1. This analysis did not yield any significant effects, *p*s > 05 (Table 20). Accordingly, the reported significant effect of route of processing

Table 17
Study 2 ANCOVA Table for Effect of Processing Condition and Questionnaire Order on Behavioral Willingness

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	312.46	8	39.06	44.06	< .001	.67
T1 BW	279.60	1	279.60	315.38	<.001	.64
Rational	.02	1	.02	.06	.87	<.01
Experiential	.10	1	.10	.11	.74	<.01
Processing Condition	11.62	2	5.81	6.56	<.01	.07
Order	.80	1	.80	.90	.35	<.01
Processing condition by order	1.57	2	.79	.89	.41	<.01
Error	156.92	177	.89			
Corrected Total	469.38	185				
R square = .66						

Note. T1 BW refers to Time 1 behavioral willingness. Rational refers to rationality score from the Rational Experiential Inventory. Experiential refers to experientiality score from the Rational Experiential Inventory. Condition refers to processing condition.

Table 18
Study 2 ANCOVA Table for Effect of Processing Condition and Question Order on Behavioral Intentions

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	357.42	8	44.68	47.36	< .001	.68
T1 BI	315.92	1	315.92	334.92	<.001	.65
Rational	1.48	1	1.48	1.57	.21	<.01
Experiential	.00	1	.00	.00	.98	<.01
Processing Condition	2.04	2	1.02	1.08	.34	.01
Order	3.45	1	3.45	3.66	.06	.02
Processing condition by order	2.04	2	1.02	1.08	.34	.01
Error	166.96	177	.94			
Corrected Total	524.38	18				
R square = .68						

Note. T1 BI refers to Time 1 behavioral intentions. Rational refers to rationality score from the Rational Experiential Inventory. Experiential refers to experientiality score from the Rational Experiential Inventory. Condition refers to processing condition.

on behavioral willingness to engage in health risk behaviors was not significantly different from the effect of route of processing on behavioral intentions to engage in health risk behaviors.

Effect of processing condition: Mediation analyses. The next set of analyses examined two potential mediators of the effect of route of processing on behavioral willingness to engage in health risk behaviors. For these analyses, I separately examined behavioral willingness to engage in sexual behaviors and behavioral willingness to drink alcohol. With respect to sex, I focused on motivation to engage in sex as the potential mediator. With respect to alcohol use, I focused on outcome expectancies as the potential mediator. I examined these hypothesized relations with a bootstrapping procedure (Preacher & Hayes, 2008) that tested the indirect effect of processing condition on behavioral willingness through each hypothesized mediator (Preacher & Hayes, 2008). The bootstrapping procedure that I used is recommended over other tests of indirect effects such as the Sobel method because the former possess higher statistical power, fewer assumptions (e.g., normality), better control over Type I error, and is less conservative (MacKinnon, Lockwood, Hoffman, West, and Sheets, 2002; MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2004). Consistent with recommendations (Preacher & Hayes, 2008), 3,000 bootstrap samples were generated for each analysis.

To test these mediational effects, two dummy coded variables were created. The first contrast (referred to as contrast A) compared the reasoned condition (*reasoned* = 0) against the control and experiential conditions (*experiential* = 1, *control* = 1). The second contrast (referred to as contrast B) compared the experiential condition (*experiential* = 0) against the reasoned and control conditions (*reasoned* = 1, *control* = 1). This series of analyses was conducted four times, first using contrast A as the independent to predict behavioral willingness to have casual sex via motivation to have sex, and second using contrast B as the independent variable to predict behavioral willingness to have casual sex via motivation to have sex. Third, contrast A was used as the independent variable to predict behavioral willingness to drink alcohol via alcohol outcome expectancies, and fourth contrast B was used as the independent variable to predict behavioral willingness to drink alcohol via

Table 19
Study 2 ANCOVA Table for Effect of Processing Condition and Questionnaire Order on Behavioral Willingness minus Behavioral Intentions

Source	Sum of squares	df	Mean Square	*F*	Sig	η_p^2
Corrected Model	71.35	8	8.92	6.68	<.001	.23
T1 BW-BI	62.17	1	62.17	46.58	<.001	.21
Rational	2.15	1	2.15	1.61	.21	<.01
Experiential	.03	1	.03	.02	.88	<.01
Processing Condition	4.15	2	2.08	1.56	.21	.02
Order	.63	1	.63	.47	.49	<.01
Processing condition by order	2.06	2	1.03	.77	.46	<.01
Error	236.27	177	1.34			
Corrected Total	307.61	185				
R square = .23						

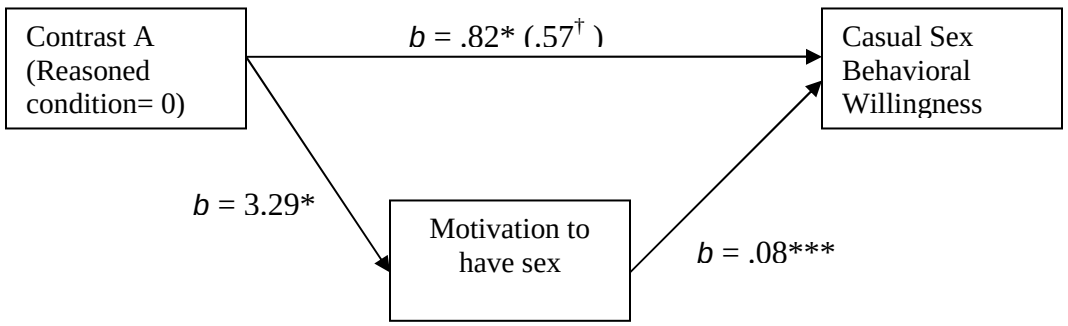
Note. T1 BW refers to Time 1 behavioral willingness. BI refers to behavioral intentions. Rational refers to rationality score from the Rational Experiential Inventory. Experiential refers to experientiality score from the Rational Experiential Inventory. Condition refers to processing condition.

alcohol outcome expectancies. All contrasts included as covariates the Time 1 measures of behavioral willingness to have casual sex and drink alcohol, respectively, and Time 1 measures of rationality and experientiality. The direct and indirect effects of these contrasts are reported in Figures 1 through 4. Tables F1 and F2 in Appendix F present the total and direct effects of processing condition on behavioral willingness to have casual sex (Table F1) and drink alcohol (Table F2) separately for contrast A and contrast B. Also reported in these tables are the direct effects of the hypothesized mediators on behavioral willingness to have casual sex.

Results that tested contrast A indicated that participants in the reasoned condition reported significantly less behavioral willingness to have casual sex, and significantly less motivation to have sex than participants in the other two conditions combined (see Figure 1). The main effect of motivation to have sex on behavioral willingness was also significant, such that greater motivation to have sex was associated with more behavioral willingness to have casual sex. Finally, the indirect effect of contrast A on behavioral willingness to have

casual sex through participants' motivation to have sex was significant. Specifically, the bootstrapping test of indirect effects yielded a bias-corrected, accelerated 95% confidence interval that excluded zero (.04 to .58). In contrast, the results that tested contrast B indicated that participants in the experiential condition did not significantly differ from participants in the other two conditions combined with respect to their behavioral willingness to have casual sex or their motivation to have sex, *p*s > .50. In addition, with respect the test of mediation, the bootstrapping test of indirect effects yielded a bias-corrected, accelerated 95% confidence interval that included zero (-.29 to .17). These results indicate that, relative to participants in the control condition, the motivation to have sex mediated the influence of reasoned processing on participants' behavioral willingness to have sex but did not mediate the influence of experiential processing on their behavioral willingness to have sex.

Figure 1
Mediation of effect of Contrast A on Casual Sex Behavioral Willingness by Sex Outcome Expectancies



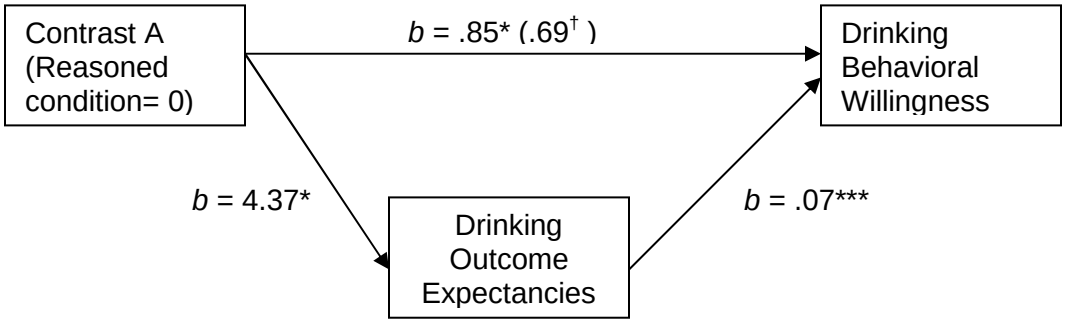
Note. Model includes Time 1 casual sex behavioral willingness, rationality and experientiality as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

Results that tested contrast A for alcohol indicated that participants in the reasoned condition reported significantly less behavioral willingness to drink alcohol, and significantly more negative outcome expectancies than participants in the other two conditions (see Figure 2). The main effect of outcome expectancies on behavioral willingness was also

significant, such that more negative outcome expectancies were associated with less behavioral willingness to drink alcohol. However, the indirect effect of contrast A on behavioral willingness to drink alcohol through participants' outcome expectancies was not significant, as indicated by the fact that the bootstrapping test of indirect effects yielded a bias-corrected, accelerated 95% confidence interval that included zero (-.06 to .51). Results that tested contrast B indicated that participants in the experiential condition did not differ significantly from participants in the other two processing conditions with respect to their behavioral willingness to drink alcohol, but did report significantly less negative outcome expectancies with respect to alcohol use (Figure 3). The main effect of outcome expectancies on behavioral willingness was also significant, such that more negative outcome expectancies for alcohol use were associated with less behavioral willingness to drink alcohol. Finally, the indirect effect of contrast B on behavioral willingness to drink alcohol through participants' outcome expectancies was significant. Specifically, the bootstrapping test of indirect effects yielded a bias-corrected, accelerated 95% confidence interval that excluded zero (-.67 to -.04). These results indicate that participants' alcohol outcome expectancies did not mediate the influence of reasoned processing on their behavioral willingness to drink alcohol but did mediate the influence of experiential processing on their behavioral willingness to drink alcohol.

Effect of processing condition on health risk behaviors: Moderated mediation. Next, a series of analyses were conducted to examine if the significant mediational relations reported above were moderated by question order. Following the procedures recommended by Preacher, Rucker, and Hayes (2007), these analyses tested for conditional indirect effects while controlling for the effects of covariates on both the mediator variable and the dependent variable. The covariates were Time 1 measures of rationality and experientiality

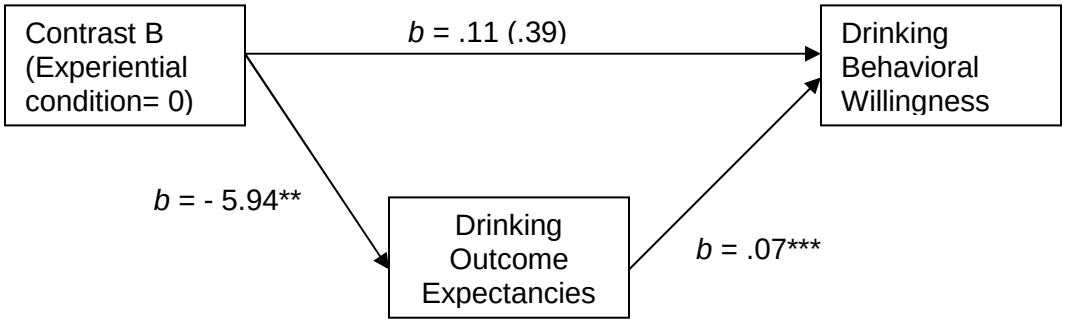
Figure 2
Mediation of effect of Contrast A on Drinking Behavioral Willingness by Drinking Outcome Expectancies



Note. Model includes Time 1 drinking behavioral willingness, rationality and experientiality as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

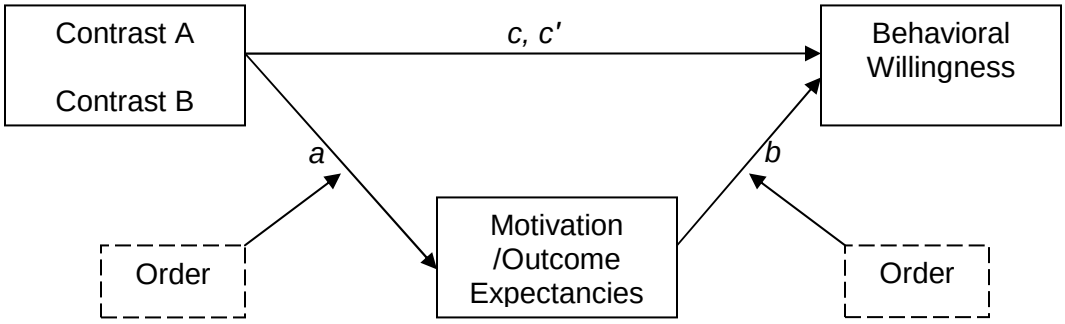
plus Time 1 measures of either behavioral willingness to have sex or behavioral willingness to drink alcohol. The independent variables were the same two dummy coded variables used in the previous series of analyses (contrast A where 0=*reasoned* 1=*experiential* and *control* and contrast B where 0=*experiential*, 1=*reasoned* and *control*). These analyses examined whether question order moderated relations between (1) each contrast (contrast A and B) and each hypothesized mediator (motivation to have sex and alcohol outcome expectancies) and (2) each hypothesized mediator and each outcome variable (behavioral willingness to have sex and behavioral willingness to drink alcohol). These relations were tested with product terms that I created by multiplying question order by each contrast (i.e., question order X contrast A and question order X contrast B) and by multiplying question order by each hypothesized mediator (i.e., question order x motivation to have sex and question order x alcohol outcome expectancies). The results indicated that none of the product terms were significant, all *b*s ≤ .50; all *p*s > .05. Therefore, none of the significant mediational relations reported previously differed as a function of question order.

Figure 3
Mediation of effect of Contrast B on Behavioral Willingness to Drink Alcohol by Alcohol Outcome Expectancies



Note. Model includes Time 1 drinking behavioral willingness, rationality and experientiality as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

Figure 4
Illustration of Moderated Mediation Effects



CHAPTER 10: STUDY 2 DISCUSSION

The primary goals of Study 2 were to replicate the findings of Study 1, and if replicated, examine how those effects were mediated by motives and outcome expectancies. These goals were addressed by conducting an experiment in which participants were randomly assigned to receive one of three different processing instructions and to receive one of two questionnaire orders. Overall the hypotheses regarding route of processing were supported and the hypotheses regarding mediation of those effects was partially supported. Below, those findings are detailed, and elaborated upon.

Efficacy of processing manipulation. Because Study 2 was only the second known study to manipulate route of processing, it was again necessary to validate that the manipulation was in fact affecting route of processing. Significant main effects of processing manipulation condition were expected on participants' self-reported rationality when controlling for trait measures of rationality and experientiality. Specifically, it is was hypothesized that participants in the reasoned condition would report significantly greater rationality than participants in the control condition, who were similarly expected to report significantly greater rationality than participants in the experiential condition. Results revealed that the hypothesized main effect did emerge, and consistent with hypotheses, all three conditions were significantly different from one another in the hypothesized directions. Therefore, examination of participants' self-reported rationality during the experimental session suggests that the processing manipulation effectively shifted participants' perceived reliance on reasoned or experiential processing.

It was also hypothesized that the processing condition manipulation would influence participants' decision response times. Specifically, it was hypothesized that the reasoned condition participants would answer the questionnaire items slower than both the experiential and control condition participants. Similarly, the experiential condition was

expected to respond significantly faster than the other two processing condition. As hypothesized, processing condition influenced response times for all measures. Follow-up analyses revealed a consistent pattern of group differences for the behavioral willingness and behavioral intentions items. When participants reported behavioral willingness to have casual sex and to drink alcohol, the reasoned condition participants responded significantly slower than both the control and experiential condition participants, and those differences corresponded to medium to large effect sizes, Cohen's *d*s $\geq$ .50. The control and experiential conditions, however, did not significantly differ and reflected small effect sizes (Cohen's *d*s < .20). In general, it appears that there was a medium to large effect of the processing manipulation on increasing the amount of time participants in the reasoned condition spent thinking about the behavioral willingness items, relative to the control and experiential groups. Not consistent with hypotheses, was the finding that the experiential and control conditions did not significantly differ. This finding suggests that the processing manipulation may have more effectively induced reasoned processing than experiential processing.

Examination of the response times for behavioral intentions to have casual sex and drink alcohol, revealed that participants in the reasoned condition responded significantly slower than participants in the experiential condition, but not significantly slower than participants in the control conditions (although that contrast was marginally significant at *p* < .10). In addition, these differences represented small effect sizes Cohen's *d*s $\leq$ .40. Similarly to the behavioral willingness response times, the control and experiential conditions did not significantly differ from one another. These findings suggest that the processing manipulation may have more effectively influenced response times for participants in the reasoned condition than for participants in the other processing condition. In sum, the processing manipulation had the hypothesized main effects on the

self-reported rationality and on response times, although there is some evidence that the manipulation was more effective for the reasoned condition than the experiential condition.

Effect of processing condition on behavioral willingness and behavioral intentions. It was hypothesized that the processing manipulation would significantly affect behavioral willingness to engage in casual sex and drink alcohol. A main effect of processing manipulation on behavioral intentions was not expected. Consistent with hypotheses, there was a significant main effect of processing condition on behavioral willingness to engage in health risk behaviors. A consistent pattern emerged from the follow-up analyses conducted to further examine this main effect, such that participants in the reasoned conditions reported significantly lower behavioral willingness than participants in the control conditions, which corresponded to a medium effect size (Cohen's d = .48). The experiential condition, however, did not significantly differ from either the reasoned or control conditions, and those non-significant differences corresponded to small effect sizes (Cohen's ds < .30). Also consistent with hypotheses was the null effect of processing manipulation on behavioral intentions to engage in health risk behaviors. Overall these findings are consistent with the hypothesized main effects of the processing manipulation on behavioral willingness and the null effects for behavioral intentions. These findings have several implications which are discussed below.

First, these results suggest that one's route of processing can be influenced by external factors. This is important because previous research studies have used within-subjects designs that simply ask participants, for example what "a rational person" would do, or what "most people" would do (e.g., Epstein, Pacini, Denes-Raj, & Heier, 1996). The underlying assumption with this protocol is that it is not possible to push people into one route of processing versus another. The results of this study suggest that individuals' use of reasoned and experiential processing is malleable. It was originally hypothesized that the main effect of processing manipulation would be qualified by significant differences

between all three experimental conditions. Although the self-reported rationality significantly differed for all three groups, the response time differences were only significant between the reasoned and control groups. Similarly, the differences in behavioral willingness were only significant between the reasoned and control groups. Therefore, it appears that the processing manipulation more successfully shifted route of processing for participants in the reasoned condition than for participants in the experiential condition.

Second, these results offer further support for the assumption that less risky decisions are the result of more reasoned processing. This contention has long been presented in the literature (Reyna & Farley, 2006), but not empirically tested until now. Empirical support for this claim is important because one could reasonably argue that *risky* decisions could sometimes be the result of reasoned processing. For example, it is feasible that adolescents might weigh the costs and benefits of a given risk behavior, such as binge drinking, and in a reasoned fashion arrive at the decision to engage in the risky behavior because the perceived benefits outweigh the perceived costs. Although this is still a possibility, evidence from the current study suggests that participants who were utilizing a reasoned route of processing did make significantly less risky decisions than participants in the control condition. Overall, the hypothesized effects of processing route on behavioral willingness and not on behavioral intentions were supported, although further research is needed to more effectively and reliably induce experiential processing.

Effect of processing condition by question order interaction. Because order of questionnaire items was counterbalanced in the Study 2, a series of analyses were conducted to examine the affects of question order on behavioral willingness and behavioral intentions. Although the effects of question order were somewhat exploratory, it was not expected that a main effect of question order would emerge. As expected, there were no significant main effects of questionnaire order on behavioral willingness or

behavioral intentions for casual sex or drinking alcohol. Although there were no main effects of questionnaire order on behavioral willingness or behavioral intentions, it was still possible that the main effects of processing route on behavioral willingness could be moderated by questionnaire order. Therefore, interactions between processing route and question order on behavioral willingness and behavioral intentions were examined. As expected, there were no significant interaction effects. Therefore, the effects of the processing manipulation on behavioral willingness were not moderated by questionnaire order. This finding suggests that responding to the expectancy items does not influence participants' responses to subsequent health risk questions.

Effect of processing condition: Mediation analyses. It was hypothesized that the significant main effects of processing route on behavioral willingness would be mediated by alcohol outcome expectancies or sex motives (alcohol and sex respectively). Specifically, it was hypothesized that the reasoned condition participants would report less behavioral willingness than the other two conditions, and the effect would be mediated by significantly lower sex motives or more negative alcohol outcome expectancies. In addition, it was predicted that the experiential condition participants would report significantly higher behavioral willingness than participants in the other two conditions, and the effect would be mediated by an increase in sex motives or greater alcohol outcome expectancies. Overall, the findings were mixed, and this hypothesis received only partial support. Consistent with predictions, participants in the reasoned condition reported significantly lower behavioral willingness to have casual sex than the other two conditions, and the indirect effect through reduced sex motives was statistically significant. The effects of the experiential processing condition, relative to the other two conditions, on behavioral willingness and on alcohol outcome expectancies were not significant. In addition, there were no significant indirect effects of the experiential condition on behavioral willingness to have casual sex through outcome expectancies for sex. This pattern of results is not

consistent with hypotheses, but is consistent with the pattern of results observed in Study 2. These results suggest that the reasoned processing manipulation may have been more effective than the experiential processing condition, and that shifting participants to a more reasoned route of processing led to significantly lower outcome expectancies for sex.

Unexpectedly, the pattern of results with respect to behavioral willingness to drink alcohol was the opposite of that observed for behavioral willingness to have casual sex. Specifically, the effects of the reasoned condition, relative to the other two conditions, on behavioral willingness to drink alcohol and on alcohol outcome expectancies were in the predicted directions (although the latter path was non-significant). The indirect effects through outcome expectancies, however, were non-significant. Therefore the pattern of indirect effects of the reasoned processing manipulation on behavioral willingness through outcome expectancies was different for casual sex and drinking behavioral willingness. When examining the effects of the experiential condition relative to the other two conditions, there was not a significant main effect of the experiential processing manipulation on behavioral willingness to drink alcohol, but there was a significant main effect on alcohol outcome expectancies. Interestingly, the indirect effect of the experiential processing condition on behavioral willingness to drink alcohol was statistically significant. These mixed findings are somewhat puzzling, and further explanation is provided below.

It is possible that it is easier to promote reasoned processing in the laboratory and subsequently reduce the motives to engage in sexual activity. One could argue that the potential negative consequences associated with sexual behavior are more negative than the potential negative consequences associated with drinking alcohol (e.g., getting a sexually transmitted disease vs. becoming intoxicated). Therefore, it may be easier to induce reasoned processing and significantly reduce behavioral willingness to engage in casual sex, and reveal a significant indirect effect through reduced motives for the reasoned processing participants. This process may be more difficult for the experiential

processing participants because it may be more difficult to first, induce experiential processing, and second, significantly increase outcome expectancies for sexual behavior. This assertion is supported by the non-significant path from the experiential condition to outcome expectancies for sex, and the significant main effect of the reasoned processing manipulation on reduced outcome expectancies for sex. Overall, mean motives for engaging in sexual behavior were positive, and they may be more difficult to increase than outcome expectancies for drinking alcohol. Conversely, the effects of the processing manipulation on behavioral willingness to drink alcohol showed the opposite pattern. It appears that the reasoned processing manipulation did not significantly reduce outcome expectancies for drinking alcohol, but the experiential processing manipulation did significantly increase outcome expectancies. These findings suggest that it is easier to reduce outcome expectancies for sexual behavior than drinking behavior, and it is easier to increase outcome expectancies for drinking than motives for sexual behavior. What is noteworthy, however, is that this is the first study (that I am aware of) that documents that route of information processing can influence individuals' outcome expectancies, although further research is needed to explore how this finding may be moderated by the behavior and participants' experience with that behavior.

Effect of processing condition: Moderated mediation analyses. Because no previous research studies have examined behavioral willingness and outcome expectancies and motives in the laboratory setting, the potential effects of answering outcome expectancies on behavioral willingness was unknown. Previous research has documented, however, that participants' behavioral willingness can be influenced by other questions that precede the behavioral willingness measure. Therefore, question order was manipulated in Study 2. Two possible patterns of mediation were tested and the results were consistent; the effects of processing condition on behavioral willingness were not moderated by questionnaire order. Thus, responses to behavioral willingness measures do not differ as a

result of the order in outcome expectancies are measured relative to behavioral willingness.

CHAPTER 11: GENERAL DISCUSSION

The primary scientific objectives of this dissertation were to first to demonstrate that route of processing can be affected by external factors in the environment, and second to examine the effects of one's route of processing on health risk cognitions, and finally examine how those effects were mediated by outcome expectancies for alcohol and motives for sex. No other studies have used a between-subjects manipulation to induce reasoned and experiential processing to examined how one's route of processing influences health risk cognitions. Additionally, no other studies have specifically examined how route of information processing influences one's outcome expectancies and motives for health risk behaviors.

Overview of Results

Efficacy of processing manipulation. Overall, the results of these studies were consistent with one another. Two studies were conducted to test whether route of information processing could be experimentally induced. Participants in these studies received explicit verbal and written instructions that were aimed at influencing route of processing. A series of measures commonly used in other studies to infer route of processing were included in these studies to validate that participants' route of processing had been altered. Results from both studies suggest that participants' route of processing was successfully shifted. Although results demonstrated significant main effects of the processing manipulation on these measures, pairwise condition comparisons suggest that the processing manipulation may have more successfully induced reasoned processing than experiential processing.

Effect of processing condition and question order on health risk cognitions. It was hypothesized that route of processing would influences people's health risk decisions. The results from both studies suggest that route of processing does in fact influence participants'

behavioral willingness to engage health risk behaviors. It was hypothesized that the order in which people respond to the questionnaire items would also influence their responses to those items. Because previous research has demonstrated that responses to behavioral willingness can be influenced by other questions during measurement, the order of behavioral willingness and behavioral intentions was counterbalanced in Study 1. Overall, there were not consistent main effects of questionnaire order, and there was not consistent evidence that questionnaire order moderated the effects of the processing manipulation when answering the behavioral willingness items. Questionnaire order was also manipulated in Study 2, where the order of behavioral willingness and outcome expectancies was counterbalanced. The results from Study 2 clearly demonstrated that participants' behavioral willingness was not affected by question order. Therefore, responding to outcome expectancies prior to responding to behavioral willingness did not influence behavioral willingness. Moreover, questionnaire order did not moderate the effects of the processing manipulation in Study 2. Thus, it appears that questionnaire order may have an influence on health risk cognitions, but perhaps these effects are diminished in the presence of other environmental factors, such as the processing instructions used in the current research.

Effect of processing condition: Mediated effects. An additional goal of this dissertation was to examine the effects of individuals' route of processing on behavioral willingness to engage in health risk behaviors was mediated by alcohol outcome expectancies and sex motives, respectively. Overall, the findings testing these hypothesized effects were mixed, but it appears that the effects of route of processing on behavioral willingness via outcome expectancies and motives may be moderated by the specific health risk behavior. The results of the current investigation suggest that it may easier to reduce motives for sexual behavior than reduce the positivity of alcohol outcome expectancies for drinking behavior when participants are utilizing a reasoned route of processing. In addition

it may be easier to increase participants' outcome expectancies for alcohol than increase sex motives when utilizing an experiential route of processing.

Future Directions

While this dissertation contributes to the understanding of how peoples' route of processing can be influenced by external factors in the environment, and how that route of processing can influence health risk cognitions, several questions remain. First, this research examined only two specific health risk behaviors. Future studies could examine the effects of route of processing on behavioral intentions and behavioral willingness to engage in a variety of other drinking and sex related behaviors (e.g., intentions to have monogamous sex, intentions to use a condom in the future, and willingness to do so). This would allow for a greater understanding of what dimensions of drinking and sexual risk behaviors are more dependent upon reasoned and experiential routes of processing.

In addition, the manipulation used in this study to affect route of processing was admittedly a "heavy handed" manipulation. Future studies could begin to examine how route of processing may be influenced by external factors that are more subtle. Response time has been proposed to be a major determinant of experiential processing; therefore it is possible to examine behavioral willingness and behavioral intentions to engage in risk behaviors under time constraints. It may be possible in future studies to induce a more reasoned route of processing with instructions sets that may have fewer demand characteristics associated with them. Finally, the indirect effects of route of processing on behavioral willingness in the current study were not consistent. Future research studies should explore the relations between people's route of processing and their outcome expectancies for a variety of health risk behaviors.

Limitations

Conclusions from this research should be considered in the context of its limitations. Among the most significant of these are issues with sample sizes and data collection

procedures. In Study 1, firm conclusions, especially as they relate to differences in findings between sex and alcohol behavioral willingness, are limited because of the lower sample size for the alcohol items. The lower sample size for the alcohol items is due to the fact that mass testing occurred at two different time points throughout the academic semester, and there was a slight difference in the items that were included in those sessions. Specifically, the alcohol items were not included in the second mass testing session, which resulted in a lower number of respondents for the alcohol items. It may be the case that a different pattern of findings emerged for sex and alcohol behavioral willingness because the sample size for the alcohol items was too low. Additionally, a limitation with the data collection procedures in Study 2 was that most participants (80%) participated in mass testing, "Time 1", after they had participated in the experimental session. This was due to the timing of the department of psychology's mass testing session relative to the initiation of data collection in the experiment. Although this may have influenced the results of Study 2 to some degree, analyses examining the two groups of participants separately did not suggest this was the case.

Conclusions

This dissertation contributes important empirical evidence regarding dual-process theories of reasoning and health risk. First, this research demonstrates that route of processing can be influenced by external factors in the environment. This research documents that route of processing is in fact malleable, and the consequences of that shift in processing has implications for individuals' health risk cognitions. Specifically, this research documents that consistent with the tenets of the prototype willingness model, behavioral willingness to engage in health risk behavior is more malleable than behavioral intentions, and reasoned information processing reduces individuals' behavioral willingness to engage in casual sex and drink alcohol. The studies included in this dissertation are only

the beginning of a long line of exciting research examining the degree to which individual's route of information processing can be manipulated, and the implications that will have on both laboratory based, and real world health risk behaviors.

FOOTNOTES

1. Researchers have debated what rationality in decision making really means. The correspondence view of rationality requires that the end-result of the behavior be a positive outcome (Reyna & Farley, 2006). In contrast, the coherence view requires only that the decision making process be consistent with the actor's desired outcomes. For example, some teens admit that they want to drink alcohol in excess in order to have a good time. Most people, and those that prescribe to the correspondence view, would argue that this is in fact an illogical choice. Those that prescribe to the coherence view, however, would argue that while it is certainly not a "good choice" it is not illogical, and in fact can be a very well "reasoned" decision. Dual-process theories in general, do not suggest that there is a necessary relation between "computational complexity" and outcomes (Klaczynski, 2001).

2. Although there is much similarity between how dual-process models conceptualize experiential processing, there are key differences. For example, some models propose that the experiential system operates primarily on pre-existing heuristics stored in memory (e.g., Chen & Chaiken, 1999). Other models, however, propose that it is the rapid and pre-conscious nature of the information processing that characterizes experiential processing (which can include heuristics), rather than sole reliance upon pre-existing knowledge structures (e.g., Epstein & Pacini, 1999). For the purposes of these studies, the latter conceptualization will be used.

3. One theoretical question that remains unanswered in the dual-processing literature concerns the relative influence of both the experiential and the reasoned processing systems on overt behavior. Many dual-process researchers hypothesize that overt behavior represents a compromise between the influences of both the reasoned and the experiential systems (e.g., Epstein & Pacini, 1999, Evans, 1996, 1998). Other researchers, however, posit that overt behavior is almost always the result of the experiential system alone

(Klaczynski, 2004; Wadda & Nittono, 2004). Theoretically, any differences, or lack of, between participants not given instructions on how to process information, and those that are induced into processing primarily in a reasoned or experiential fashion, will reveal the degree to which decisions reflect the relative influence from each processing system.

4. Reliabilities for the Rationality subscale (α= .91) and the experientiality (α= .81) subscales from the full Rationality Experientiality Inventory were slightly higher than the internal reliabilities achieved with the shortened version used in this study.

5. A series of repeated measures ANCOVAS were also conducted to examine within-subjects differences in participants' self-reported confidence. Rationality and experientiality scores were included as covariates while processing manipulation condition served as the between-subjects independent variable. The purpose of this analyses was to determine if participants reported significantly different confidence levels in 1/10 than 10/100 odds or from 1/10 than 9/100 odds. These analyses revealed no significant within-subject effects, *F*s < .01, *p*s > .94.

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APPENDIX A: PROCESSING MANIPULATION INSTRUCTIONS

Control / No manipulation instructions

We have a set of hypothetical scenarios that we would like you to read through. After reading each scenario, you will be asked to make some judgments and decisions about that scenario. We know that people do not always make decisions in the same way. Sometimes people make decisions based on logic, and other times people make decisions based on intuition. For this study we would like you to simply answer all questionnaire items as you, yourself, would normally do.

Reasoned Processing Instructions

We have a set of hypothetical scenarios that we would like you to read through. After reading each scenario, you will be asked to make some judgments and decisions about each scenario. We know that people do not always make decisions in the same way. Sometimes people make decisions based on logic, and other times people make decisions based on intuition. For this study we would like you to think carefully, using logic to come to your answers. We want you to be sure of your answer because at the end of the session, we will randomly pick some of the questions you answered, and you will be asked to explain how you arrived at your decision for that question. Please keep these instructions in mind while answering all questionnaire items.

Experiential Processing Instructions

We have a set of hypothetical scenarios that we would like you to read through. After reading each scenario, you will be asked to make some judgments and decisions about each scenario. We know that people do not always make decisions in the same way. Sometimes people make decisions based on logic, and other times people make decisions based on intuition. For this study we would like you to go with what feels right, using your gut reaction to come to your answers. We want you to arrive at your decisions as efficiently as possible, selecting your choice as soon as you think you have the decided. Please keep these instructions in mind while answering all questionnaire items.

APPENDIX B: RATIONAL EXPERIENTIAL INVENTORY

1	2	3	4	5
Definitely not true of myself				Definitely true of myself

Rationality sub-scale

1. I try to avoid situations that require thinking in depth about something. (re-)
2. I'm not that good at figuring out complicated problems. (ra-)
3. I enjoy intellectual challenges. (re)
4. I am not very good at solving problems that require careful logical analysis. (ra-)
5. I don't like to have to do a lot of thinking. (re-)
6. I enjoy solving problems that require hard thinking. (re)
7. Thinking is not my idea of an enjoyable activity. (re-)
8. I am not a very analytical thinker. (ra-)
9. Reasoning things our carefully is not one of my strong points. (ra-)
10. I don't reason well under pressure (ra-)

Experientiality sub-scale

1. I like to rely on my intuitive impressions. (ee)
2. I don't have a very good sense of intuition. (ea-)
3. Using my gut feelings usually works well for me in figuring out problems in my life. (ea)
4. I believe in trusting my hunches. (ea)
5. Intuition can be a very useful way to solve problems. (ee)
6. I often go by my instincts when deciding on a course of action. (ee)
7. I trust my initial feelings about people. (ea)
8. If I were to rely on my gut feelings, I would often make mistakes. (ea-)
9. I don't like situations in which I have to rely on intuition. (ee-)
10. I think it is foolish to make important decisions based on feelings. (ee-)

ee=experiential engagement; ea=experiential ability; re=rational engagement; rational ability. A minus sign (-) with a scale item denotes reverse coding of that item.

APPENDIX C: FULL QUESTIONNAIRE

Behavioral Willingness

Suppose you were at a party and met a man/woman for the first time. You think that he/she is very attractive, and the two of you get along very well. At the end of the evening, you go to his/her apartment with him/her. You're feeling as if you might like to have sex with him/her, and he/she obviously feels the same way. How willing would you be to do each of the following?

1	2	3	4	5	6	7
Not at all willing			Maybe			Very willing

1. Stay at his/her apartment and have oral sex.
2. Stay at his/her apartment and have sex.
3. Stay at his/her apartment, but don't have sex.

Suppose that you are at a party with friends on a Saturday night. After a few drinks you are beginning to feel that you may have had enough, and you are getting ready to leave. Then a friend you haven't seen for a while starts talking to you and offers to get you another drink. How willing would you be to do each of the following?

1	2	3	4	5	6	7
Not at all willing			Maybe			Very willing

4. Stay and have one more drink.
5. Stay and continue to drink (more than one drink).
6. Stay, but not drink any more.
7. In this situation, how many drinks do you think you would be willing to have? (use the scale below)

A	B	C	D	E	F	G	H	I	J
0	1	2	3	4	5	6	7	8	9

Intentions

8. In the next 6 months, do you intend to have casual sex? (for all questions, casual sex is defined as sex with someone you don't know very well)

1	2	3	4	5	6	7
Definitely not			Maybe			Definitely

9. In the next 6 months, how likely is it that you will have casual sex?

1	2	3	4	5	6	7
Not at all likely			Maybe			Very likely

10. In the next month, do you intend to have 5 or more drinks in a single drinking episode?

1	2	3	4	5	6	7
Definitely			Maybe			Definitely

Not

11. In the next month, how likely is it that you will have 5 or more drinks in a single drinking episode?

1	2	3	4	5	6	7
Not at all likely			Maybe			Very likely

Previous Behavior

12. How many people have you had sexual intercourse with in your lifetime?

A	B	C	D	E	F	G	H	I	J
None	1	2	3	4	5	6-7	8-9	10-11	12 or more

13. How many times have you had casual sex in your lifetime?

A	B	C	D	E	F	G	H	I	J
None	1 or 2	3 to 6	7 to 9	10 to 12	13 to 15	16 to 19	20 to 22	23 to 25	More than 25

14. Please indicate how many times you have had a whole drink of alcohol (for example, a bottle of beer or a whole mixed drink) during the last month:

1	2	3	4	5	6	7
Never	Once	Twice	3-5	6-8	9-11	12 or more

15. Please indicate how many times you have had 5 or more drinks in a single drinking episode during the last 3 months:

1	2	3	4	5	6	7
Never	Once	Twice	3-5	6-8	9-11	12 or more

Outcome Expectancies

Before deciding to engage in sexual activity or drink alcohol, people may consider many reasons they may or may not want to engage that behavior. The following are commonly cited reasons why one may or may not engage in sexual activity or drink alcohol. For each of the following items please indicate...

(1) Would this go through your mind (i.e. would you consider this)

1	2	3	4	5
No, Definitely would Not	No, Would not	Maybe	Yes, it Would	Yes, It Definitely would

and (2) how important would this be to you when making your decision?

1	2	3	4	5	6	7
Not at all important	Not important	Somewhat unimportant	Neither important, or unimportant	Somewhat important	Important	Very important

When making your response – please consider why you would or would engage in these behaviors.

Motivations for engaging in sexual activity

1. I would have sex because I was attracted to the other person
2. I would have sex because I want the experience physical pleasure
3. I would have sex because the opportunity presented itself
4. I would have sex because I want to show ay affection to the person
5. I would have sex because it would make me feel desired
6. I would have sex because I felt sexually aroused and wanted the release
7. I would have sex because it is fun
8. I would have sex because I was in love
9. I would have sex because I would be in the heat of the moment
10. I would have sex because I would feel better about myself afterwards
11. I would have sex because I wanted to please my partner
12. I would have sex because I desire emotional closeness (i.e., intimacy)

Motivations for not engaging in Sexual Activity

1. I would not have sex because of a personal commitment to delaying sexual activity (until older, until marriage, etc.)
2. I would not have sex because my family wants me to delay sexual activity
3. I would not have sex until I felt a deeper level of trust with the other person
4. I would not have sex because of the risk of getting (a girl) pregnant
5. I would not have sex because of the risk of passing/receiving a sexually transmitted infection (e.g., Herpes, HIV)
6. I would not have sex because doing so could interfere with my future goals
7. I would not have sex because I would feel badly afterwards (guilty, dirty, etc.)
8. I would not have sex because of my religious beliefs
9. I would not have sex because it could hurt my relationship with the other person.
10. I would not have sex because it could affect my reputation

Motivation for consuming Alcohol

1. I would drink Alcohol because I would have a good time

2. I would drink alcohol because it would be easier for me to socialize
3. I would drink alcohol because I would feel part of a group
4. I would drink alcohol because I would be able to take my mind of problems
5. I would drink alcohol because I enjoy the buzz
6. I would drink because I am more accepted socially when I drink
7. I would drink alcohol because I am less shy
8. I would drink alcohol because I am more relaxed when I drink
9. I would drink alcohol because I am more energetic when I drink
10. I would drink alcohol because I am more outgoing
11. I would drink alcohol because I feel relaxed
12. I would drink alcohol because I am less sexually inhibited

Motivations for not consuming alcohol.

1. I would not drink alcohol because I would do things I wouldn't' do otherwise
2. I would not drink because I am less alert
3. I would not drink because I would feel sick
4. I would not drink because I would behave badly
5. I would not drink because I take more risks
6. I would not drink because I get sleepy or tired
7. I would not drink because I feel sad or depressed
8. I would not drink because I lose my self-control
9. I would not drink because I become clumsy or uncoordinated
10. I would not drink because I would feel ashamed of myself

APPENDIX D: STUDY 1 CORRELATIONS AND DESCRIPTIVE STATISTICS BY CONDITION

Table D1
Study 1 Correlations and Descriptive Statistics for Reasoned Condition only

Variable	1	2	3	4	5	6	7	8	9	10
1. Rational	1 34	.09 33	-.13 87	-.08 34	-.02 25	-.07 34	-.41* 26	.04 34	-.16 25	-.06 34
2. Experiential		1 35	.09 33	.19 35	-.08 25	-.01 35	-.18 27	.24 35	.01 26	.24 35
3. Casual sex BW (Time 1)			1 33	.85*** 33	.35† 25	.42* 33	.65*** 27	.52** 33	.48* 26	.34* 33
4. Casual sex BW (Time 2)				1 56	.35† 25	.25** 56	.51** 27	.74*** 56	.41* 26	.34** 56
5. Drinking BW (Time 1)					1 25	.75*** 25	.54** 25	.58** 25	.76*** 24	.69*** 25
6. Drinking BW (Time 2)						1 56	.59** 27	.31* 56	.62*** 26	.56*** 56
7. Casual sex BI (Time 1)							1 27	.63*** 27	.61*** 26	.37† 27
8. Casual sex BI (Time 2)								1 56	.52** 26	.42*** 56
9. Drinking BI (Time 1)									1 26	.80*** 26
10. Drinking BI (Time 2)										1 56
Mean (SD)	33.8 (7.36)	32.2 (7.72)	6.73 (4.79)	6.34 (3.85)	7.96 (3.90)	8.88 (3.46)	4.78 (3.69)	4.48 (3.73)	15.73 (10.07)	17.69 (9.92)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.
†p < .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001.

Table D2
Study 1 Correlations and Descriptive Statistics for Experiential Condition only

Variable	1	2	3	4	5	6	7	8	9	10
1. Rational	1 27	-.06 26	-.06 27	-.13 27	-.06 24	-.24 27	-.15 24	-.24 27	-.03 24	-.22 27
2. Experiential		1 26	.19 26	.22 26	-.22 24	-.09 26	.01 24	.02 26	-.12 24	-.16 26
3. Casual sex BW (Time 1)			1 27	.88*** 27	.39† 24	.32† 27	.78*** 24	.67*** 27	.51** 24	.51** 27
4. Casual sex BW (Time 2)				1 41	.36† 24	.44** 41	.80*** 24	.71*** 41	.55** 24	.49*** 41
5. Drinking BW (Time 1)					1 24	.68*** 24	.33 24	.17 24	.78*** 24	.78*** 24
6. Drinking BW (Time 2)						1 41	.41* 24	36* 41	..67** 24	.71*** 41
7. Casual sex BI (Time 1)							1 24	.90*** 24	.58** 24	.60** 24
8. Casual sex BI (Time 2)								1 41	.48* 24	.47** 41
9. Drinking BI (Time 1)									1 24	.93*** 24
10. Drinking BI (Time 2)										1 41
Mean	35.56	35.19	4.85	6.83	6.63	9.05	3.75	5.24	13.42	17.87
SD	5.44	3.84	3.44	3.90	3.76	3.16	2.63	3.74	10.41	9.49

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.
†p < .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001.

Table D3
Study 1 Correlations and Descriptive Statistics Control Condition only

Variable	1	2	3	4	5	6	7	8	9	10
1. Rational	1 31	.04 31	.02 28	-.13 31	-.01 22	-.06 31	-.05 22	.05 31	-.21 22	-.11 31
2. Experiential		1 31	-.13 28	-.12 31	-.13 22	-.07 31	-.32 22	-.51** 31	-.03 22	-.04 31
3. Casual sex BW (Time 1)			1 28	.67*** 28	-.04 22	.38* 28	.79*** 22	.47** 28	.15 22	.49** 28
4. Casual sex BW (Time 2)				1 42	.08 22	.40** 42	.39† 22	.45** 42	.35 22	.64*** 42
5. Drinking BW (Time 1)					1 22	.70*** 22	-.15 22	-.04 22	.68** 22	.49* 22
6. Drinking BW (Time 2)						1 42	.14 22	.20 42	.59** 22	.55** 42
7. Casual sex BI (Time 1)							1 22	.52** 22	.09 22	.08 22
8. Casual sex BI (Time 2)								1 42	.09 22	.34* 42
9. Drinking BI (Time 1)									1 22	.85*** 22
10. Drinking BI (Time 2)										1 42
Mean (SD)	32.00 (5.98)	34.77 (4.54)	4.75 (3.77)	5.93 (3.56)	5.18 (2.54)	8.33 (3.40)	3.41 (3.00)	3.52 (2.66)	12.31 (8.55)	16.98 (9.70)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.
†p < .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001.

Appendix E: Study 2 Correlations and Descriptive Statistics by Condition

Table E1

Study 2 Correlations and Descriptive Statistics for Time 1 and Time 2 variables for Reasoned Condition only

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Rational	1	.11	-.10	.05	-.08	-.05	-.08	-.07	-.09	-.06	-.02	-.10
	66	62	66	66	66	66	65	66	66	66	66	66
2. Experiential		1	-.19	-.22†	.21†	.20	-.19	-.24†	.19	.07	.03	.21†
		63	63	63	63	63	62	63	63	63	63	63
3. Casual sex BW (Time 1)			1	.82***	.32**	.29*	.64***	.60***	.34**	.26*	.59***	.32**
			67	67	67	67	66	67	67	67	67	67
4. Casual sex BW (Time 2)				1	.21†	.31**	.56***	.53***	.25*	.24*	.21†	.43***
				67	67	67	66	67	67	67	67	67
5. Drinking BW (Time 1)					1	.64***	.47***	.45***	.72***	.57***	.20†	.43***
					67	67	66	67	67	67	67	67
6. Drinking BW (Time 2)						1	.43***	.30*	.50***	.56***	.20†	.53***
						67	66	67	67	67	67	67
7. Casual sex BI (Time 1)							1	.85***	.43***	.31**	.32**	.27*
							66	66	66	66	66	66
8. Casual sex BI (Time 2)								1	.36**	.27*	.33**	.22†
								67	67	67	67	67
9. Drinking BI (Time 1)									1	.73***	.25*	.59***
									67	67	67	67
10. Drinking BI (Time 2)										1	.79	.73***
										67	67	67
11. Sex expectancies											1	.32**
											67	67
12. Alcohol expectancies												1
												67
Mean	34.76	34.13	5.39	5.49	6.84	6.91	3.55	3.61	6.9	14.46	3.36	1.20
(SD)	(7.15)	(5.92)	(3.92)	(3.58)	(3.26)	(3.45)	(3.03)	(2.72)	(4.69)	(8.89)	(10.42)	(11.64)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.

$^{\dagger}p \leq .1$, *$p \leq .05$, **$p \leq .01$, ***$p \leq .001$.

Table E2

Study 2 Correlations and Descriptive Statistics for Time 1 and Time 2 variables for Experiential Condition only

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Rational	1	.29*	.08	.12	-.04	-.27*	.00	-.06	.05	-.09	.09	-.20
	58	57	58	58	57	58	57	58	57	58	58	58
2. Experiential		1	-.07	-.01	.20	.42	-.08	-.09	.26*	.30*	.11	.18
		60	60	60	59	60	59	60	59	60	60	60
3. Casual sex BW (Time 1)			1	.76***	.35**	.19	.78***	.66***	.34**	.12	.73***	.21
			61	61	60	61	60	61	60	61	61	61
4. Casual sex BW (Time 2)				1	.26*	.17	.63***	.70***	.24†	.13	.75***	.15
				65	60	65	60	65	60	65	65	65
5. Drinking BW (Time 1)					1	.75***	.23†	.38**	.71***	.65***	.52***	.60***
					60	60	59	60	59	60	60	60
6. Drinking BW (Time 2)						1	.11	.23†	.59***	.60***	.48***	.65***
						65	60	65	60	65	65	65
7. Casual sex BI (Time 1)							1	.79***	.37**	.15	.60***	.26*
							60	60	59	60	60	60
8. Casual sex BI (Time 2)								1	.30*	.31**	.64***	.36**
								65	60	65	65	65
9. Drinking BI (Time 1)									1	.77***	.48***	.70***
									60	60	60	65
10. Drinking BI (Time 2)										1	.39***	.70***
										65	65	65
11. Sex expectancies											1	.49***
											65	65
12. Alcohol expectancies												1
												65
Mean	35.74	34.97	5.57	6.09	8.37	8.26	4.67	4.48	8.42	18.03	5.86	7.12
(SD)	(6.90)	(6.65)	(4.09)	(3.82)	(3.70)	(3.62)	(4.13)	(4.02)	(4.78)	(8.97)	(11.00)	(12.77)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.

†p ≤ .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001.

Table E3

Study 2 Correlations and Descriptive Statistics for Time 1 and Time 2 variables for Control Condition only

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Rational	1	-.10	-.01	.11	-.30*	-.33**	-.12	-.08	-.19	-.29	-.13	-.32**
	69	67	68	69	68	69	67	69	68	69	69	69
2. Experiential		1	.14	.02	.07	.08	-.01	.06	.07	.06	.15	-.06
		69	68	69	68	69	67	69	69	69	69	69
3. Casual sex BW (Time 1)			1	.85***	.44***	.41***	.64***	.60***	.41***	.32**	.48***	.29*
			70	70	69	70	69	70	69	70	70	70
4. Casual sex BW (Time 2)				1	.25*	.23†	.50***	.54***	.28*	.19	.55***	.23*
				72	70	72	69	72	70	72	72	72
5. Drinking BW (Time 1)					1	.77***	.51***	.45***	.74***	.72***	.29*	.49***
					70	70	68	70	69	70	70	70
6. Drinking BW (Time 2)						1	.54***	.46***	.78***	.82***	.22†	.55***
						72	69	72	70	72	72	72
7. Casual sex BI (Time 1)							1	.81***	.53***	.46***	.30*	.35**
							69	69	68	69	69	69
8. Casual sex BI (Time 2)								1	.43***	.42***	.33**	.37***
								72	70	72	72	72
9. Drinking BI (Time 1)									1	.90***	.25*	.60***
									70	70	70	70
10. Drinking BI (Time 2)										1	.27*	.66***
										72	72	72
11. Sex expectancies											1	.43***
											72	72
12. Alcohol expectancies												1
												72
Mean (SD)	Mean (SD)	35.81 (6.48)	34.16 (6.41)	5.33 (3.83)	6.31 (3.99)	7.51 (3.52)	8.33 (3.76)	3.67 (3.10)	3.83 (3.29)	7.99 (4.91)	6.97 (10.00)	3.53 (12.40)

Note. Sample sizes are reported on diagonal. Rational refers to the rationality score from the Rational Experiential Inventory. Experiential refers to the experientiality score from Rational Experiential Inventory. BW refers to behavioral willingness. BI refers to behavioral intentions.

†p ≤ .1, *p ≤ .05, **p ≤ .01, ***p ≤ .001.

APPENDIX F: STUDY 2 REGRESSION ANALYSES TESTING MEDIATION THROUGH SEX MOTIVES AND ALCOHOL OUTCOME EXPECTANCIES

Table F1
Summary of Hierarchical Regression Analyses for Condition Predicting Casual Sex Behavioral Willingness through Sex Motives

	b	*SE b*	*t*		*b*	*SE b*	*t*
Total Effect of IV on DV				Total Effect of IV on DV			
Total effect of Condition A on BW	.82	.34	2.35*	Total effect of Condition B on BW	-.14	.36	-.39
Direct Effect of IV on DV				Direct Effect of IV on DV			
Direct effect of Condition A on BW	.57	.34	1.69†	Direct effect of Condition B on BW	-.10	.34	-.30
Direct effect of IV on Mediator				Direct effect of IV on Mediator			
Direct effect of Condition A on Expectancies	2.97	1.32	2.25*	Direct effect of Condition B on Expectancies	-.42	1.37	-.31
Direct Effect of Mediator on DV				Direct Effect of Mediator on DV			
Direct effect of expectancies on BW	.08	.02	4.51***	Direct effect of expectancies on BW	.09	.02	4.81***

Note. Condition A (*reasoned* = 0, *experiential* and *control* = 1).
Condition B (*experiential* = 0, *reasoned* and *control* = 1).
Model includes Time 1 casual sex behavioral willingness, rationality and experientiality as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

Table F2
Summary of Hierarchical Regression Analyses for Condition Predicting Drinking Behavioral Willingness through Alcohol Outcome Expectancies

	b	*SE b*	*t*		*b*	*SE b*	*t*
Total Effect of IV on DV				Total Effect of IV on DV			
Total effect of Condition A on BW	.85	.39	2.17*	Total effect of Condition B on BW	.11	.41	.27
Direct Effect of IV on DV				Direct Effect of IV on DV			
Direct effect of Condition A on BW	.69	.38	1.83†	Direct effect of Condition B on BW	.39	.39	.99
Direct effect of IV on Mediator				Direct effect of IV on Mediator			
Direct effect of Condition A on Expectancies	2.31	1.68	1.38	Direct effect of Condition B on Expectancies	-3.68	1.71	-2.14*
Direct Effect of Mediator on DV				Direct Effect of Mediator on DV			
Direct effect of expectancies on BW	.07	.02	4.21***	Direct effect of expectancies on BW	.08	.02	4.49***

Note. Condition A (*reasoned* = 0, *experiential* and *control* = 1).
Condition B (*experiential* = 0, *reasoned* and *control* = 1).
Model includes Time 1 drinking behavioral willingness, rationality and experientiality as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

Table F3
Summary of Hierarchical Regression Analyses for Condition Predicting Casual Sex Behavioral Willingness through Sex Outcome Expectancies by importance

	b	*SE b*	*t*		*b*	*SE b*	*t*
Total Effect of IV on DV				Total Effect of IV on DV			
Total effect of Condition A on BW	.58	.33	1.73†	Total effect of Condition B on BW	-.11	.34	-.32
Direct Effect of IV on DV				Direct Effect of IV on DV			
Direct effect of Condition A on BW	.58	.34	1.72†	Direct effect of Condition B on BW	-.11	.34	-.33
Direct effect of IV on Mediator				Direct effect of IV on Mediator			
Direct effect of Condition A on Expectancies by importance	-14.62	28.27	-.52	Direct effect of Condition B on Expectancies by importance	-16.63	28.53	-.58
Direct Effect of Mediator on DV				Direct Effect of Mediator on DV			
Direct effect of expectancies by importance on BW	-.00	.00	-.11	Direct effect of expectancies by importance on BW	-.00	.00	-.19

Note. Condition A (*reasoned* = 0, *experiential* and *control* = 1).
Condition B (*experiential* = 0, *reasoned* and *control* = 1).
Model includes Time 1 casual sex behavioral willingness, rationality, experientiality, sex outcome expectancies, and importance of outcome expectancies as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

Table F4
Summary of Hierarchical Regression Analyses for Condition Predicting Drinking Behavioral Willingness through Alcohol Outcome Expectancies by importance

	b	*SE b*	*t*		*b*	*SE b*	*t*
Total Effect of IV on DV				Total Effect of IV on DV			
Total effect of Condition A on BW	.70	.38	1.86†	Total effect of Condition B on BW	.37	.39	.93
Direct Effect of IV on DV				Direct Effect of IV on DV			
Direct effect of Condition A on BW	.71	.38	1.87†	Direct effect of Condition B on BW	.37	.39	.92
Direct effect of IV on Mediator				Direct effect of IV on Mediator			
Direct effect of Condition A on Expectancies by importance	42.72	56.33	.76	Direct effect of Condition B on Expectancies by importance	-62.46	58.43	-1.07
Direct Effect of Mediator on DV				Direct Effect of Mediator on DV			
Direct effect of expectancies by importance on BW	-.00	.00	-.25	Direct effect of expectancies by importance on BW	.00	.00	-.07

Note. Condition A (*reasoned* = 0, *experiential* and *control* = 1).
Condition B (*experiential* = 0, *reasoned* and *control* = 1).
Model includes Time 1 drinking behavioral willingness, rationality, experientiality, alcohol outcome expectancies, and importance of outcome expectancies as covariates.
†p < .1, *p ≤ .05, **p ≤ .01 ***p ≤ .001.

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Education

PhD Iowa State University, Ames, IA — May, 2009

Major: Social Psychology, Concentration: Health
Dissertation Defended December 9, 2008
Dissertation Title: Health risk cognitions: An empirical examination of the effects of heuristic versus reasoned information processing.
Committee Members: Douglas Gentile, Stephanie Madon, Frederick Gibbons, Frederick Lorenz, Gary Wells, and Veronica Dark

M. S. Iowa State University, Ames, IA — December, 2006

Major: Social Psychology, Concentration: Health
Thesis Title: Can Health Risk be Primed: A Dual Process Approach?
Committee members: Frederick Gibbons, Meg Gerrard, Frederick Lorenz, and Anne Cleary

B. S. University of Iowa, Iowa City, IA — May, 2003

Major: Psychology (with Honors), Concentration: Child development
Honors Thesis Title: The emergence of biases in spatial memory over learning for children.
Advisor: Jodie Plumert

Academic Positions

Assistant Professor	Des Moines University, College of Health Sciences	Masters of Public Health Department	February, 2009 – present
Adjunct Faculty member	Des Moines University, College of Health Sciences	Masters of Public Health Department	Fall, 2008 – January, 2009
Adjunct Faculty Member	Simpson College	Department of Psychology, Division of Adult Learning	Summer, 2008
Graduate Assistant	Iowa State University	Department of Psychology	2003 - present

Publications

Gerrard, M., Roberts, M. X., **Reimer, R. A.,** & Gibbons, F. X. (2009). Mother-Daughter communication and HPV Vaccination. Under Review: *Special Issue on HPV, Preventive Medicine.*

Gentile, D. A., Welk, G., Eisenmann, J., **Reimer, R. A.** Walsh, D. A., Russell, D. W., Callahan, R., Walsh, M., & Strickland, S., Fritz, K. (2009). Evaluation of the SWITCH program: A multiple ecological level obesity prevention program. Under Review; Annals of Behavioral Medicine.

Reimer, R. A., Gerrard, M. & Gibbons, F. X. (2009). Racial differences in smoking knowledge: Data from the Health Information National Trends Survey. In Press: *Psychology and Health*.

Houlihan, A. E., Gibbons, F. X., Gerrard, M., Yeh, H-C., **Reimer, R. A.,** Murry, V. M. (2008). Sex and the self: The impact of early sexual onset on the self-concept and subsequent risky behavior of African American Adolescents. *Journal of Early Adolescence, 28, 70-91*.

Recker, K., Plumert, J. M., Hund, A. M & **Reimer, R. A.** (2008). How do biases in memory for location emerge during learning? *Journal of Experimental Child Psychology, 98, 217-232.*

Gibbons, F. X., **Reimer, R. A.,** Gerrard, M., Hsiu-Chen, Y., Houlihan, A. E. Cutrona, C., Simons, R. Brody, G. (2008). Rural Urban differences in substance use among African American Adolescents. *Special Issue, Journal of Rural Health, 23,* 22-30*.*

Gibbons, F. X., Gerrard, M., **Reimer, R. A**. & Pomery, E. A. (2006). Health Decision-making: Reasoned vs. reactive responding (pp. 45-70). In D. de Ridder & J. de Wit (Eds.) *Self-regulation in health behaviour.* W. Sussex, UK: Wiley and Sons, Inc.

Manuscripts in Preparation

Gentile, D. A., **Reimer, R. A**., & Walsh, D. Frogs sell Beer: The effects of alcohol advertising on adolescent's drinking attitudes and behaviors. Under revision.

Reimer, R. A., Gentile, D. A, Russo, T. The longitudinal effects of parental involvement in media on child wellness: Data from the Switch obesity intervention program. In preparation.

Reimer, R. A., & Stock, M. Absent-Exempt cognitions: Changes in perceived cancer risk across the lifespan. In preparation.

Conference Presentations

Reimer, R. A., Gentile, D., Welk, G., Eisenmann, J. C., Walsh, D. A., Russell, D. W., Callahan, R., Walsh, M., Strickland, S., & Fritz, K. (2009). 7th International Conference on Diet and Activity Methods, June 5-7. Washington DC.

Reimer, R. A., Gibbons, F. X., Madon, S., Gentile, D. A. (2009, Feb). The effect of a between-subjects manipulation of processing route on behavioral intentions and behavioral willingness to engage in risky health behaviors. Poster accepted for presentation at the Annual meeting for the Society for Personality and Social Psychology, Tampa, FL.

Roberts, M., Gerrard, M., **Reimer, R. A**., Gibbons, F. X. (2009, Feb). Mother-daughter communication and HPV vaccine uptake. Poster accepted for presentation at the Annual meeting for the Society for Personality and Social Psychology, Tampa, FL.

Reimer, R. A., & Gerrard, M. (2008, Feb). Racial differences in smoking Myths: Data from the Health Information National Trends Survey. Poster presented at the Annual meeting of the Society for Personality and Social Psychology, Albuquerque, NM.

Houlihan, A. E. & **Reimer, R. A**. & Gibbons, F. X., Yeh, H. C., & Gerrard, M. (2006, May). Early sexual behavior's impact on self-concept and risky behavior. Poster presented at the Annual Meeting of the Midwestern Psychological Association, Chicago, IL.

Teaching Experience

Semester	Course Title	Course level	Role	Institution	Number of students
Spr 2009	Social Psychology	Undergraduate core	Co-Instructor	Iowa State University	2 sections Ns = 125
Fall 2008	Health Interventions	Graduate elective	Instructor	Des Moines University	N = 6
Sum 2008	Psychology of Women	Undergraduate core	Instructor	Simpson College	N = 15
Sum 2007	Psychology of Women	Undergraduate upper-level	Instructor	Iowa State University	N = 30
Spr 2007	Psychology of Women	Undergraduate upper-level	Instructor	Iowa State University	N = 60
Sum 2006	Social Psychology	Undergraduate core	Co-Instructor	Iowa State University	N = 20
Spr 2004	Academic Success	Undergraduate entry-level	Instructor	Iowa State University	N = 25
Fall 2003	Academic Success	Undergraduate entry-level	Instructor	Iowa State University	N = 20
Spr 2002	Close Relationships	Undergraduate upper-level	Teaching Assistant	University of Iowa	N = 130
Fall 2001	Child Development	Undergraduate core	Teaching Assistant	University of Iowa	N = 35
Guest Lecturer:					
Summer 2008		Research Methods			
Spring 2008		Research Methods			

Spring 2006	Psychology of motivation
Spring 2007	Research Methods II

Teaching Interests:
Health Psychology / Behavioral medicine, Research Methods, Preventive Medicine, Public Policy & Tobacco use, Health Interventions.

Grants and Awards

- Iowa Osteopathic Education Research Grant: Principle Investigator **Application Granted** March, 2009
- FRA HL-08-013 "Translating Basic Behavioral and Social Science Discoveries into Interventions to Reduce Obesity: Centers for Behavioral Intervention Development (U01): Co-Investigator **Application submitted** January, 2009
- Graduate Student Teaching Excellence Award Summer, 2008
- Graduate and Professional Student Senate Peer Teaching Award Spring, 2008
- Department of Psychology Professional Advancement Travel Grant Fall, 2007
- Graduate College Professional Advancement Travel Grant Fall, 2007
- Department of Psychology Professional Advancement Travel Grant Spring, 2006
- Premium Academic Excellence Award Fall, 2005

Professional Development
NIH Regional Grant Writing Seminar, Atlanta Georgia April, 2009
Attended multiple seminars sponsored by the Center for Excellence in Learning and Teaching
Attended Structural Equation Modeling seminar (Dr. Dan Russell)

Professional Affiliations
Member of the Society for the Teaching of Psychology
Member of the American Psychological Association
Member of the Society for Research in Child Development
Member of the Society for Personality and Social Psychology

Ad Hoc Reviewer
Pharmacoepidemiology and Drug Safety

Departmental Service

Graduate Students in Psychology	Member	Fall 2003 - Present
Graduate Students in Social Psychology	Secretary	Spring 2006 - 2008
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References
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