

IDENTITY IS A PROTECTED VALUE:

GENDER IDENTITY, FUZZY-TRACE THEORY, AND SURGICAL DECISION MAKING

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## ABSTRACT

This study tests the central concept that identity is a protected value. More specifically, the purpose of the proposed research is to assess how people process conflicts between identity and risk when making medical decisions, especially in regard to how people trade (or refuse to trade) protected values such as gender identity (i.e., an enduring sense of self as a man or a woman or some combination thereof) against important risks, such as those encountered in identity-relevant surgeries (e.g., sex reassignment surgery, prostatectomy, and mastectomy).

Gender congruent males (N=187), gender congruent females (N=471), and transgender men (N=229) participated in an online study of how people process conflicts between identity and risk. Participants were randomized into a control condition, a standard dual process condition, or a fuzzy-trace theory condition. Across four medical scenarios, participants were asked to choose between an identity preserving option that was paired with a higher risk outcome and an identity threatening option that was paired with a lower risk option. Then participants completed a questionnaire assessing gender identity, personal values, and basic demographics. Gender identity was measured using personal report and validated using the Hoffman Gender Scale. Personal values were scored on a 10-point Likert rating scale from completely unimportant to extremely important.

Results indicated that identity is a protected value and when triggered in threatening medical scenarios, people were not willing to trade the integrity of their gender identity for a less risky alternative, even when the option to preserve identity carried a higher risk of death. Both participant gender and the gender of the protagonist in the hypothetical medical dilemmas predicted choices across the decision problems. More specifically, when the participant's gender identity matched the gender identity of the protagonist in the medical scenario (e.g., a female-

identified respondent making a choice about which breast cancer treatment to pick for the female in the medical dilemma), participants chose the identity-preserving option more than respondents whose gender identities were not matched to the protagonist (e.g., male or transgender men's responses to the breast cancer dilemma).

Thus, the current findings demonstrate that identity is a protected value in decision making in medical contexts, even when the identity preserving context involves greater risk than an alternative choice. These data also provide an empirical test of standard dual process against fuzzy-trace theory mental representations in decision making that involves a trade off.

## BIOGRAPHICAL SKETCH

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In 2008, Seth received his M.A. in Developmental Psychology from Cornell University, where he is also recognized as a Knight Scholar for Writing in the Disciplines and as a Graduate Student Affiliate to both the Institute of Social Sciences and the Cornell Population Program. While at Cornell, Seth served his fellow graduates as a Departmental Representative to the Graduate and Professional Student Assembly and as Graduate Student Chair to the University Assembly. He currently holds professional leadership positions as a Trainee Representative to the Society for Medical Decision Making Education Committee, a Member of the Research and Data Analysis Advisory Group for the California State-wide LGBTQ Mental Health Disparities Project, and the Laboratory Coordinator for the Laboratory for Rational Decision Making under the direct mentorship of Dr. Valerie Reyna.

*For my Papa Shike.*

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“Every Warrior of the Light has felt afraid of going into battle. Every Warrior of the Light has, at some time in the past, lied or betrayed someone. Every Warrior of the Light has trodden a path that was not his. Every Warrior of the Light has, at least once, believed he was not a Warrior of the Light. Every Warrior of the Light has failed in his spiritual duties. Every Warrior of the Light has said ‘yes’ when he wanted to say ‘no.’ Every Warrior of the Light has hurt someone he loved. That is why he is a Warrior of the Light, because he has been through all this and yet has never lost hope of being better than he is.”

- Paulo Coelho, from *Warrior of the Light*

Writing a dissertation is a lot like being the Warrior of the Light. The entire process is a microlife where one births ideas, runs experiments to test the ideas, receives guidance on how to make these ideas better, and experiences failure with some (ok many) of those ideas. But, in the end, as is for the Warrior of the Light, after going through all that it takes to finish a dissertation, one can stand tall knowing that he or she has been through it all and yet never lost hope of being better than he or she once was.

As in life, a dissertation is never accomplished alone. I owe a great deal of thanks and gratitude to my dissertation committee chair, Dr. Valerie Reyna, and to my committee members Dr. Ritch Savin-Williams and Dr. Qi Wang. Combined, your guidance, confidence, critical feedback, and intellectual support are second to none. Thank you for helping me keep perspective throughout this process. This dissertation is far improved from where it began in large part due to your comments and suggestions. I thank each of you deeply.

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~

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## INTRODUCTION

Most theories of risky decision making emphasize the trade-off between degrees of risk and amounts of reward (Reyna & Farley, 2006). In particular, dual-process approaches suggest that decision makers can operate in multiple modes—analytical and intuitive—that result in differing choices (Fujita & Han, 2009; Fujita, Trope, Liberman, & Levin-Sagi, 2006; Loewenstein & O’Donoghue, 2007; Reyna, 2004; Reyna & Brainerd, 2008). However, there are gaps in the extant literature regarding how identity influences decision making, in particular, whether people are willing to trade off who they are in order to reduce or avoid serious risks.

I first define protected (sacred) values. Second, I review the literature on the role of identity in decision making and discuss how protected values as a special class of values predict noncompensatory decision making, that is, how testing identity as a protected value should tell us more about decision making in circumstances that objectively involve a trade-off. Third, I review two dual process models (fuzzy-trace theory and standard dual process theory), and discuss the predictive implications of each model in decision making scenarios that are relevant to the present study, in particular how gist processing (a construct from fuzzy-trace theory) enhances the identity-protecting effect. Fourth, I review the literature on the relationship between risk perception and medical decision making, and highlight the circumstances in which identity serves as a primary consideration for certain kinds of medical decisions that involve a trade off.

## LITERATURE REVIEW

### **Sacred (protected) values**

Sacred values are personal values that are protected from trade-offs with other values (Baron & Ritov, 2009) or social norms (Tetlock, 2003). For example, imagine the following question: How many species of fish are you willing to destroy in order to save 20 species of fish that would go extinct if nothing were done? Baron and Ritov (2009) demonstrated that people with protected values against the destruction of species reported a lower maximum number of species that they were willing to destroy. In some cases, a protected value against killing fish species may be absolute in principle. That is, participants with an absolute value against species destruction (such as amongst extreme biological conservationists) report a firm unwillingness to destroy *any* number of species even if it were to save some fish.

According to the sacred value protection model (SVPM), an individual struggles to preserve and protect both the private self and the public identity from any action which is considered immoral (either by the individual himself or by society at large). In other words, when sacred values are tested or compromised, research suggests that individuals experience an aversive arousal state, or what Tetlock (2003) referred to as a “moral outrage” that creates cognitive, affective and behavioral reactions.

The current study is a test of the sacred value protection model, and represents an empirical test of whether gender identity has sacred value properties for the individual. In the present study, individuals with different gender identities (man, woman, or transgender) will be presented with different medical dilemmas where the choices pit a gender-identity preserving option that is paired with a high risk consequence against a

gender identity threatening option that is paired with a lower risk consequence. For example,

Imagine that at your most recent doctor's appointment you were found to have stage I node-negative breast cancer. This means that cancer has formed in the breast but it has not yet spread. There are two contemporary treatment options for treatment of this disease (*breast conserving surgery* or *total mastectomy*). If you choose *mastectomy*, the cancer and the breasts will all be surgically removed, and there is very little risk (4%) of cancer recurrence. If you choose *breast conserving surgery*, only the cancerous tumor will be removed using a small incision to preserve the natural breast, but there is a two to three times greater risk (8-14%) of cancer recurrence.

In this scenario, the participant is faced with a decision between the breast-conserving surgery and the total mastectomy. The mastectomy is identity threatening (for many women) because it requires surgical removal of the breasts. However, in this example, a mastectomy carries half the risk for cancer recurrence than breast conserving surgery. In contrast, breast conserving surgery preserves a woman's gender identity because it preserves the natural breast. However this option carries twice as much recurrence risk (Veronesi, Cascinelli, Mariani, Greco, Saccozzi, Luini, et al, 2002). Thus, the implied trade-off is to either maintain identity integrity (by selecting the breast conserving option) and incur a higher cancer recurrence risk, or to trade-off identity integrity (to give up her breasts via mastectomy) for a lower objective cancer risk.

Expected utility theory states that decision makers choose between risky or uncertain prospects by comparing their expected utility values, (i.e., the weighted sums obtained by the magnitude of outcomes multiplied by their respective probabilities). For example, am I willing to



play a chance game if I have a 50% chance of winning \$200? The expected utility of this game is  $.50 \times \$200$  or \$100. Thus, by definition, expected utility is both multiplicative and scope sensitive. To keep a constant expected value, there is an inverse relationship between probability and the magnitude of the payoff; in other words, if my odds of winning decrease to 10%, the magnitude of the payoff must increase to \$1000 to maintain an equal expected value of \$100. Greater risk requires greater reward to make it worth the gamble.

Bartels and Medin (2007) among others (e.g., Ritov & Baron, 1999) note that individuals are typically quantity sensitive, but that one displays quantity insensitivity (noncompensatory decision patterns) when presented with alternatives that involve a protected value. Thus, this study tests whether participants will display noncompensatory decision making in order to protect gender identity even when the alternative choice presents a great threat of risk, including a small chance of death.

Imagine the following sacred value dilemma (from Greene, Sommerville, Nystrom, Darley, & Cohen, 2001). The participant is asked to imagine the following dilemma: “A runaway trolley is headed for five people who will be killed if it proceeds on its present course. The only way to save them is to hit a switch that will turn the trolley onto an alternate set of tracks where it will kill one person instead of five” (Greene, et al., 2001).

One explanation of this forced-choice dilemma suggests that people should be more willing to hit the switch than not because saving five is more than saving one. Indeed, Reyna and Casillas (2009) argued that verbatim (precise, quantitative) mental representations support making numerical comparisons (one vs. five). Thus, in this scenario, people were more willing to hit the switch in order to save five people at the expense of one. Put slightly differently, participants were willing to let the *trolley* kill one person rather than five.

In an alternative problem, the participant is told that “a trolley threatens to kill five people, and you are standing next to a large stranger on a footbridge that spans the tracks, in between the oncoming trolley and the five people. In this scenario, the only way to save the five people is to push this stranger off the bridge, onto the tracks below. He will die if you do this, but his body will stop the trolley from reaching the others.” The specifics of this choice is between the deaths of one person versus five people (same as in the trolley car problem above), but the gist here is a choice between “I kill one person” versus “the trolley kills five people” (Reyna & Casillas, 2009). Thus, the participant must decide if *he/she* is willing to actively push one stranger to his death to save the five people from the oncoming trolley.

As explained in Reyna and Casillas (2009), two decision dilemmas may produce contradictory outcomes if a sacred value (e.g. “thou shalt not kill”) is activated in one version of a decision dilemma i.e., (Am *I* willing to kill one person, else *a trolley* will kill five people?) and a utilitarian approach is activated in a different version of the same dilemma (i.e., If I have a choice between a trolley killing one person or five people, it is more rational to save more people).

Returning to our cancer dilemma above, then, the bottom line of the decision regarding identity is whether to give up, or not, a part of one’s self or who one is to reduce risk. Recall that in either scenario, there is at least some chance of cancer recurrence, but the dilemma is whether to keep or to lose the breast for a chance at a better recurrence outcome. Research suggests that for some women, the breast is a key component of her gender identity as a woman (Britton, Britton, & Gronwaldt, 2006; Foster, Slade, & Wilson, 1996). Thus, if individuals protect gender identity as they would any other protected value, then the same decision dilemma should produce contradictory outcomes across differently gendered persons.

In a scenario currently relevant to health care, individuals experiencing gender dysphoria (i.e., persistent discomfort with his or her sex or sense of inappropriateness in the gender role of that sex; American Psychiatric Association, 2000) sometimes feel torn about whether to medically transition to live socially in the gender with which one identifies. There are great medical risks involved including those associated with general surgery (e.g., blood loss, surgical site infection, anesthesia-related death) as well as social risks including social rejection (Cohen-Kettenis & Gooren, 1999), relationship breakups, and in some instances the loss of certain civil rights such as the right to legal marriage or child custody rights (Currah, Juang, & Minter, 2006).

In one recent survey of 170, mostly White adults (mean age 29, range 18-56 years) that asked whether a medical transition was necessary to feel like one was living authentically, nearly 100% of female-to-male transsexuals reported “yes,” compared to less than 10% of non-transsexual natal females who self-identified as gender nonconforming with masculine but not cross-gender identifications (Pardo, 2008). Thus, among female-to-male transsexuals, not to pursue the medical transition because of the medical and social risk would mean to trade off a great part of authentic living, in other words, who one *is*.

### **Identity defined**

Identity has a complex conceptual history that spans multiple disciplines including psychology (Tajfel, 1981), sociology (Burke, 1980), anthropology (Eriksen, 2001), and the humanities (Butler, 1990; Feinberg, 1993). Moreover, due to its diverse history, *identity* has rarely assumed a single consensual definition. For example, in the late 1800s, the study of the self became a formal psychological concern. William James first developed a theory of self-concept whereby the self was divided into four components: the material, social, and spiritual

selves, and the pure ego (James, 1890). More recently, self-concept was still viewed as a set of internal schemas and goals (Carver & Scheier, 1981; Markus, 1990). In other words, the focus of identity was directed inward, on the individual as separate from society.

However, over approximately the past 50 years, the structure and content of self-concept has shifted outward. Several of the major theorists who published on the self since James' early work noted that even though each person may be unique and keep a private sense of self, the individual must be understood in relation to others; in other words, the self is inherently social (Bowlby, 1969; Mead, 1934; Sullivan, 1940). Consequently, more recent understandings of the self involve a sense of embeddedness within a social context (Collins, 2000); that is, a sense of inseparability of the self from the social context. Thus, if the self is inherently social, and if in order to study self-concept one must be able to identify and distinguish different social groups as unique and separate collections of similar individuals, then an identifier, or an *identity*, is necessary for the purpose of social categorization. As Frable (1997) explains, identity is the individual's psychological relationship to particular social category systems. For the purpose of this study, it is not the goal to argue one theory of identity is better or more accurate than another. Rather, it is important for the purpose of this study to establish the premise that an identity is an organizing construct within which an individual feels a sense of belonging and around which the individual bases one's behavior.

Tajfel's (1981) social identity model proposed that the social part of one's identity derives from the groups to which one belongs. In other words, because people do not exist in isolation, and because we are social beings, our identities are shaped by the groups to which we develop a sense of belonging. Social identity theory also suggests that once a group of belonging is identified and engaged, one acquires both a positive sense of who he/she is, and a clear

understanding of how to act toward others who are within one's group compared to those who are not in the group. In other words, the sense of who and what we are (our identity) is in part constructed based on the meaning that is derived from our chosen social group as well as our learned behavioral interactions within that social environment.

As an example of how the meaning derived from social group membership influences individual behavior, consider the social categorization system of gender. Distinct from *sex*, which (as a noun) is most often used to describe one's demographic categorization as either male or female (Deaux, 1993; Ruble, Martin, & Berenbaum, 2007), and is often measured biologically via sex chromosomes (Hines, 2004) or physically by genital appearance (Preves, 2000), *gender* is the trait characteristics and behaviors culturally associated with one's sex (e.g., masculinity, femininity, or some androgynous combination thereof; Hines, 2004). Moreover, as a social categorization system, gender carries an expected set of behaviors, attitudes, dress style and appearance; and often, what is appropriate gendered behavior and gendered self-concept is learned early (Bem, 1989).

In fact, social learning theory posits that children come to understand sex-typical gender roles and behaviors by modeling same-sex persons (often a same-sex parent), and via social comparison and reinforcement (Mischel, 1973). In one behavioral study of children, Slaby and Frey (1975) found that children with an advanced understanding of gender spent more time observing same-sex models. Thus, our gendered self-concept, or our gender identity is in part constructed based on our early experiences, and the understanding that there is meaning in behavior and appearance to signal one's gender. People learn early how to behave in "appropriate" gendered ways in accordance with one's natal sex, and interact with others within the same gendered group and outside of that gendered group.

The current study is built on several theoretically motivated premises. First, identity is a sense of who we are. Second, identity derives meaning from social group membership. Third, gender is a social group to which one may feel a sense of belonging and membership, and thus individuals have a gender identity that has meaning. Fourth, identity is associated with behavior. Moreover, one of the main goals of this study is to test a theoretically motivated mechanism by which gender identity predicts behavior in contexts in which individuals are asked to make tradeoffs between preserving gender identity and incurring risk.

### **Identity and self-discrepancy**

Higgins (1987) suggested that people make choices to behave in ways that avoid self-discrepancies; this may be alternatively understood that people behave in ways to preserve the status quo of one's sense of self and to maintain consistency with one's identity. In one study that tested the relationship between self-discrepancy and negative emotional outcomes, Higgins, Klein, and Strauman (1985) found a positive association with self-discrepancy and negative emotions such as depression, fear, and threat. More specifically, as the discrepancies increase between one's actual self and one's idealized self, participants report stronger feelings of disappointment, dissatisfaction, inefficacy, and disinterest. Moreover, as the discrepancies increase between one's actual self and what is perceived as what one ought to be (or ought to do), participants report stronger feelings of fear and threat.

Self-discrepancy research has not tested this theory within specific types of identities such as gender or race or class, but instead has allowed the participant to generate his/her own statements about what he/she considers part of the actual self, the idealized self, and who one ought to be without domain restriction. Higgins and colleagues demonstrated that people's behaviors are, in theory, patterned towards maintaining self-consistency with identity-related

goals. Thus, in extension of the current self-discrepancy literature the current study tests people's intolerance of gender identity discrepancy when forced to choose between a gender discrepancy and risk. It is interesting to note that this question has not yet been directly tested in the experimental literature. However, as summarized above, there exists behavioral research that provides evidence for how people respond in moral dilemmas. Thus, given that a protected value predicts when a person is unwilling to make a trade-off (Baron & Ritov, 2008; Tetlock, 2003); given that an individual will act to preserve and protect one's identity from any action, which is considered immoral or at odds with societal norms; and given that as a social categorization system, gender carries an expected set of behaviors, attitudes, dress style and appearance that is positively and negatively reinforced by social norms, I argue that gender identity is a protected value. The current study will directly test whether gender identity is a protected value by asking participants to choose between gender identity preservation and an option of lesser risk.

### **Identity as a protected (sacred) value**

Imagine that a woman of childbearing age is dying from cancer and the only treatment that will save her life requires a total mastectomy (breast removal). The surgery has both a high success rate and a low recurrence rate, but challenges a sacred value of womanhood, the breasts, which also serve as a natural bonding tool with her potential future child (Britton, Britton, & Gronwaldt, 2006). In fact, women who intended to breast-feed were more satisfied with their body shape and reported higher levels of maternal-fetal attachment (Foster, Slade, & Wilson, 1996). From a utilitarian standpoint, this decision seems like an obvious choice: it is better to have the surgery. However, is she willing to live as an "incomplete woman?"

As reviewed above, researchers have applied dual-process approaches to explain variations in moral reasoning, although the standard dual-process accounts differ from fuzzy-trace theory (Green et al, 2001; Hsee & Rottenstreich, 2004; Reyna & Casillas, 2009). Given the work of Higgins and colleagues (Higgins, Klein, and Strauman, 1985), which demonstrates that people feel negative emotions including some degree of self-threat as self-discrepancy increases, this suggests that people will choose to behave in ways that minimize self-threat. However, it remains an empirical question whether people are willing to incur any degree of risk in order to minimize self-threat.

### **Dual process models, memory, and decision making**

As described above, identity is, in part, constructed based on the meaning that is derived from the social context. However, the literature remains unclear whether identity alone will predict decision making or whether people will weigh risks and benefits for a given behavior. Fuzzy-trace theory is a dual-process model of memory and reasoning that provides a framework for understanding how people extract meaning from everyday experiences, including how meaning depends on the self (Reyna, & Adam, 2003).

According to fuzzy-trace theory, thinking is anchored at one extreme by qualitative thinking that is based on simple meaning-based (gist-based) representations and values such as “avoid risk,” and at the other extreme by precise surface form (verbatim) representations that support trading off precise risks and benefits (Reyna, 2004; Reyna & Brainerd, 1995). For example, a gist or qualitative memory representation of information presented may be retrieved as “more than” or “increasing” (Reyna & Brainerd, 1994, p. 261). In contrast, verbatim or quantitative memory representations of information presented pertain to the surface form of the



stimuli (e.g., the exact wording of a message that a woman's lifetime risk of invasive breast cancer is 13%).

Tests of fuzzy-trace theory demonstrate that people generally rely more on gist information rather than verbatim information to make decisions (Reyna, Lloyd, & Brainerd, 2003). Age effects have also been observed. Although traditional theories of cognitive development predict that children progress from implicit, emotional thinking to explicit, analytical reasoning, research informed by fuzzy-trace theory shows the opposite pattern; children and adolescents are less likely to use gist (intuitive) representations for decision-making than are adults (Reyna & Adam, 2003; Reyna & Ellis, 1994; Reyna et al., 2003). For example, in one developmental study, Reyna and Ellis (1994) presented modified framing problems to N=111 children of varying ages (28 preschoolers, 40 second graders, and 43 fifth graders). Children were given two blocks (one gain block and one loss block) of nine problems each.

In a traditional framing problem, the preamble asks the respondent to "Imagine that the United States is preparing for the outbreak of an unusual disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:" In the gain frame, an example sure choice alternative is "If program A is adopted, 200 people will be saved." The corresponding gamble option would be "If Program B is adopted, there is a 1/3 probability that 600 people will be saved and a 2/3 probability that no one will be saved." In the loss frame, an example of a gamble choices alternative is "If program B is adopted, there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no people will be saved." Adults' choices shift from the sure thing for gains to the gamble for losses, despite the equivalence of the options in the two frames.

Reyna and Ellis (1994) adapted framing problems for use with children and young adolescents. For developmental appropriateness, Reyna and Ellis (1994) presented the children with transparent bags of prizes so the children could see their possible winnings. Children were shown their sure choice winnings on the table before them, and placed the gamble winnings opposite a table barrier. The authors varied the levels of cumulative risk in the gamble between  $\frac{1}{2}$ ,  $\frac{2}{3}$ , and  $\frac{3}{4}$  chance to win nothing (in the gain frame) or to lose something (in the loss frame). Children were told that at the end of the game they would win a real prize based on their choices in the game – which they did receive.

Results demonstrated developmental differences in processing quantitative dimensions such as risk evaluations in decision making. Preschoolers did not show standard framing effects; that is, their choices were the same across gain (28% sure choices) and loss conditions (26% sure choices). Second graders showed a mixed response pattern whereby at lower levels of risk the choice patterns looked like the preschoolers, but at the highest risk levels, second graders showed reverse framing patterns (preferring the sure thing in the loss frame and the gamble in the gain frame). Finally, fifth graders were the youngest group to show standard framing choice patterns, but only for problems with low stakes, and they showed reverse framing for large stakes. Overall, risk taking declined from childhood to adolescence because processing became more gist-based (i.e., based less and less on processing exact risks and rewards).

In sum, the results from this study contradict what traditional theories of cognitive development would predict. They also contradict traditional economic models. According to traditional economic models (e.g., expected utility theory), the frame of the problem is irrelevant. Prospect theory predicts gain-loss differences, but does not predict changes with development or with mental representations. However, as predicted by fuzzy-trace theory, with age, there is an

increase in framing biases, whereby the youngest age group (e.g., preschoolers in Reyna & Ellis, 1994) showed no difference in choices across frames, and the oldest age group (e.g., fifth graders in Reyna & Ellis, 1994) showed similar choice patterns as adults (for low stakes). Similar developmental differences in processing are observed between experts and novices (Lloyd & Reyna, 2001; Reyna, 2008; Reyna & Adam, 2003).

These and other results indicate that analytical processing may result in greater risk taking (Mills, Reyna, & Estrada, 2008). Indeed, more recent research (see Reyna, 2008) shows that differences in decision making occur because adults simplify information as much as possible in order both to understand risk and to make decisions based on the balanced risks and benefits. Tests of fuzzy-trace theory have confirmed that when people are cued to rely more on gist representations they display more risk avoidance for unhealthy choices (Mills et al., 2008). Thus, in this view, it makes sense that risk perception for surgery would depend on a person's identity.

### **Fuzzy-trace theory, memory, and retrieval**

Previous research demonstrates that information recollection is affected by how information is stored and retrieved (Brainerd, Wright, & Reyna, 2002). For example, in line with fuzzy-trace theory, Reyna and Kiernan (1994) demonstrated that test probes differ in how they cue gist and verbatim memory traces: while one cognitive operation may facilitate retrieval of verbatim traces of individual verbal targets which results in recall of stored *surface* information, another operation retrieves gist memories of previously presented content and processes them constructively (relying on the bottom-line meaning of the semantic content) to reconstruct targets. Research by Brainerd and colleagues (2002) demonstrated that how information was presented to an individual had an effect on the respondent's direct access to and retrieval of the

stored information. In other words, the manipulation of the surface form of the presented items directed information retrieval toward the targets (rather than toward relations among targets).

In one study theoretically motivated by fuzzy-trace theory, information recall was tested as a function of information processing by using an atypical font manipulation (Brainerd et al., 2002). The atypical visual study task (e.g., presenting an unusual font type) was designed to interfere with direct cognitive access to the stored information by disrupting participants' normal encoding of the surface forms of familiar words (e.g., iron, copper, steel, gold). In other words, the atypical fonts interfered with participants' ordinary methods of encoding. Thus, a surface "distracter" task should disrupt verbatim encoding and when cued for recall, the participant would rely more on gist processing.

Each of these kinds of representations is associated with different cognitive processes. This study tests two cognitive processes, analytical and intuitive, against each other in tasks that involve decision-making. Fuzzy-trace theory provides evidence that gist-based processing is generally protective against risk (Mills et al., 2008). However, there are situations when gist-based, categorical thinking would be expected to *promote* risk taking, such as when medical decisions involve tradeoffs between identity and risk. For example, a woman with stage I breast cancer may have a choice between a lumpectomy (breast conserving surgery) versus mastectomy. Although five-year survival outcomes for either procedure are about equal (when breast conserving surgery is paired with adjuvant chemotherapy), evaluation of the quantitative risks for each procedure suggests that, overall, breast-conserving surgery is more objectively risky than mastectomy because the risk of cancer recurrence is 8-14% versus approximately 4%, respectively (National Cancer Institute, 2009; Veronesi, Cascinelli, Mariani, Greco, Saccozzi, Luini, Aguilar, & Marubini, 2002). However, the qualitative risk of mastectomy is a deep-

seated feeling of loss because of the feeling that one's womanhood is assaulted or mutilated following removal of the breast (Wilmoth, 2001).

Thus, based on the assumptions of fuzzy-trace theory, respondents who are induced to use verbatim or analytical processing should pick the decision option with lower quantitative risk (mastectomy), and respondents that are induced to use gist or intuitive processing cues should pick the decision option that is more in line with the bottom line meaning of his/her individual values (pick lumpectomy if the participant is a woman so as to avoid losing one's breasts). In other words, respondents primed to use gist processes will base their decisions on intuition or gut reactions and emotions in response to the dilemma, and not on quantitative risk evaluations.

*Affect versus cognition: Standard dual process theory*

The second dual process theory I plan to test in this research study is the dual process valuation model (Hsee & Rottenstreich, 2004). It has been shown that valuation-by-calculation and valuation-by-feeling are two processes by which people assess the value of a target. Hsee and Rottenstreich (2004) demonstrated that when participants are primed to think quantitatively, changes in magnitude (scope) have an approximately linear relationship with participant's reported value of the target. In contrast, when participants are primed to valuation-by-feeling, they are sensitive to the presence or absence of a stimulus; in other words, value is moderated categorically (e.g., 0 and 1), and is insensitive to variations in magnitude.

For example, in a recent study, participants were primed to one of the two valuation conditions (calculation or feeling) and then were asked, "How much would you be willing to pay for the bundle of Madonna CDs" (p. 24)? The scope of the bundle was either five or 10 CDs (presented in a between-participants design). Participants primed to valuation-by-calculation were scope-sensitive; that is, they were willing to pay more on average for more CDs, whereas

participants primed to valuation-by-feeling demonstrated no difference in amount they were willing to pay for 10 CDs versus five.

Building on Hsee and Rottenstreich's (2004) dual process valuation model (DPVM), for this study, DPVM would predict that participants primed to valuation-by-calculation would be more scope-sensitive to the survival estimates in the decision problems, and thus, should choose the option that offers *higher* objective survival (i.e., *lower* objective risk). However, participants primed to valuation-by-feeling should be scope-insensitive and should choose the option that best fits their feelings about the decision. For example, when primed to valuation-by-feeling, participants (especially men) deciding between hormone therapy and prostatectomy (for prostate cancer treatment) should choose prostatectomy because despite the high risk involved with surgery (e.g., high rates of year-long incontinence; complications from anesthesia) the hormone-therapy-induced gynecomastia (male breast development) is a threat to manhood and should result in more *aversive* feelings toward hormone therapy.

### **Risk perception and medical decision making**

Every surgery involves some degree of risk. The most recent report of national health statistics demonstrated that over 46 million inpatient surgical procedures are documented annually (DeFrances, Lucas, Buie, & Golosinskiy, 2006). Of these procedures, over 200,000 are breast cancer diagnoses in women, and an additional 200,000 are prostate cancer diagnoses in men. Medical decisions that involve some degree of risk are quite prevalent. Moreover, people do not always have a clear understanding of risks, such as the risks of cancer, risk of contracting sexually transmitted infections, or condom effectiveness in reducing rates of infections (Peters, McCaul, Stefanek, & Nelson, 2006; Reyna & Adam, 2003). Also, people do not always have a clear understanding of the likelihood of various outcomes of medical screening tests and

treatments (Peters, et al., 2006; Reyna, Lloyd, & Whalen, 2001; Reyna, Nelson, Han, & Dieckmann, 2009). For example, with genetic testing, people tend to overestimate their risk of cancer and underestimate the risks associated with genetic testing itself, such as the stigma associated with testing positive for a cancer susceptibility gene (Reyna, et al., 2001). In extreme cases, exaggerated risk judgments may lead to anxiety that decreases self-reported quality of life and may contribute to an increase in self-protective behaviors or unnecessary (and aggressive) medical treatments (e.g., prophylactic mastectomy in the absence of a family history or genetic vulnerability to breast cancer) (Erblich, Bovbjerg, & Valdimarsdottir, 2000).

Patients often confront the decision whether to have surgery by weighing the risks against the probabilistic benefits (Lloyd, Hayes, Bell, & Naylor, 2001; Reyna & Hamilton, 2001). Indeed, most interventions that are designed to improve higher order reasoning skills assume the computer metaphor of mind and accordingly emphasize precise, quantitative thinking and reasoning (Reyna & Brainerd, 1994). However, recent research suggests that people are likely to remember the imprecise gist representations of information they have stored, such as recalling “high risk of dying of heart attack” to make medical decisions rather than the verbatim diagnosis of “20% probability of acute cardiac ischemia” (Lloyd & Reyna, 2001; Reyna & Brainerd, 1994; Reyna, Lloyd, & Brainerd, 2003). In other words, people simplify information as much as possible in order both to understand risk and to make decisions based on the balanced risks and benefits. For example, Lloyd and colleagues (2001) surveyed patients who were undergoing a medical intervention for blocked arteries (carotid endarterectomy, CEA) to prevent a stroke, but which carried a smaller risk for inducing a stroke. In this study, patients were faced with a real risk dilemma whereby they had to consent to a somewhat risky procedure in order to avoid the risk of a more life-threatening event that had not yet occurred.

Specifically, 73 patients who were on the waiting list for surgery were surveyed after seeing their vascular surgeon in order to determine their understanding of the risks of stroke as a result of surgery and their risks if they had decided not to go ahead with the operation. After participants were briefed on the procedure and given information regarding their real risk estimates, participants were surveyed for their recall. Results demonstrated that patients' recall of the verbatim risk information was very poor, and only one patient could recall all of the risks that he had been told. However, although patients' stroke risk estimates were variable (range 22–100%, mean 57%, actual risk 22% for not having the procedure) and inaccurate (range 0–65%, mean 10%, actual risk quoted 2%), most patients understood the order of risks (the gist of which option had the most risk). Thus, data suggest that real patients used fuzzy-processing (gist representations) of the available information for risk perceptions of surgery (Reyna, 2008; Reyna & Adam, 2003; Reyna & Hamilton, 2001).

Mental representations alone, whether gist or verbatim, do not determine choice outcomes. Applications of fuzzy-trace theory suggest that after information is presented, people also retrieve their past experiences, values, principles, and knowledge and apply them to the representation before making a decision (Reyna, 2008). For example, the woman who thinks that her 22.2% lifetime breast cancer risk is high because it is higher than average, has retrieved knowledge about what is the “average risk.” Second, if this woman thinks her risk is high because her sister and her mother also had breast cancer, she has retrieved information about her past experiences and may decide to pursue aggressive treatment because she has retrieved the value “better to avoid risk.” Third, if this woman has retrieved a personal value about her breasts being a fundamental part of her identity as woman, despite the knowledge that she has higher than average risk, she may prioritize keeping her breasts over the higher than average chance of a



cancer diagnosis. In this third scenario where the woman has retrieved the value “better to keep my breasts while I can,” she demonstrates how one can have competing values and prioritized values stored in long-term memory.

Fuzzy-trace theory suggests that because these competing, hierarchical values can be differentially cued, it is possible for an individual to make different decisions even when presented with the same scenario. For instance, Reyna and Adam (2003) argued that when prostate cancer patients generated a gist of “chemotherapy is poison ” and then retrieved the value “poison is bad,” patients were motivated to seek alternatives to chemotherapy; but when prostate cancer patients generated a gist of surgery as a way to “remove something bad” from the body, more patients choose surgery (e.g., prostatectomy) over a non-surgical alternative (Reyna, 2008), even when the long term treatment outcome probabilities are equal.

This study directly tests whether cuing different protected values (such as “save the self” or “avoid risk”) results in differential decisions across the same decision problems. If fuzzy-trace theory is correct, then to cue different values should produce different decisions across the same problems. For example, when presented with a prostate cancer medical dilemma about whether to choose a surgical option to remove the prostate and the associated cancer (i.e., prostatectomy) or to have a hormone therapy alternative, the participant must weigh the general risks associated with the surgical option, or the body image risks associated with hormone therapy (e.g., male breast development, erectile dysfunction). If the participant is male, then he may be cued to retrieve identity-based values (e.g., avoid breast development), and choose prostatectomy over hormone therapy. However, if the male is not cued to retrieve identity-based values, he may select hormone therapy over surgery to avoid invasive medical procedures.

*Medical decision making in transgender populations*

The decision to pursue gender reassignment through surgery is life-altering and for the most part, permanent. As with any surgical procedure, gender reassignment surgery (GRS) involves great risk and uncertainty. However, some surgeries involve more risk and uncertainty than others. *Vaginoplasty*, for example, is a procedure whereby the male-to-female (MTF) transsexual patient's original phallus is inverted and reconstructed as a neo-vagina. One prospective follow-up study of n=66 male-to-female transsexuals undergoing vaginoplasty reported a range of complications (14% major; 36% minor), but the vast majority were overall satisfied with appearance (94%) and function to orgasm (87%), and none expressed regret (Krege, Lummen, & Rubben, 2001).

*Phalloplasty*, in contrast, is a procedure for female-to-male (FTM) transsexuals that uses skin grafts from the forearm, leg, or abdominal areas to create a non-erectile, non-sensate phallus. This procedure involves a greater complication risk and has reportedly dissatisfactory sexual function and appearance according to the physicians who conduct the procedures (Bettocchi, Ralph, & Pryor, 2005). For example, nearly three-quarters of the sample experienced complications, many of whom experienced multiple major complications that required follow-up surgeries and, at the conclusion of the study, nearly one third reported ongoing medical problems. Some patients reported good sexual function (21%) without a prosthesis, but an equal proportion required prosthesis for penetrative sex.

In sum, research regarding GRS has been primarily focused on physical outcome (i.e. function and appearance), psychosocial adjustment (e.g., minimizing body dysphoria and gender dissonance related depression), and personal satisfaction with the surgical results (Mate-Kole, Freschi, & Robin, 1990). Moreover, the primary aim for GRS outcome research has been to identify sources of post-surgical regrets to better finely tune the criteria for surgical approval

(Kuiper & Cohen-kettenis, 1998). It is remarkable that despite great surgical risk, high complication rates, and the degree of functional uncertainty for several gender transition procedures, as among those mentioned here, transgender individuals continue to seek these risky procedures.

In a systematic review of various gender reassignment surgeries, Sutcliffe and colleagues (2009) found that a limited number of studies reported whether their samples met the current recommended standards of care (Meyer, Bockting, Cohen-Kettenis, Coleman, DiCeglie, Devor, et al., 2001) for surgical approval. The reported research limitations also included a dearth of prospective follow up, limited controls for direction outcome comparison, using non-standardized and non-validated outcome measures, and high attrition rates. Moreover, with one exception (Rachlin, 1999), research has paid little attention to the factors that influence surgical decision making in trans populations; and, as of this review, no peer-reviewed, published study has explored how trans people cognitively process the decision to transition.

Thus, one of the overarching goals of my empirical program of research is to provide greater predictive insight for clinicians working with transgender clients who are contemplating a medical transition. An additional goal is to provide more information for clinicians working with non-transgender clients who currently struggle with life course decisions (especially decisions involving an important trade-off) that may have a fundamental consequence for the self. In applied settings, my research program also more generally serves to aid individuals who are contemplating risky surgical decisions.

It is important to note that although overall reported regret following gender reassignment surgeries is low, few studies document the perceived risks and benefits following informed consent procedures in any population. Of the studies available, evidence suggests that patients

(in general) do not fully understand the quantitative risks involved with surgery, yet are able to make an intuitive decision for what just “feels right” (Pardo, 2009). Thus, further research is warranted regarding the mechanisms for how cognitive processes and protected values interact to motivate judgments and decision-making, particularly in contexts that involve great health implications such as sex reassignment surgeries or cancer surgeries (prophylactic or as post-hoc treatment). Using empirically motivated hypothesis-driven research, my dissertation research directly addresses these current gaps in the literature and is readily applicable in clinical contexts

In light of such limited information, specific questions are addressed in the current study: Is identity the motivating factor driving a transgender person’s decision to pursue surgical gender reassignment? Are transgender people trading-off lower risk options (e.g., non-surgical transition) in order to maintain or obtain identity integrity (e.g., self-actualization in one’s identified gender)? In other words, is one’s gender identity so important (e.g., a core value) that people are willing to trade-off lower risk in order to maintain identity integrity?

### **The present study**

The purpose of the proposed study is to examine how people process conflicts between identity and risk when making medical decisions. Specifically, I examine how people trade-off (or refuse to trade-off) protected values such as gender identity (i.e., an enduring sense of self as a man or a woman or some combination thereof) against important risks, such as those encountered in identity-relevant surgeries (e.g., sex reassignment surgery, prostatectomy, and mastectomy).

This study is also designed to assess how cognitive processing affects medical decision-making. More specifically, this study is designed to evaluate alternative dual process models to demonstrate both the appropriateness and the extent to which each model makes accurate

predictions about human behavior in medical decision scenarios that involve a core value trade-off. Thus, this study tests a crucial factor to determine which of the models has greater predictive validity.

To conduct these critical tests, participants will be randomized into either one of two dual process manipulations (fuzzy-trace theory gist or standard dual process theory's valuation-by-calculation vs. valuation-by-feeling) or into a control condition where the participant does not receive any cognitive priming. Also, participants will be randomized to either receive or not to receive a gender identity prime. Participants will answer several additional measures to control for potential confounding (e.g., history of mastectomy due to cancer), and then will answer at least one surgical decision scenario that pits a higher risk option that preserves identity against a lower risk option that threatens identity.

Some scenarios are used as controls for others. For example, the gynecomastia problem controls for gender identity as a man, whereas the breast cancer problem controls for biological sex orientation as female. Also, because mastectomy is the identity preserving option in the man-oriented scenario whereas mastectomy is the identity threat option in the female-oriented scenario, the choice options control for respondent bias for or against surgery. A third decision problem, the female-to-male gender transition problem, controls both for gender as a man and biological sex as female and for direction of choice and bias for or against surgery. However, the decision options are identical to the gynecomastia scenario. The prostate cancer problem controls for direction of choice; more specifically, rather than seeking an identity-preserving option, the prostate cancer problem presents the respondent with two threatening options -- prostatectomy, which is a surgical procedure and carries a low chance of death, and hormone replacement therapy, which is non-surgical, but carries a greater threat to a man's identity

because it carries a low risk of erectile dysfunction plus a high risk of male breast development. In the prostate cancer scenario, the test is whether the respondent will avoid the option that presents a greater identity threat (hormone replacement therapy) and thus choose prostatectomy.

Studies often assume similarities across the dual process theories, but this study is the first to test for differences in the constructs by evaluating alternative dual process models in the same study. For example, some dual-process theories distinguish affect from deliberation as the dual modes of decision making. As discussed in prior research (Rivers, Reyna, & Mills, 2008), emotion is a part of affect: while one immediately encodes valence of events, one also organizes memory around valence (Eigsti, Zayas, Mischel, Shoda, Ayduk, ... Casey, 2006). As discussed in Rivers et al (2008), there are some gists that are not simply good versus bad; in other words, affect is one type of gist, but not all gists are affective. Thus, there exist examples of noncompensatory decision making that do not involve affect.

In order to distinguish the effects of valence or mood, my delay manipulation in the fuzzy trace condition (gist) affects memory accessibility but does not manipulate affect. In other words, because the manipulation is a delay, emotion is not manipulated. Therefore, respondent affect should remain constant when making a decision in the immediate test condition (verbatim) as in the delay condition (gist). Delay itself is not a core affect manipulation. Therefore, affect would not explain any results consistent with my predictions for fuzzy-trace theory. Fuzzy-trace theory does not require affect (whereas the valuation dual-process manipulations do). If you do not manipulate affect, then the effects cannot be *due to affect*.

In contrast to fuzzy-trace theory, the dual-process valuation model assumes that emotion is required to obtain effects of scope neglect (not trading off the amount of risk in order to

preserve the self). I argue in the present study (and specifically test) that it is not the emotional charge that is required to get the scope neglect; it may be the gist itself.

In sum, despite considerable literature on protected values, risk perceptions, medical decision making and dual processes theories, previous studies have not yet tested the mechanistic relationships among protected values, dual processes, and surgical decision making in the same study. Therefore, the current study provides four unique contributions to the current literature. First, this study is the first to test the central concept that identity is a protected value. Second, this study tests dual process implications for surgical decision-making. Third, this study tests how identity is taken into account in decisions regarding risky surgical procedures, especially when there is a trade-off between identity and surgical risk. Fourth, because studies often assume similarities across the dual process theories (Smith & DeCoster, 2000), this study is the first to test for differences in the constructs by evaluating alternative dual process models in the same study.

## RESEARCH HYPOTHESES

The overarching goal of this research is to test gender identity as a protected value. A second goal of this research is to test whether dual process models effect noncompensatory decision processing in medical dilemmas that involve a trade-off between a more risky gender-preserving option and a less risky option that threatens gender identity. Thus, this study addresses two primary research questions, which are outlined below. In some cases, specific predictions are presented; however, in other cases where there is little prior research on which to base specific predictions, hypotheses are presented based on the most related literature available.

### 1. Is identity a protected value?

Hypothesis 1a. If identity is a protected value, then I anticipate that the data will reveal a main effect of identity prime, whereby the tradeoffs between identity and risk will be less likely to occur when gender identity is primed than when it is not primed. In other words, respondents in the identity prime condition will select the identity preserving choice options for the protagonist in the medical dilemma, regardless of what their own gender identity is. The identity preserving options are:

- Mastectomy > Chest Binding in the male Gynecomastia problem.
- Mastectomy > Chest Binding in the Gender Transition problem in order to have a more male appearing chest.
- Lumpectomy > Mastectomy in the Breast Cancer problem in order to preserve the integrity of the breast over losing the breast to a mastectomy.

Hypothesis 1b. If identity is a protected value, then respondents in the identity prime condition will more often choose the identity preserving option, compared to the identity threatening treatment option, regardless of what their own gender identity is.



- Prostatectomy > Hormone Replacement Therapy in the Prostate Cancer problem.

Hypothesis 1c. If identity, specifically, is a protected value, then I anticipate that the results will reveal an interaction effect of problem by participant gender, whereby the tradeoffs between gender identity preservation and risk will be less likely to occur and respondents will select the identity preserving choice options for the protagonist in the medical dilemma more often than the alternative across problems when there is a participant–protagonist gender match than when there is a participant-protagonist gender mismatch.

- Respondents who identify as men will choose Mastectomy > Chest Binding in the Gynecomastia problem more than respondents who do not identify as men.
- Respondents who identify as transgender will choose Mastectomy > Chest Binding in the Gender Transition problem more than respondents who do not identify as transgender.
- Respondents who identify as women will choose Lumpectomy > Mastectomy in the Breast Cancer problem more than respondents who do not identify as women.

Hypothesis 1d. Respondents in the identity prime condition will more often avoid the more threatening treatment option than the alternative choice for the protagonist in the medical dilemma when there is a gender identity-protagonist gender match than when there is a mismatch.

- Respondents who identify as men will choose Prostatectomy > Hormone Replacement Therapy in the Prostate Cancer problem more than respondents who do not identify as men.

2. Do dual processes predict noncompensatory decision processing in medical dilemmas that involve a trade-off between a risky gender-preserving option and a less risky option that threatens gender identity?

Hypothesis 2a. Given that standard dual process theory predicts that when using system 2 (the rational system), individuals would calculate the outcome with the best expected value (i.e., utility), it follows then that respondents in the valuation-by-calculation condition (a system 2 correlate) should choose the choice option with less risk that still has a reward.

- Mastectomy < Chest Binding in the Gynecomastia problem because there is no surgical risk in chest binding, and the compression will still hide the breast.
- Mastectomy < Chest Binding in the Gender Transition problem because there is no surgical risk in chest binding, and the compression will still hide the breast.
- Lumpectomy < Mastectomy in the Breast Cancer problem because there is more surgical risk with the mastectomy for a similar recurrence outcome.
- Prostatectomy < Hormone Replacement Therapy in the Prostate Cancer problem because there is no surgical risk with hormone replacement therapy, and the chance of breast development may be considered low.

Hypothesis 2b. Given that 1) standard dual process theory predicts that when using system 1 (the intuitive system), individuals think quickly, automatically, effortlessly, and with emotion; 2) when using system 1, people tend to apply the most accessible rules for making decisions, and as such, individual decisions are often governed by habit; and 3) affect tends to be more accessible, it follows then that if identity is a habit-based, readily accessible, and emotionally charged construct, then when primed to evaluate-by-feeling (a system 1 correlate), respondents will select the decision option consistent with their identities.

- Mastectomy > Chest Binding in the Gynecomastia problem more if the respondent identifies as a man.
- Mastectomy > Chest Binding in the Gender Transition problem more if the respondent identifies as a man or as transgender.
- Lumpectomy > Mastectomy in the Breast Cancer problem more if the respondent identifies as a woman.
- Prostatectomy > Hormone Replacement Therapy in the Prostate Cancer problem more if the respondent identifies as a man.

Hypothesis 2c. Given that fuzzy-trace theory predicts that when using gist processing, individuals think automatically, effortlessly, based on experience and expertise, and consistent with their personal values. It follows that, if identity is both an experience-based and value-based construct, then when primed to use gist representations for the decision problems, respondents will select the choice consistent with their identities.

- Mastectomy > Chest Binding in the Gynecomastia problem.
- Mastectomy > Chest Binding in the Gender Transition problem.

- Lumpectomy > Mastectomy in the Breast Cancer problem.

Hypothesis 2d. It also follows that when primed to use gist representations for the decision problems, respondents will select the choice that best avoids the greatest threat to their identity.

- Prostatectomy > Hormone Replacement Therapy in the Prostate Cancer problem.

Hypothesis 2e. Given that fuzzy-trace theory predicts that gist processing is the default process and the control condition does not provide respondents with a cognitive manipulation, if gist is a default process, then in accordance with Hypothesis 2c above, individuals in the control condition will select the choice consistent with their values, experiences, and expertise. In other words, respondents should choose the identity preserving choice options more often than the alternative when there is a participant gender –protagonist gender match.

- Respondents who identify as men will choose Mastectomy > Chest Binding in the Gynecomastia problem more than respondents who do not identify as men.
- Respondents who identify as transgender will choose Mastectomy > Chest Binding in the Gender Transition problem more than respondents who do not identify as transgender.
- Respondents who identify as women will choose Lumpectomy > Mastectomy in the Breast Cancer problem more than respondents who do not identify as women.

Hypothesis 2f. Also, if gist is a default process, then in accordance with Hypothesis 2c and 2e above, individuals in the control condition will select the choice that is consistent with their values, experiences, emotions, and expertise. In other words, respondents will avoid the more threatening treatment option more often than the alternative for the protagonist in the medical dilemma when there is a respondent gender - protagonist gender match.

- Respondents who identify as men will choose Prostatectomy > Hormone Replacement Therapy in the Prostate Cancer problem more than respondents who do not identify as men.

## METHOD

### Participants

Gender congruent males (N=187), gender congruent females (N=471), and transgender-spectrum participants (N=229) participated in an online study of how people process conflicts between identity and risk. Qualtrics survey software was used to host the survey and initially collect the anonymous data prior to download to a secure Cornell University research server maintained by the principal researcher and faculty advisor. According to Qualtrics, N=935 people clicked on the survey, of which N=887 provided demographic information, for a response rate of 95%. Participants were randomized into a control condition (N=167), a fuzzy-trace theory gist only condition (N=147), an identity prime only condition (N=166), a gist prime plus identity prime condition (N=166), or to one of four standard dual process theory conditions (low affect, low magnitude N=72; low affect, high magnitude N=72; high affect, low magnitude N = 71; or high affect, high magnitude N= 73). Recruitment took place in public places (e.g., campus libraries, Ho Plaza) and online via identity-based list serves (e.g., FTM International, APA's Division 44 member list) as well as via online student research venues such as Susan within Cornell University's Psychology Department. Where applicable, Cornell University students received one extra credit point for their participation in this study. It is important to note that given the targeted sampling among transmen and University students, this study has more transmen than transwomen and more University-aged respondents than other age groups. These demographic biases are discussed further in the discussion of the study's sample below, and both age and education will be controlled for in some analyses.

*Transgender* is a broad category typically used to denote any individual whose gender-related identification or external gender presentation conflicts in some way with his or her birth

sex, and who therefore violates conventional standards of unequivocal "male" or "female" sex-gender congruent identity and behavior. For the purpose of this study, *transgender-spectrum participants* included anyone whose gender identity is discordant with one's birth sex. To determine gender congruent and gender discordant (transgender-spectrum participants), participant birth sex and current gender identity were recorded. The Hoffman Gender Scale (Hoffman, 2000) was used to operationalize gender congruent and gender discordant respondents.

Both developmental and social psychological research suggests that identity is a core component of an individual's understanding of him or her self. Wang (2001), among others (Bem, 1982), demonstrated that people cognitively organize their memories in ways that give meaning to a "self." This study tests the notion that identity is central to everyone. Moreover, by presenting actual decision scenarios, this study is designed for *any* participant, regardless of medical history, current medical condition, or gender identity, in order to maximize external validity (i.e., generalizability beyond this research sample). However, transgender participants were necessary to specifically test for behavioral and conceptual differences in identity as a protected value in determining the role of identity in medical decision paradigms that involve an identity trade-off because, as a population, transgender persons struggle daily with identity conflict whereas gender-congruent controls often take their gender identity stability for granted.

### **Gender Identity**

The Hoffman Gender Scale consists of two versions a female and a male version, and each is composed of 14 items pertaining to gender self-concept and gender self-acceptance. Response options are rated on a seven-point Likert scale ranging from *Strongly Disagree* (1) to *Strongly Agree* (7). An individual total scale score is calculated by taking the average across the

14 items. Subscale means may also be calculated. Higher scores indicate sex-gender congruence and lower scores indicate sex-gender discordance. Previous research validated a single factor structure Cronbach's alpha = .97. The 14 items are listed in Appendix A for both the female and male versions of the scale.

### **Dual process manipulations**

Two types of dual process manipulations were used in this study: Fuzzy-trace theory (Reyna & Brainerd, 1995; Reyna, 2004) and standard dual process (SDP; Hsee & Rottenstreich, 2004). Each dual-process manipulation was piloted for efficacy.

#### *Fuzzy-trace theory*

Research suggests that verbatim representations are accessible immediately after original information is presented, but become less accessible over a delay; memory responses shift to gist after a delay (Reyna & Kiernan, 1994). That is, forgetting rates are higher over time for verbatim than for gist representations. Also, verbatim representations of information are susceptible to interference from cognitive outputs (Titcomb & Reyna, 1995).

In the gist condition, participants first read the decision problem, then reviewed the choice options. In order to enhance the bottom line meaning of the information in the decision problem and to induce gist processing upon retrieval, participants were asked on the next survey page, "For you, what is the gist (i.e., the bottom line meaning) of this choice? Finally, participants were asked to make the best choice from the options provided based on what they remembered of the preamble. Thus, in this gist condition, the delay between reading the decision problem and responding to the choice options, interferes with accessing the verbatim details and promotes retrieval of the bottom line meaning of the information (i.e., the gist), which is then used to make a decision. If participants encode the surface trace details of the presented



information, and those memories are accessible, then participants in the control condition should pick the choice option with lower objective risk (e.g., *mastectomy* has lower cancer recurrence rates than *lumpectomy*). However, participants in the gist condition are susceptible to memory interference due to the delay, and thus, are expected to make a choice based more on gist memory representations.

#### *Standard dual process theory*

Participants randomized to the standard dual process condition were asked to “Imagine that a team of Chicago zoology students had discovered a number of pandas in a remote Asian region. The team intended to save these endangered animals and was soliciting donations for the rescue effort.” Respondents were randomly assigned to one of four conditions of a 2 (scope) x 2 (presentation) between-participants design. The scope variable concerned the number of pandas. Participants were told that a zoology team had found either one or four pandas. Presentation was either affect-poor or affect-rich. Participants were shown a table indicating the number of pandas found. In the affect-poor conditions, the table depicted each panda by either one or four large dots. In the affect-rich conditions, the table depicted each panda with either one or four pictures of the panda. The donation amounts ranged from \$10 to \$40 in \$10 increments and were aligned with the choice options so that \$10 lined up with 1 panda and \$40 lined up with 4 pandas to suggest each panda is worth a \$10 incremental donation schedule.

A manipulation check was conducted after data collection was completed, using a new group of participants (N=77) who were recruited in a similar place and manner. Participants in the manipulation check were asked, “How much emotion is evoked when you look at the dot(s) (picture[s])?” Responses were collected on a 10-point likert scale ranging from 1 (a little) to 10 (a lot). Participants were also asked, “How strong of an emotional appeal is the team’s request

for donations?” Responses were collected on a 10-point likert scale ranging from 1 (very weak) to 10 (very strong). The dependent measure was “What is the most you would be willing to donate?” and participants circled either \$10, \$20, \$30, \$40.

### **Identity prime**

Following the procedures of Shih, Pittinsky, and Ambady (1999) and McGlone and Aronson (2006), participants in the gender identity prime condition will be asked to indicate their sex, gender, and answer six additional questions related to their gender identity at the beginning of the questionnaire and *before* receiving the decision problems. Participants randomized to the no identity prime condition will answer the same questions in the demographic section at the end of the questionnaire. The questionnaires were originally constructed to make salient the identity of interest (gender) implicitly so as to avoid priming of any gender-related performance stereotypes (Shih et al, 1999). The questions are as follows:

1. What is your birthsex? (male, female, intersex)
2. What is your gender? (Man, Woman, Transgender, Transman/FTM, Transwoman/MTF, other \_\_\_\_\_)
3. Where do you live? (University on-campus, University off-campus, Non-University residential)
4. Do you have a roommate? (yes, no)
5. What is your living situation? (coed, single sex)
6. What is your preferred living situation? (coed, single sex)
7. Please list three reasons why you would prefer a coed living situation.
8. Please list three reasons why you would prefer a single-sex living situation.

### **Choice**

To assess the effects of dual processing and identity on surgical decision making, participants will be asked to choose one treatment option in a binary forced-choice format. Specifically, participants will be asked, “Assuming that whatever option you choose will be provided free of charge, from the above available options, which would you choose (*pick as if you had to choose one of the above in real life*)? One of the choice options preserves an important component of one’s gendered identity (e.g., the breast, erectile function, etc), but at a higher objective risk, and the other choice option presents a lower objective risk but threatens the integrity of the important component of one’s gender identity. Preference for the identity preservation despite the higher objective risk would indicate that gender identity is a protected value.

There are a total of four decision problems, one for each of breast cancer, gynecomastia, and female-to-male gender reassignment, and a prostate cancer decision problem (see Appendix B for the full preamble descriptions and answer choices).

### **Signed Confidence**

Signed confidence was recorded on a zero to 100 probability scale. Participants were asked after each choice, “On a scale from 0 to 100%, how confident are you with your choice?” The identity preserving option was coded as +1 times the raw score reported, and the identity threatening option was coded as -1 times the raw score reported.

### **Values**

At the conclusion of the survey, participants were again presented with the vignette preambles in random order, and after each vignette, participants were asked to “please indicate on a 1-10 scale how important the following values are to YOU.” One was rated as “least

important” and 10 was rated as “most important.” The same fourteen values were presented after each vignette. Table 7 lists each of the 14 values.

## **Procedure**

All participants were randomly assigned to an experimental condition using the Qualtrics survey block design. The online survey was organized into three sections. Section I included the dual process manipulation and gender identity prime (if the participant is randomized into the identity prime condition). Section II will included the decision problems. Section III included a series of follow up questions designed to control for potential confounding factors such as memory, risk perception, and basic demographic information.

After answering each decision problem, participants were asked on a 0% to 100% probability scale: *How sure are you about your choice?* In the event that a participant is randomized into the intuitive condition/identity prime condition where the option begs a preference reversal, the choice should be conceptually difficult and this difficulty will be reflected in this item. At the end of the demographic section, the decision problems were presented again, and a list of approximately 14 problem related values were listed in random order and respondents were asked to rate on a 10-point Likert scale from 1-not at all important to 10-extremely important, how important each of these values were to them (e.g., flat appearing chest, if male; erectile function; body-identity congruence).

## RESULTS

### Sample

In this study, N=934 participants consented to participate in the survey. Demographic data was not available for N=325 (35%) of the sample due to a technology failure of the survey. As a whole, the sample had a mean age =  $22.3 \pm 7.5$  [range: 18-72]. Participants were non-transgender males (20%), non-transgender females (73%), and 1% knew that they were intersex at birth. About one quarter of the sample identified as transgender, and among the transgender respondents, nearly all (94%) had been born female, but currently identified as men or as boys. This oversampling of transmen (and undersampling of transwomen) is due in large part to community access. It is very difficult to survey transwomen if the investigator is not a transwoman, or if the investigator does not otherwise have strong community connections. Thus, in the analyses that follow, the transgender group is a transman gender group. This grouping is validated using the Hoffman Gender Scale.

Male respondent's total Hoffman Gender Scale score was high for the male/masculine scale (4.9) and low for the female/feminine scale (1.4). In contrast, female's total Hoffman Gender Scale score was low for the male/masculine total scale (1.4) and high for the female/feminine total scale (5.0). Tukey HSD tests revealed that male and female total scores were significantly different at the  $p < .001$  level for each of the male/masculine and female/feminine scales including the Hoffman total scores, Hoffman self-definition subscales, and Hoffman self-acceptance subscales. Transgender respondents scored a mean of 4.4 on the male/masculine total scale and a mean of 1.8 on the total female/feminine scale. Similar trends were found for the gender self-definition and self-acceptance subscales (Table 1). Although the mean scores appear very similar for males and transgender respondents, Tukey HSD tests

revealed that transgender respondent scores were significantly different at the  $p < .001$  from both males and females for each of the male/masculine and female/feminine scales with one exception; there was no difference in transgender and male respondent scores on the Hoffman total female/feminine score. Thus, these data suggest that the transgender group is a distinct gender group for the purpose of analysis. Also, because Hoffman gender scale scores trend towards the male/masculine self-identification and self-acceptance range, for the remainder of the description of results, the transgender respondents as a group will be referred to as *transmen*.

Among the N=612 participants for whom ethnicity data is available, most (N=441, 72%) were White, N=73 (12%) were Asian, N=45 (7%) were Mixed, N=26 (4%) were Black, and N=26 (4%) were Hispanic or Latino. Of the N=882 participants for whom highest education level is available, N=626 (71%) completed a high school diploma, N=143 (16%) completed a Bachelor's degree, N=77 (9%) completed a Master's degree, and N=30 (3%) completed a doctorate or professional degree. It is important to note that these trends may not reflect population demographics due to oversampling at the University level. In addition, as reflected in the demographics table (Table 1), the transmen are older and more educated on average than the non-transgender men and women in this sample. Thus, I control for education level and age as covariates in the analyses of variance models where appropriate.

Among the N=612 participants for whom sexual identity data is available, most (N=508, 83%) identified as heterosexual. To assess sexual attractions, participants were instructed to "Please fill in the blank with a number between 0 and 100% representing how often it applies to you within the past month. Your totals should add up to 100%." Then with three separate statements, participants were asked to complete the statement, "My attractions towards [MEN/WOMEN/TRANSGENDER or GENDER QUEER people] is approximately \_\_\_%."

Among the N=775 participants (83% of the total sample) who provided sexual attraction ratings, participants overall reported relatively high mean attractions towards men (63%), followed by attractions towards women (31%), and some reported attractions towards transgender and/or gender queer persons (4%). About one-third of the sample (31%) reported exclusive attractions towards men (i.e., reported 100% attractions towards men rated on a continuous scale from 0 to 100%). Approximately 15% reported exclusive attractions towards women, and zero participants reported exclusive attractions towards transgender or gender queer persons. Interestingly, although a majority of the sample identified as heterosexual, and only N=27 participants reported labeling their sexual orientation as bisexual or pansexual, 43% of this study's participants reported having non-exclusive attractions towards men (reported a frequency between and not including zero and 100%); 43% reported non-exclusive attractions towards women, and 19% reported non-exclusive attractions towards transgender persons. The summary of sexual attractions by gender group are summarized in Table 1.

To assess sexual behaviors, participants were instructed to "Please fill in the blank with a number between 0 and 100% representing how often it applies to you within the past month. Your totals should add up to 100%." Then with three separate statements, participants were asked to complete the statement, "I engage in sexual behaviors with [MEN/WOMEN/TRANSGENDER or GENDER QUEER people] is approximately \_\_\_%." Among the N=775 participants who provided sexual behavior ratings, participants overall, reported engaging in most sexual behaviors with men (52%), followed by women (26%), and transgender and/or gender queer persons (3%). Nearly half of the sample (N=360, 47%) reported engaging in exclusive sexual behaviors with men. About one quarter (N=182, 23%) reported engaging in exclusive sexual behaviors with women, and N= 15 (2%) reported exclusive sexual

behavior with transgender and gender queer persons. About 10% (N=78) of the participants who provided data for this question reported engaging in non-exclusive sexual behaviors with men. About three-quarters (N=593, 77%) reported engaging in non-exclusive sexual behaviors with women, and about 3% (N=27) reported engaging in non-exclusive sexual behaviors with transgender or gender queer persons. Table 1 summarizes the demographic information for this sample.

### **Standard dual process manipulation check**

Manipulation check data (N=77) confirmed that the pictures of the pandas evoked significantly greater mean affective reactions than the dots (mean picture rating = 6.5; mean dot rating = 2.9),  $t(75) = 8.40$ ,  $p < .001$ . Data also confirmed that the mean emotional appeal was significantly greater for the panda pictures than the dots (mean picture appeal = 5.7; mean dot appeal = 3.0),  $t(75) = 5.68$ ,  $p < .001$ .

In the larger sample, the dots yielded a pattern of scope-sensitivity; mean donations were significantly greater for four dots versus one dot ( $M(\text{four dots}) = \$24.80$ ,  $SD = \$12.10$  and  $M(\text{one dot}) = \$19.70$ ,  $SD = \$11.20$ ),  $t(140) = -2.60$ ,  $p = .01$ . In contrast, the panda pictures yielded scope-insensitivity. Mean donations were the same across the two scope levels ( $M(\text{four pandas}) = \$20.60$ ,  $SD = \$12.10$  and  $M(\text{one panda}) = \$20.40$ ,  $SD = \$10.60$ ),  $t(139) = -.07$ , ns. However, the scope x presentation interaction missed significance,  $F(1, 279) = 3.26$ ,  $p = .07$ ,  $MSE = 430$ ,  $\eta^2 = 0.01$ . Although this interaction missed significance, data trended in the expected direction. In the low magnitude condition, when shown only one panda, participants donated slightly (but not significantly) more than in the dot condition, ns. In contrast, in the high magnitude condition when shown four pandas, participants donated less than in the than in the



dot condition. In other words, participants were more sensitive to variations in scope when presented with distinctions among dots, but responded to pandas categorically.

### **Gist manipulation check**

To examine the effect of cognitive manipulation on choice, participants in the gist conditions (N=313) answered the question, “For you, what does this choice boil down to? In other words, for YOU, what is the gist of this decision?” in an open-ended question. A random sample of 50 participant responses were coded for each of the decision vignettes. In the gynecomastia vignette, 67% of respondents (N=28/42) reported that the gist of the decision boiled down to a choice between *identity* versus *risk*. Some example responses for this gist in the gynecomastia problem include, “breast vs. risk,” “How important is it for me to care about future disease than to cut off my body parts,” and “remove the breasts and have all the dangerous side effects of any surgery or do a non invasive treatment that is annoying to deal with in daily life, but is much safer.” Another gist reported for the gynecomastia vignette included *less vs. more risk* (n=9); for example, “It comes down to the amount of risk in the procedure, which is very low in this case.” One participant reported that the gist was a choice between “breast vs. no breast,” and three respondents reported that the gist came down to *quality of life*, including statements such as simply it boils down to “quality of life,” or that it’s a “Quality of life issue, chest compression decreases quality of life.” Eight people did not provide a gist response.

In the gender transition scenario, 84% of respondents (n=31/37) also reported that the gist of the decision boiled down to a choice between *identity* versus *risk*; some specific response examples include, “binding vs. surgery risk,” “is the risk of surgery worth the cosmetic outcome or is the safer alternative better in a case where there are no physical bodily harm left as is,” “It would boil down to how uncomfortable I felt in my body and the size of the risk factor,” and “I

would rather take the risk than live in a body that does not resemble what it should.” Five respondents reported that the gist of the choice boiled down to *less vs. more risk*, for example, “certain unpleasant side effects in not really solving the problem v. very small chance of side effects for full treatment,” and “The severity of the symptoms are important.” Thirteen people did not provide a response. There is no interrater reliability for these codings as there were no secondary investigators or research assistants for this study.

### **Decision problems**

The four decision problems were coded for the purpose of analysis by problem gender orientation (2: man, not man) and by problem natal sex (2: natal female, not natal female). Problem gender orientation refers to the direction of the identity preserving choice (favoring a gender identity as a man or not favoring a gender identity as a man). For example, the protagonist in the gynecomastia and female-to-male gender transition vignettes are each male identified. Thus, the direction of the identity preserving choice favors the option that preserves the male identity of the protagonist (e.g., mastectomy to remove the breast tissue). In contrast the protagonist in the breast cancer problem is female identified; thus the identity preserving choice for her is breast conserving surgery, or the choice option that is not identity preserving for a man.

Although the protagonist in the prostate cancer scenario is male identified, both of the choice options in this vignette are threatening for the protagonist; in other words there is no clear identity preserving choice regardless of the protagonist's gender identity orientation or natal sex. The choice options are either “hormone therapy” or “prostatectomy.” For this vignette, the study participant must decide which is the lesser threatening option of the two available choices. As stated in the prostate cancer vignette, the side effects of hormone therapy include breast

enlargement and erectile dysfunction. In addition, although the prostatectomy will remove the cancerous tumor for sure, this option is paired with a chance of death.

Thus, across all four decision problems, for the 2(problem gender orientation) x 2(problem natal sex) vignette design for the purpose of analysis, the gynecomastia problem has a clear identity preserving choice that favors a man gender orientation, and the protagonist is not a natal female. In contrast, the breast cancer problem does not have an identity preserving choice that favors a man gender orientation, and the protagonist is a natal female. In the gender transition problem, the protagonist has a clear identity preserving choice that favors a man gender orientation, but the protagonist is also a natal female; and in the prostate cancer problem, there is no clear identity preserving choice for a man gender orientation, and the protagonist is not a natal female.

### **Standard dual process manipulation on choice**

Table 2 presents the ANOVA results for choice. A 2(problem gender orientation: man, not man) x 2(problem natal sex orientation: female, not female) x 2(magnitude: low, high) x 2(dual process condition: calculation, feeling) x 2(gender: man, woman) repeated measures ANOVA revealed a significant main effect of male problem gender orientation ( $p < .001$ ). Overall, participants picked the identity preserving option more in the man gender problems (75%) than in the non-man problem gender orientations (50%). In other words, respondents overall chose the mastectomy option more often in both the gynecomastia and gender transition problems than the identity preserving or less threatening option in the other two problems (breast cancer and prostate cancer, respectively), Figure 1.

The model also revealed significant interactions for problem gender orientation x problem natal sex orientation, problem natal sex x dual process condition, problem gender

orientation x dual process condition x gender, and problem gender orientation x magnitude x gender.

In the problem natal sex orientation x standard dual process condition 2-way interaction, the data revealed a crossover interaction  $F(1, 256) = 5.441, p = .02$  (Figure 2). More specifically, respondents overall chose the identity preserving options for the non-natal female problems (e.g., mastectomy in the gynecomastia problem and prostatectomy in the prostate cancer problem) more often in the calculation dual process condition than in the feeling condition, but chose the identity preserving options in the natal female problems (e.g., mastectomy in the gender transition problem and lumpectomy in the breast cancer problem) more in the feeling condition than in the calculation condition. Post hoc tests confirmed that the difference between dual process conditions for the mean gynecomastia and prostate choices was the only comparison that approached significance for this interaction ( $p=.05$ ).

In the man gender problem orientation x female natal sex problem orientation 2 way interaction the mean difference of identity preserving choices was larger between the gynecomastia (82%) and prostate cancer problems (41%),  $p < .001$ , than between the gender transition (67%) and breast cancer problems (59%), ns, Figure 3. In addition, despite being the same problems except for the reason for surgery, respondents selected the identity preserving option (mastectomy) significantly more in the gynecomastia problem than in the gender transition problem,  $p < .001$ . Also, identity preservation is more effective than avoiding a lesser of two threatening choices. As seen here, respondents selected the identity preserving options more often when there was a clear choice to preserve the self (mastectomy for gynecomastia, mastectomy for gender transition, and lumpectomy for breast cancer, rather than to avoid the

greater of two identity threatening choices (hormone therapy vs. prostatectomy for prostate cancer,  $p < .001$  for each comparison to the prostate cancer problem.

In the man problem gender orientation by dual process condition by participant gender 3-way interaction, there is a gender difference across the male problems (gynecomastia and gender transition) in the calculation condition (women = 82%, men = 66%,  $p = .01$ ) but not in the feeling condition (men = 76%, women = 76%, ns). There is no gender difference in the non-male problem gender orientations (breast cancer and prostate cancer) across conditions (Figure 4). Also, men choose the identity preserving options more in the male gender orientation problems (gynecomastia and gender transition) compared to the non-male gender orientation problems (prostate cancer and breast cancer) in the feeling condition ( $p < .001$ ), but there is no significant difference in men's identity preserving choices across problem gender orientation in the calculation condition. Women, in contrast choose the identity preserving option more in the male gender orientation problems than the non-male gender orientation problems, regardless of which dual process condition they were assigned ( $p < .001$  for each condition).

In the man problem gender orientation by magnitude by participant gender 3-way interaction, there is a gender difference across the male problems (gynecomastia and gender transition) in the low magnitude condition (women = 80%, men = 62%,  $p = .003$ ) but not in the high magnitude condition (men = 80%, women = 78%, ns). There is no gender difference in the non-male problem gender orientations (breast cancer and prostate cancer) across magnitudes (Figure 5). Also, men choose the identity preserving options more in the male gender orientation problems (gynecomastia and gender transition) compared to the non-male gender orientation problems (prostate cancer and breast cancer) in the high magnitude conditions ( $p = .001$ ), but there is no significant difference in men's identity preserving choices across problem gender

orientation in the low magnitude conditions. Women, in contrast choose the identity preserving option more in the male gender orientation problems than the non-male gender orientation problems, regardless of which magnitude condition they were assigned ( $p < .001$  for each magnitude condition).

Although respondents picked the identity preserving option slightly more in the high magnitude (66%) than the low magnitude (60%) dual process condition, the repeated measures ANOVA revealed that this difference is not significant; in other words magnitude missed significance ( $p = .08$ ).

Means also demonstrated the trend that women selected the identity preserving option slightly more (67%) than men (59%) in the natal female oriented problems (breast cancer, gender transition), and males selected the identity preserving options slightly, but not significantly more (63%) than women (61%) in the non-natal female oriented problems (gynecomastia, prostate cancer), but the ANOVA revealed that this two-way interaction for female natal sex problem orientation by gender also missed significance ( $p = .08$ ).

Finally, although the gender by standard dual process condition by magnitude interaction also missed significance ( $p = .07$ ), the mean trends were consistent with standard dual process predictions. For instance, men and women chose the identity preserving option more in the high magnitude (men = 71%, women = 66%) than the low magnitude (men = 52%, women = 64%) conditions when primed with the calculation standard dual process manipulation. In contrast, trends showed equal identity preserving choices across magnitudes for both genders in the feeling conditions.

### **Standard dual process manipulation on signed confidence**

A 2(problem gender orientation: man, not man) x 2(problem natal sex orientation: female, not female) x 2(magnitude: high, low) x 2(standard dual process condition: calculation, feeling) x 2(gender: man, woman) repeated measure ANOVA revealed a significant main effect of male problem gender orientation ( $p < .001$ ) and a significant 2-way interaction of male problem gender orientation by participant gender ( $p = .04$ ) that qualified the main effect. Table 3 summarizes the ANOVA results for the standard dual process manipulation on signed confidence.

Consistent with the choice effects in this experiment, the signed confidence effects revealed that, overall, respondents showed the strongest preference for the identity preserving option in the male gender problem orientations (gynecomastia, gender transition; mean signed confidence = 40.6) than in the non-male problem gender orientations (mean signed confidence = -1.3), Figure 6. Moreover, in the male problem gender orientation by participant gender interaction, women showed a significantly greater preference than men (mean signed confidence women = 47.6, men = 33.5,  $p = .02$ ) for identity preserving choices in the male gender orientation problems.

The signed confidence model also revealed three interactions that missed significance, but displayed means in the predicted directions. A two-way interaction of natal female sex by magnitude missed significance ( $p = .07$ ), but shows that respondents displayed a stronger preference for the identity preserving options in the non-natal female problems (gynecomastia and prostate cancer) in the higher magnitude condition (mean signed confidence = 28.7) than in the low magnitude condition (mean signed confidence = 13.2), but did not show a preference difference for the natal female problems (breast cancer, gender transition) across the magnitude conditions (mean signed confidence high magnitude = 18.3, low magnitude = 18.4).

A three-way interaction of male gender problem orientation by dual process condition by respondent gender ( $p = .07$ ) missed significance, but showed similar predicted patterns to the gender differences observed in significant identity preserving choice preference across the male problems (gynecomastia and gender transition) in the calculation condition (mean signed confidence women = 51.9, men = 29,  $p = .03$ ) but not in the feeling condition (men = 37.9, women = 43.3, ns). Preference ratings between genders were equal across the non-male gender problem orientations (breast cancer and prostate cancer) across conditions. Also, data patterns showed that men choose the identity preserving options more in the male gender orientation problems (gynecomastia and gender transition) compared to the non-male gender orientation problems (prostate cancer and breast cancer) in the feeling condition (mean signed confidence male problems = 37.9, non-male problems = -8.1,  $p < .001$ ), but there were no differences in men's identity preserving choice preferences across problem gender orientation in the calculation condition (mean signed confidence male problems = 29.0, non-male problems = 8.7). Women, in contrast choose the identity preserving option more in the male gender orientation problems overall than the non-male gender orientation problems, regardless of which dual process condition they were assigned (calculation condition: mean signed confidence in the male gender problems = 51.9, non-male problems = -3.5; feeling condition: mean signed confidence male gender problems = 43.3, non-male problems = -2.3).

Another three-way interaction of male gender problem orientation by female natal sex problem orientation by magnitude missed significance. Looking at the descriptive data across magnitude, respondents showed a preference for the identity preserving choice in the gynecomastia, transition, and breast cancer problems, but not in the prostate cancer problem.



The data patterns reveal that the preference for the identity preserving choices were greater in the higher magnitude condition than in the low magnitude condition.

### **Fuzzy-trace theory manipulation on choice**

Table 4 presents the ANOVA results for the fuzzy trace manipulation effects on choice. A 2(problem gender orientation: man, not man) x 2(problem natal sex orientation: female, not female) x 2(gist prime: yes, no) x 2(identity prime: yes, no) x 3(gender: man, woman, transman) repeated measure ANOVA on identity preserving choice revealed a significant main effect of problem gender orientation ( $p < .001$ ). The model also revealed significant interactions for problem gender orientation x gender, problem natal sex orientation x gender, problem natal sex orientation x gist prime, problem natal sex orientation x identity prime, and problem gender orientation x problem natal sex orientation x gender.

Overall, participants picked the identity preserving option more in the male gender problems (81%) than in the non-male gender problems (39%). More specifically, in the gynecomastia problem respondents chose the identity preserving option (mastectomy = 76%) more than the identity threatening option (binding = 17%;  $n=3$  (7%) missing). In the gender transition problem respondents also chose the identity preserving option (mastectomy = 69%) more than the identity threatening option (binding = 22%;  $n=3$  (9%) missing), Figure 7.

In the man gender problem orientation x gender 2-way interaction, the mean difference in identity preserving choices across male problem gender orientation was larger among transman respondents than the difference between either men or women  $F(2, 821) = 46.04, p < .001$ ; (Figure 8). More specifically, the mean proportion difference for choosing the identity preserving option among transmen was 67%, whereas among men the mean difference was 29%, and among women the mean difference was also 29%.

Transmen chose the identity preserving option (mastectomy) in the man gender orientation problems (gynecomastia, gender transition) 93% of the time, and this was significantly more than both men (76%,  $p < .001$ ) and women (73%,  $p < .001$ ). In the non-man gender orientation problems (breast cancer, prostate cancer), transmen chose the identity preserving option (lumpectomy in the breast cancer problem; prostatectomy in the prostate cancer problem) significantly less overall (26%) than both men (47%,  $p < .001$ ) and women (44%,  $p < .001$ ) overall. Post hoc tests revealed no significant differences between men and women in either the male problem gender orientation or the non-male problem gender orientation.

In the female natal sex problem orientation x respondent gender 2-way interaction, the mean difference in identity preserving choices across natal female problem orientation was larger among transmen (16%) than the difference among either men (2%) or women (9%) overall,  $F(2, 821) = 46.04, p < .001$ ; (Figure 9). More specifically, transmen chose the identity preserving options (lumpectomy; mastectomy) in the natal female gender orientation problems (breast cancer; gender transition, respectively) 52% of the time, and this was significantly less than women (63%,  $p < .001$ ), but not significantly different from men (60%, ns). In the non-natal female problems (gynecomastia; prostate cancer), transmen chose the identity preserving option (mastectomy in the gynecomastia problem; prostatectomy in the prostate cancer problem) significantly more overall (68%) than women (54%,  $p < .001$ ), but not significantly different from men (62%, ns) overall. There was a significant difference between men's and women's identity preserving choices in the non-natal female problems ( $p = .02$ ), but there was no significant difference between men and women's identity preserving choices in natal female problem orientations.

In the female natal sex problem orientation x gist prime 2-way interaction, the mean difference in identity preserving choices across natal female problem orientation was larger among respondents when they did not receive the gist manipulation (mean difference = 7%,  $p < .01$ ) than when they did receive the gist manipulation (mean difference = 0%, ns),  $F(1, 821) = 3.81, p = .05$ ; (Figure 10). Moreover, although there was no difference across gist prime (57% no gist prime; 59% yes gist prime) for overall proportion of identity preserving choices in the natal female problem orientations (lumpectomy in the breast cancer problem; mastectomy in the gender transition problem), respondents chose the identity preserving option significantly less when they received a gist prime (59%) than when they did not receive the gist prime (64%),  $p = .02$ .

In the female natal sex problem orientation x identity prime 2-way interaction, the mean difference in identity preserving choices across natal female problem orientation (lumpectomy in the breast cancer problem; mastectomy in the gender transition problem) was significantly larger among respondents when they did receive the identity manipulation (mean difference = 6%,  $p = .01$ ) than when they did not receive the identity manipulation (mean difference = 0%, ns),  $F(1, 821) = 3.72, p = .05$ ; (Figure 11). But, post hoc tests revealed no significant differences between identity prime conditions for proportion of identity preserving choices within either the natal female problem orientations (no identity prime = 59%; yes identity prime = 57%) or the non-natal female problem orientations (no identity prime = 59%; yes identity prime = 63%).

In the man gender problem orientation x female natal sex problem orientation x gender three-way interaction, respondents chose the identity preserving option at varying proportions depending on the decision problem,  $F(2, 821) = 43.78, p < .001$ ; (Figure 12). For example, in the gynecomastia problem (man gender, non-natal female sex orientation), transmen chose the

identity preserving option significantly more (92%) than both men (81%,  $p = .02$ ) and women (76%,  $p < .001$ ); the difference between men and women's identity preserving choices for the gynecomastia problem were not statistically significant.

In the gender transition problem (man gender, natal female sex orientation), transmen chose the identity preserving option significantly more (95%) than both men (71%,  $p < .001$ ) and women (70%,  $p < .001$ ); the difference between men and women's identity preserving choices for the gender transition problem were not statistically significant.

In the prostate cancer problem (non-man gender, non-natal female sex), women respondents chose the identity preserving option significantly less (32%) than both men (43%,  $p = .03$ ) and transgender (44%,  $p = .01$ ) respondents; the difference between men and transmen's identity preserving choices for the prostate cancer problem were not statistically significant.

In the breast cancer problem (non-man gender, natal female sex orientation), transmen chose the identity preserving option significantly less (9%) than both men (50%,  $p < .001$ ) and women (55%,  $p < .001$ ); the difference between men and women's identity preserving choices for the breast cancer problem were not statistically significant.

After controlling for age and education level as covariates in the 2(problem gender orientation: man, not man) x 2(problem natal sex orientation: female, not female) x 2(gist prime: yes, no) x 2(identity prime: yes, no) x 3(gender: man, woman, transgender) repeated measure ANOVA on choice, data revealed similar effects in the predicted directions as in the uncontrolled model. First, data revealed a main effect of male problem orientation, whereby, respondents overall chose identity preservation more in male problem orientations (81%) than in non-male problem orientations (39%).

Second, as before, a two-way interaction of male problem orientation by participant gender emerged with a divergent pattern. HSD tests revealed that *within* each gender group (men, women, transmen) there is a significant difference across problem orientation ( $p < .001$  for each gender group across man vs. non-man problem orientation), whereby identity preservation is selected more often among the man problem orientations than among the non-man problem orientations, but the difference between problem orientations is the smallest among men (mean difference = 29%) and women (mean difference = 30%), followed by a significantly larger difference among transmen (mean difference = 66%). HSD tests showed that transmen, make significantly more identity preserving choices than men (mean difference = 17%,  $p < .001$ ) and women (mean difference = 19%,  $p < .001$ ) in the man problem orientations, and make significantly less identity preserving choices than both men (mean difference = 20%,  $p < .001$ ) and women (mean difference = 17%,  $p < .001$ ) in the non-man problem orientations.

Third, data revealed another two-way interaction of natal female problem orientation and participant gender whereby the mean difference in identity preserving choices across natal female problem orientations was smallest amongst men (mean difference = 1%, ns), followed by women (mean difference = 8%,  $p < .001$ ), and largest amongst transmen (mean difference = 17%,  $p < .001$ ). HSD tests also revealed that transmen selected the identity preserving option significantly less than both men (mean difference = 9%,  $p < .001$ ) and women (mean difference = 11%,  $p < .001$ ) in the natal female problem orientations, but significantly more than women (mean difference = 14%,  $p < .001$ ) in the non-natal female problem orientations. There was no difference in proportion of identity preserving choices between men and transmen in the non-natal female problem orientations, and men also chose the identity preserving option

significantly more than women (mean difference = 7%,  $p = .03$ ) in the non-natal female problem orientations.

The three-way interaction described below qualifies the three effects described above. In sum, respondents overall selected the identity preserving option more in the man problem orientations (gynecomastia and gender transition); however, transmen selected the identity preserving option significantly more than both men (gynecomastia mean difference = 12%,  $p < .001$ ; gender transition mean difference = 22%,  $p < .001$ ) and women (gynecomastia mean difference = 16%,  $p < .001$ ; gender transition mean difference = 23%,  $p < .001$ ). In fact, transmen selected the identity preserving option nearly 100% of the time for each man-oriented problem (gynecomastia = 93%; gender transition = 94%). There was no significant difference between men and women's proportions of identity preserving choices for both the gynecomastia and gender transition problems. The inverse pattern was observed in the breast cancer problem. Transmen selected the identity preserving option only 10% of the time for the breast cancer problem, significantly less than both men (50%,  $p < .001$ ) and women (56%,  $p < .001$ ). HSD tests revealed no difference between men and women's proportions of identity preserving choices for the breast cancer problem. Finally, men and transmen reported similar proportions of identity preserving choices for the prostate cancer problem (44% and 45%, respectively, ns), and women selected the identity preserving choice significantly less than both men (mean difference = 11%,  $p = .04$ ) and transmen (mean difference = 12%,  $p = .01$ ) for the prostate cancer problem.

In sum, although transmen as a group were more educated and older on average than both men and women in this sample, after controlling for age and education level in the model, there was no change in the results. Patterns of identity preserving choices emerged in the predicted directions.

### **Fuzzy-trace theory manipulation on signed confidence**

A 2(problem gender orientation: man, not man) x 2(problem natal sex orientation: female, not female) x 2(gist prime: yes, no) x 2(identity prime: yes, no) x 3(gender: man, woman, transgender) repeated measure ANOVA on signed confidence revealed a significant main effect of male problem gender orientation ( $p < .001$ ) and a significant main effect of female natal sex problem orientation ( $p < .001$ ). The model also revealed significant interactions for problem male gender orientation x gender ( $p < .001$ ), problem natal sex orientation x gender ( $p < .001$ ), problem natal sex orientation x gist prime ( $p = .03$ ), and male gender problem orientation x female natal sex problem orientation x participant gender ( $p < .001$ ). Table 5 presents the ANOVA results for fuzzy-trace theory manipulation on signed confidence. The model also revealed a two-way interaction for problem natal sex orientation x identity prime that missed significance ( $p = .08$ ), and a male gender problem orientation by respondent gender by gist interaction that missed significance ( $p = .06$ ).

Overall, respondents showed a strong significant preference for identity preserving choice in the man gender orientation problems (gynecomastia, gender transition; mean signed confidence = 54.4) than in the non-male gender orientation problems (breast cancer, prostate cancer; mean signed confidence = -20.3), Figure 13. Moreover, respondents showed a small but stronger preference for identity preserving choices in the non-natal female problem orientations (prostate cancer, gynecomastia; mean signed confidence = 22.2) than in the natal female problem orientations (breast cancer, gender transition; mean signed confidence = 11.9), Figure 14.

The male gender problem orientation by participant gender two-way interaction revealed that the mean difference in choice preferences as measured by signed confidence was significantly larger among transmen than either men or women. More specifically, in the male

gender problem orientations (gynecomastia, gender transition) transmen showed the greatest preference for identity preserving choices (mastectomy in both cases; mean signed confidence = 83.8) over men's (mean signed confidence = 41.1,  $p < .001$ ) and women's (mean signed confidence = 38.4,  $p < .001$ ) preferences. There was no statistically significant difference between men's and women's identity choice preferences in either the male gender problem orientations (gynecomastia, gender transition) or the non-male problem orientations (breast cancer, prostate cancer), Figure 15. In the non-man problem orientations, transmen showed a stronger but moderate preference for the identity threatening choices (mastectomy in the breast cancer problem, and hormone therapy in the prostate cancer problem; mean signed confidence = -44.1) compared to both men (-6.4) and women (-10.5) respondents ( $p < .001$ ).

The natal female sex problem orientation by participant gender two-way interaction revealed a crossover effect between men and women in their identity preserving preferences across problems whereby men displayed stronger identity preserving preferences (mean signed confidence = 20.0) than women (mean signed confidence = 10.4) over all the non natal female problems (gynecomastia and prostate cancer), but women displayed stronger identity preserving preferences (mean signed confidence = 17.5) than men (mean signed confidence = 14.7) in the natal female oriented problems (breast cancer, gender transition), Figure 16. Moreover, transmen showed a similar pattern to men across natal female problem orientation, but to a greater degree. The mean difference across problem type was significantly greater among transmen than either men ( $p < .001$ ) or women ( $p < .001$ ). More specifically, transmen report significantly greater preference (mean signed confidence = 36.2) than both men and women for the identity preserving options in the non-natal female problems (mastectomy in gynecomastia;



prostatectomy in prostate cancer), and show significantly less identity preserving preferences (mean signed confidence = 3.5) in the natal female oriented problems.

In the two-way significant interaction of natal female problem orientation by gist prime respondents showed a greater difference in identity preserving preferences between the problems when they did not receive a gist prime (mean difference = 12.9) than when they did (mean difference = 4.7). More specifically, respondents overall displayed stronger identity preserving preferences in the non-natal female problems (mastectomy for gynecomastia, and prostatectomy for prostate cancer; mean signed confidence = 25.8) than in the natal female problems (lumpectomy for breast cancer, mastectomy for gender transition; mean signed confidence = 9.9) when they did not receive a gist prime. However, when respondents received a gist prime, the preferences across problems were not significantly different (natal female mean signed confidence = 13.9, non-natal female mean signed confidence = 18.6), Figure 17.

The three-way interaction of man gender problem orientation by female gender problem orientation by participant gender, the data qualify the main effect of male gender problem orientation and the two-way interaction of male gender problem orientation by participant gender  $F(2, 753) = 70.97, p < .001$ . Again, here data reveal that all three gender groups have stronger identity preserving preferences in the male gender problem orientations (Figure 18), but the three way interaction highlights that the transmen are driving the higher order effects. More specifically, transmen show greater identity preserving preferences (mastectomy) in the gynecomastia (mean signed confidence = 78.6) and gender transition problems (mean signed confidence = 89.1) compared to men (gynecomastia mean signed confidence = 50.7; gender transition mean signed confidence = 31.5) and women (gynecomastia mean signed confidence = 44.6; gender transition mean signed confidence = 32.2). Transmen also show significantly

greater identity threat preferences (mastectomy) in the breast cancer problem (mean signed confidence = -82.1) than both men (mean signed confidence = -2.0) and women (mean signed confidence = 2.8).

Natal female problem orientation by identity manipulation on signed confidence missed significance. However, the means show patterns consistent with predictions. More specifically, the differences in identity preserving preferences were larger when respondents received an identity prime (mean difference = 14.7) than when they did not receive an identity prime (mean difference = 2.9).

Man gender problem orientation by participant gender by gist on signed confidence also missed significance, but although the data show the same patterns as the significant two-way interaction of male problem by participant gender, there is a trending crossover by gist condition in the male gender problems between men and transmen. In other words, in the man gender problem orientations (gynecomastia and gender transition), men show slightly more identity preserving preferences (mastectomy) when they received a gist prime (mean signed confidence = 45.4) than when they did not (mean signed confidence = 36.9), whereas transgender participants showed the opposite pattern; transgender participants showed slightly more identity preserving preferences when they did not receive the gist prime (mean signed confidence = 89.3) than when they did receive a gist prime (mean signed confidence = 78.3); women showed no difference across male gender problem orientation whether they received a gist prime (mean signed confidence = 38.5) or not (mean signed confidence = 38.3).

After controlling for age and education as covariates, a 2(problem gender orientation: man, not man) x 2(problem natal sex orientation: female, not female) x 2(gist prime: yes, no) x 2(identity prime: yes, no) x 3(gender: man, woman, transgender) repeated measure ANOVA on

signed confidence revealed no major changes in the results. There was a significant main effect of male problem gender orientation ( $p < .001$ ). The model also revealed significant interactions for problem male gender orientation x gender ( $p < .001$ ), problem natal sex orientation x gender ( $p < .001$ ), problem natal sex orientation x gist prime ( $p = .03$ ), and male gender problem orientation x female natal sex problem orientation x participant gender ( $p < .001$ ).

After controlling for age and education, overall, data revealed that respondents showed a strong significant preference for identity preserving choice in the man gender orientation problems (gynecomastia, gender transition; mean signed confidence = 54.5) than in the non-male gender orientation problems (breast cancer, prostate cancer; mean signed confidence = -19.2). After controlling for age and education, there was no longer a significant main effect of female problem orientation (prostate cancer, gynecomastia).

The male gender problem orientation by participant gender two-way interaction revealed that the mean difference in choice preferences as measured by signed confidence was significantly larger among transmen than either men or women. More specifically, in the male gender problem orientations (gynecomastia, gender transition) and after controlling for age and education, transmen showed the greatest preference for identity preserving choices (mastectomy in both cases; mean signed confidence = 82.5) over men's (mean signed confidence = 42.1,  $p < .001$ ) and women's (mean signed confidence = 39.0,  $p < .001$ ) preferences. There was no statistically significant difference between men's and women's identity choice preferences in either the male gender problem orientations (gynecomastia, gender transition) or the non-male problem orientations (breast cancer, prostate cancer). In the non-man problem orientations, transmen showed a stronger but moderate preference for the identity threatening choices (mastectomy in the breast cancer problem, and hormone therapy in the prostate cancer problem;

mean signed confidence = -41.2) compared to both men (-6.7) and women (-9.8) respondents ( $p < .001$ ).

As before, the natal female sex problem orientation by participant gender two-way interaction revealed a crossover effect between men and women in their identity preserving preferences across problems whereby men displayed stronger identity preserving preferences (mean signed confidence = 19.9) than women (mean signed confidence = 11.0) in the non natal female problems (gynecomastia and prostate cancer), but women displayed stronger identity preserving preferences (mean signed confidence = 18.2) than men (mean signed confidence = 15.6) in the natal female oriented problems (breast cancer, gender transition). Moreover, transmen showed a similar pattern to men across natal female problem orientation, but to a greater degree and with a larger mean difference across problem orientation. The mean difference across problem type was significantly greater among transmen than either men ( $p < .001$ ) or women ( $p < .001$ ). After controlling for age and education, transmen reported significantly greater preferences (mean signed confidence = 37.9) than both men and women for the identity preserving options in the non natal female problems (mastectomy in gynecomastia; prostatectomy in prostate cancer), and showed significantly less identity preserving preferences (mean signed confidence = 3.5) in the natal female oriented problems.

In the two-way significant interaction of natal female problem orientation by gist prime, participants showed a greater difference in identity preserving preferences between the problems when they did not receive a gist prime (mean difference = 16.0) than when they did (mean difference = 4.9). Participants displayed stronger identity preserving preferences in the non-natal female problems (mastectomy for gynecomastia, and prostatectomy for prostate cancer; mean signed confidence = 26.3) than in the natal female problems (lumpectomy for breast cancer,

mastectomy for gender transition; mean signed confidence = 10.3) when they did not receive a gist prime. However, when respondents received a gist prime, the preferences across problems were not significantly different (natal female mean signed confidence = 14.6, non-natal female mean signed confidence = 19.5).

The three-way interaction of man gender problem orientation by female gender problem orientation by participant gender, qualifies the main effect of male gender problem orientation, as well as the two-way interaction of male gender problem orientation by participant gender and the two-way interaction of natal female sex problem orientation by participant gender. Again, here, after controlling for age and education, the data reveal that all three gender groups have stronger identity preserving preferences in the male gender problem orientations (similar pattern as in Figure 18), but the three way interaction highlights that the transmen are driving the higher order effects.

Transmen show greater identity preserving preferences (mastectomy) in the gynecomastia (mean signed confidence = 78.8) and gender transition problems (mean signed confidence = 86.3) compared to men (gynecomastia mean signed confidence = 50.7; gender transition mean signed confidence = 33.5) and women (gynecomastia mean signed confidence = 44.9; gender transition mean signed confidence = 33.0). Transmen also show significantly greater identity threat preferences (mastectomy) in the breast cancer problem (mean signed confidence = -79.3) than both men (mean signed confidence = -2.3) and women (mean signed confidence = 3.4).

### **Comparing fuzzy-trace theory to standard dual process theory**

A 2(man problem orientations: man oriented vs. not) x 2(natal female problem orientation: natal female vs. not) x 2(participant gender: man, woman) x 3(dual process

condition: control, fuzzy-trace theory, standard dual process) repeated measures ANOVA on choice revealed main effects of male problem orientation and natal female problem orientation. This model also revealed two significant interactions and one interaction that missed significance. There was a significant two-way interaction of natal female problem orientation and participant gender as well as a significant two-way interaction of male and female problem orientations. A three-way interaction missed significance for participant gender by male problem orientation by dual process condition. Table 6 summarizes the statistics for the significant and missed significance effects from this model.

The main effects of man problem orientation and natal female problem orientations revealed the same patterns as described in each dual process analysis above. Respondents selected the identity preserving options more in the male problem orientations (gynecomastia and gender transition) than in the non man problem orientations (breast cancer, prostate cancer). Respondents also selected the identity preserving options more, overall, in the natal female problems (breast cancer, gender transition) than in the non-natal female problems (gynecomastia, prostate cancer).

The two-way interaction of male problem orientation by natal female problem orientation demonstrates an effect of each decision problem on choice for respondents overall, and qualifies the main effects for both male problem orientation and female problem orientation. More specifically, respondents select the identity preserving choice most often in the gynecomastia problem (77%), followed by the gender transition problem (70%), then the breast cancer problem (54%), and least often in the prostate cancer problem (37%).

The two-way interaction of natal female problem orientation by participant gender qualifies the main effect of natal female problem orientation in that the difference between mean

identity preserving choices across the natal female problems is limited to women respondents. More specifically, whereas men show no difference in identity preserving choices between the natal female (59%) and non-natal female problems (59%), women select the identity preserving option 11% more often in the natal female problem orientations (65%) than in the non-natal female problem orientations (54%),  $F(1, 624) = 23.03, p < .001$ .

A three-way interaction for participant gender by male problem orientation by dual process condition missed significance, but revealed choice patterns in the predicted directions. More specifically, compared to not receiving a dual process manipulation, men chose the identity preserving option more when they received a dual process manipulation and when the problem was a self-gender mismatch (men making choices in the non-male oriented problems). Men showed no differences in identity preserving choices across dual process conditions in the gender matched problems. Moreover, women showed no differences in identity preserving choices in both male and non male problem orientations whether they received a dual process manipulation or not.

In sum, after comparing the standard dual process and fuzzy-trace theory conditions in the same model, the data do not suggest that one dual process condition is a better predictor of identity preserving choice over the other when compared to the control condition. Rather problem type and participant gender identity were stronger predictors of identity preserving choices.

## **Values**

Table 7 summarizes the group means for each gender group by problem. Overall, for the breast cancer problem the mean importance ratings for the “surviving cancer” value (mean = 9.23) and for the “cancer recurrence” value (mean = 8.76) were rated the highest. Several other

values received greater than neutral ratings for the whole sample including “surgical risks” (mean = 6.69), “living in the wrong body for your gender identity” (mean = 6.29), “having a flat chest if you are male” (mean = 6.08), “pain” (mean = 5.96), “being able to hide your breasts if you are male” (mean = 5.93), “my identity as female, or as a woman” (mean = 5.87), and “my identity as male, or as a man” (mean = 5.74).

Overall, for the prostate cancer problem the mean importance ratings for the “surviving cancer” value (mean = 9.13) and the “cancer recurrence” value (mean = 8.84) were rated the highest. Several other values received greater than neutral ratings for the whole sample including “my identity as male, or as a man” (mean = 7.14), “surgical risks” (mean = 7.04), “disability” (mean = 6.83), “conserving erectile function” (mean = 6.75), “pain” (mean = 6.22), “having a flat chest if you see yourself as male” (mean = 6.14), “being able to hide your breasts if you are male” (mean = 6.12), and “living in the wrong body for your gender identity” (mean = 6.03).

Overall, for the gynecomastia problem the highest ranked values included “surviving cancer” (mean = 7.63), “my identity as male, or as a man” (mean = 7.52), “having a flat chest if you see yourself as male” (7.33), “cancer recurrence” (mean = 7.31), “being able to hide your breasts if you are male” (mean = 7.20), “surgical risks” (mean = 7.01), and “living in the wrong body for your gender identity” (mean = 6.60). The value “enlarged breasts” rated slightly higher than neutral (mean = 5.79), but there was very low importance given to the value “conserving the breast” (mean = 3.79) in the gynecomastia scenario.

Overall, for the gender transition problem the highest ranked values included “living in the wrong body for your gender identity” (mean = 7.86), “my identity as male, or as a man” (mean = 7.74), “having a flat chest if you see yourself as male” (mean = 7.44), “surgical risks”



(mean = 6.93), and “being able to hide your breasts if you are male” (mean = 6.81). The value “my identity as female, or as a woman” rated just below neutral (mean = 4.52), and there was very low importance given to the value “conserving the breast” (mean = 3.70) in the gender transition scenario.

A 3 (gender) x 2 (gist prime) x 2 (identity prime) repeated measures ANOVA on each of the value ratings relevant to the trade offs for each problem was conducted. Table 8 summarizes the results of the ANOVA analyses. In sum, data repeatedly revealed a main effect of gender, a main effect of decision problem, and a two-way interaction of gender by decision problem.

Confirming the descriptive trends summarized above, the repeated measures ANOVA on surgical risk value ratings revealed that, overall, females rated the surgical risk value as significantly more important (mean = 7.5) than either males (mean = 6.6) or transmen (mean = 5.2). Moreover, whereas males and females rated a greater concern for surgical risk in the gender transition decision problem than in the other three problems (breast cancer, prostate cancer, or gynecomastia), transmen rated the concern for surgical risk as least important in the gender transition problem compared to each of the other three decision problems.

The main effect of problem for the repeated measures ANOVA on cancer recurrence validates that the value ratings for cancer recurrence was rated significantly higher in the two cancer decision problems (breast cancer mean = 8.7; prostate cancer mean = 8.7) than in the non-cancer problems (gynecomastia mean = 7.1; gender transition mean = 6.1).

The two-way interaction of gender by problem for the repeated measures ANOVA on conserving the breast value ratings reveals that the concern for preserving the breast was rated as most important in the breast cancer decision problem, but that the value rating was highest among females (mean = 6.3), followed by males (mean = 5.3), and rated as least important by

transmen (mean = 1.9). As expected, value ratings for preserving the breast were less important for all of the man oriented decision problems (prostate cancer, gynecomastia, and gender transition).

The two-way interaction of gender by problem for the repeated measures ANOVA on conserving erectile function value ratings reveals that the concern for preserving erectile function was rated as most important in the prostate cancer decision problem, but that the value rating was highest among males (mean = 7.6), followed by females (mean = 6.6), and rated as neutral importance by transmen (mean = 5.8). As expected, value ratings for preserving erectile function were less important for all of the other decision problems, which did not report any threat to erectile function.

Table 9 summarizes the spearman bivariate correlations of the value ratings and choice across each of the four decision problems. For the breast cancer scenario, there is a strong and significant positive correlation between choosing the identity preserving option (breast conserving surgery) and higher reported value ratings for conserving the breast ( $r = .62$ ). There is also a moderately strong, significant, positive correlation between choosing breast conserving surgery and one's identity as female or as a woman ( $r = .28$ ). The correlation results also revealed that respondents with greater values for surgical risks also significantly more often selected breast conserving surgery ( $r = .14$ ).

In the breast cancer scenario there is a moderately strong, significant negative correlation between choosing the identity preserving option (breast conserving surgery) and reported value ratings for cancer recurrence ( $r = -.24$ ), having a flat chest if you see yourself as male ( $r = -.22$ ), living in the wrong body for your gender identity ( $r = -.16$ ), surviving cancer ( $r = -.15$ ), my identity as male or as a man ( $r = -.13$ ), and being able to hide your breasts if you are male ( $r = -$

.12). In other words, as participants chose the identity preserving option more in the breast cancer scenario, the value ratings were lower for cancer recurrence, for having a flat chest if you see yourself as male, for living in the wrong body for your gender identity, for my identity as male or as a man, and for being able to hide your breasts if you are male.

For the prostate cancer scenario, there is a significant positive correlation between choosing the lesser identity threatening choice option (prostatectomy) and the value ratings for having a flat chest if you see yourself as male ( $r = .18$ ), being able to hide your breasts if you are male ( $r = .14$ ), one's identity as male or as a man ( $r = .12$ ), enlarged breasts ( $r = .12$ ), and living in the wrong body for your gender identity ( $r = .10$ ). There is a significant negative correlation between choosing prostatectomy and the value ratings for surviving cancer ( $r = -.15$ ) and cancer recurrence ( $r = -.14$ ). In other words, as participants chose the prostatectomy option, the value ratings were lower for surviving cancer, and cancer recurrence.

For the gynecomastia scenario, there is a strong significant positive correlation between choosing the identity preserving option (mastectomy) and value ratings for having a flat chest if you see yourself as male ( $r = .31$ ), being able to hide your breasts if you are male ( $r = .27$ ), and my identity as male or as a man ( $r = .25$ ). There were also significant positive correlations between choosing mastectomy and higher value ratings for living in the wrong body for your gender identity ( $r = .16$ ), and feeling uncomfortable in the warmer seasons ( $r = .10$ ). There is a strong, significant negative correlation between choosing mastectomy and value ratings for surgical risk ( $r = -.26$ ). Significant, negative correlations also emerged between choosing mastectomy and the value ratings for conserving the breast ( $r = -.15$ ), pain ( $r = -.12$ ), and disability ( $r = -.11$ ). In other words, the more respondents chose mastectomy in the gynecomastia

scenario, the lower their value ratings were for surgical risk, breast conservation, pain, and disability.

In the gender transition scenario, there is a strong significant positive correlation between choosing the identity preserving option (mastectomy) and value ratings for having a flat chest if you see yourself as male ( $r = .31$ ), being able to hide your breasts if you are male ( $r = .27$ ), and my identity as male or as a man ( $r = .25$ ). There are also significant positive correlations between choosing mastectomy and the value ratings for living in the wrong body for your gender identity ( $r = .16$ ), and feeling uncomfortable in the warmer seasons ( $r = .10$ ).

Similar to the gynecomastia problem, in the gender transition scenario, significant negative correlations emerged for choosing the identity preserving option (mastectomy) and the value ratings for surgical risk ( $r = -.29$ ), conserving the breast ( $r = -.21$ ), my identity as female or as a woman ( $r = -.17$ ), pain ( $r = -.13$ ), and disability ( $r = -.13$ ). In other words, as respondents chose mastectomy, their value ratings decreased for surgical risk, breast conservation, female identity, pain, and disability.

In sum, the results of these analyses suggest that gender identity is a protected value as evidenced by noncompensatory decision making across medical decision making scenarios that involve a trade-off between identity and risk. Although dual process manipulations did not predict variations in identity preserving choices, decision problem gender orientation and participant gender identity did predict identity preserving choices. The context of the decision problem matters a great deal, and proportions of identity preserving choices were higher amongst man oriented problems than in non-man oriented problems. In general, decisions were in line with participant values. Identity preserving choices were attenuated somewhat when life and death values were made salient in the decision problem, but identity preserving choices were the

highest when social norms were threatened, such as with the male-identified protagonists in the gynecomastia problem in which a male is described as having developed breasts and participants are asked to decide whether to choose surgery to remove the excess tissue or to choose a compression vest.

## DISCUSSION

### **Summary of findings: Identity as a protected value**

The purpose of this study was to examine how people process conflicts between gender identity and risk when making medical decisions. This was accomplished by presenting participants with dichotomous choices that contrasted gender identity preserving options that carried greater risks against gender identity threatening options that carried lower risks across a variety of decision scenarios. Consistent with predictions, the results suggest that despite the elevated risks, gender identity preservation was often more important to participants than the risk. Moreover, the gender groups responded differently to the identity threats across the decision scenarios. Although several of the groups were able to empathize with the motivation to protect one's gender identity across a variety of threatening situations, as predicted, participants were more sensitive to protecting gender identity in the decision scenarios where the protagonist's gender matched their own gender identity.

These results are also consistent with predictions of protected values found in the literature (Baron & Ritov, 2008; Tetlock, 2003). Protected values are typically personal values or moral principles that are protected from trade-offs with other values (Baron & Ritov, 2008) or social norms (Tetlock, 2003). In this study, participants were frequently not willing to compromise the integrity of their gender identity in discordance with social norms. Thus, in addition, these results provide new evidence for protected values that go beyond just moral reasoning; as predicted, this study presents new evidence for gender identity as a protected value.

In support of hypothesis 1c and 2f, although the data did not reveal a main effect of identity prime, the data did reveal a main effect of gender and an interaction between gender and decision problem, which suggests that the protected identity effect varies both by gender group

and by problem context. In the current study, when there is a protagonist-participant gender identity match, respondents showed more identity preserving choices than in decision contexts representing a protagonist-respondent gender mismatch. In other words, in this study, male respondents reported more frequent identity preserving choices across the problems in which the identity preserving option favored man gender identity orientations (gynecomastia, gender transition), but choose the identity preserving option only about half as often in non-man problem gender orientations (breast cancer, prostatectomy).

Among transmen, this pattern was even more pronounced. Transmen selected the identity preserving option nearly 100% of the time in man-oriented problems, and only 26% of the time in non-man oriented problems. Interestingly, though, women in this study showed a similar choice pattern across problems as men. That is, although the three way interaction of gender identity orientation by natal female problem orientation by gender showed that women selected the identity preserving option more often than either men or transmen in the breast cancer problem (gender-match), women also selected the identity preserving option nearly three-quarters of the time in man problem orientations (which represent a gender-mismatch).

To explain this choice pattern among women, it is important to note that across several of the problems the choice proportions across were close to or greater than 50%, which suggests that even in protagonist-respondent gender mismatch situations, respondents, in general, were still able to empathize with the protagonist's dilemma; and when asked to put themselves in the protagonist's situation, respondents chose the identity preserving option because there is a strong preference for the identity preserving option even in hypothetical decision scenarios that may not be personally relevant.

Empathy has been defined in the literature as “accurately perceiving the internal frame of reference of another” (Gold & Rogers, 1995, p. 79). In the breast cancer scenario, men selected the identity preserving choice 50% of the time even though the protagonist was a woman (protagonist-gender mismatch). Also, in the gynecomastia decision scenario, women selected the identity preserving option 77% of the time even though the protagonist was a man. Transmen, however, did not demonstrate the same degree of mismatch empathy as was observed among men and women in this study. For example, although both males and females chose the identity preserving option (breast conserving surgery) approximately 50% of the time in the breast cancer scenario, transmen almost never selected the identity preserving option for the female protagonist in this decision problem, and in fact selected mastectomy (the identity threatening option) in this decision problem nearly 100% of the time. It is possible that because transmen spend more time than non-transgender males and females negotiating their own gender conflicts in society, they are less able to separate their own choices from that which might be more important to the protagonist in the scenario.

The transmen in this study are natal-females who report masculine or male gender identities. Moreover, prior research suggests that cross-gender identified transmen often elect to remove their own breasts to feel a sense of authentic identity achievement (Pardo, 2008; Riggle, Rostosky, McCants, & Pascale-Hague, 2011). Thus, transmen would reject any action that would preserve their own breasts. In other words, it is possible that given the heightened salience of their own gender identities as transmen, the transgender respondents in this study were less able to empathize with the female in the breast cancer scenario and thus did not select the identity preserving option for the protagonist.



Alternatively, perhaps the lower proportions of identity preserving choices in the breast cancer scenario is in part due to an over-identification among transmen as men, thus resulting in *even* less empathy than non-transgender men when compared to women in a woman-oriented decision scenario. In two studies testing the effect on empathy of having a similar prior experience, Batson and colleagues (1996) found that after observing a same-sex peer endure mild, but uncomfortable electric shocks, women who had also experienced this condition reported the highest levels of empathy, while men regardless of whether they had experienced this condition or not reported less empathy. This finding was replicated in a hypothetical scenario where respondents read a transcript of an upsetting life experience. Again, women who had a similar experience as that described in the transcript reported the highest levels of empathy for the protagonist in the transcript, and men reported less empathy regardless of whether they had experienced a similar upsetting life experience or not. Thus, if transmen reflect similar empathy patterns as males in general, data would show less empathy among transmen than women, but it remains an empirical question whether transmen are over-identifying as men, and whether as such they display hypoempathy in contexts involving multigender comparisons.

Moreover, despite the data presented here, it is also possible that because of their lived experiences with constant gender conflict, transmen might be *more* empathetic to gender threats. A search of the empirical literature revealed a dearth of literature on transgender empathy. In fact, a web of science search with keywords “transsexual” or “transgender” and “empathy” produced only two published articles, only one of which was a social science publication (the other was a publication that examined themes of racial and gendered identities as performed through the experimental art projects of the diasporic London-based artist-led group *moti roti*).

In a qualitative investigation of the positive aspects of transgender identification, Riggle and colleagues (2011) found that participants reported “increased empathy” and having “a unique perspective on both sexes” (p. 150) as positive aspects to being transgender. In fact, among over 60 study participants, over one-quarter of the sample indicated that “a transgender identity allowed them to experience increased empathy for others” (p. 151). One participant reflected that being a transman forced him to think about stereotyping, and to have greater empathy for marginal groups (although this anecdote is not conclusive). Perhaps it is this latter form of empathy that explains why an overwhelming number of transmen selected mastectomy (the identity threatening option) over breast conserving surgery (the identity preserving option) in the breast cancer scenario; that is, perhaps the transmen have a greater range of what is considered acceptable gender presentations, and perhaps they were less threatened in general by the idea of a woman with a flat chest following a mastectomy. It follows then that if transmen are less threatened in general by gendered presentations that are outside of societal norms, perhaps their attention in the breast cancer scenario was cued more by the risk of cancer than the risk of appearing gender discordant. This remains an open empirical question for future investigation.

The data also suggest that the protected identity effect may also be context dependent. Although the data did not reveal a main effect of identity prime, data did reveal a significant interaction effect of identity prime by natal female problem orientation. More specifically, when respondents received an identity prime, they showed differential choice patterns across problems, but did not show differential choices across the problems when they did not receive an identity prime. Thus, heightening the salience of participants’ identities seemed to accentuate the sample’s differential choice patterns across the vignettes.

The results of this study are not easily explained by approaches such as expected utility theory. There are two key dimensions to calculating an expected value or utility: probability and magnitude of the outcome. For example, am I willing to play a chance game if I have a 50% chance of winning \$10? The expected utility of this game is  $.50 \times \$10$  or \$5. Thus, by definition, expected utility is both multiplicative and scope sensitive. To keep a constant expected value, there is an inverse relationship between probability and the magnitude of the payoff; in other words, if my odds of winning decrease to 10%, the magnitude of the payoff must increase to \$50 to maintain an equal expected value. Greater risk requires greater reward to make it worth the gamble. In this study, however, across the various types of problems, study participants were repeatedly not willing to trade off the protection of gender identity for less risk, even when responding to gender mismatched, hypothetical scenarios. More specifically, in one problem (prostate cancer), over 40% of respondents were willing to incur a small chance of death in order to avoid a greater threat to the protagonists' gender identity.

Prior research identify protected values as when individuals are quantity insensitive, that is, when people are not willing to make a trade-off no matter how high the reward (Bartels & Medin, 2007; Ritov & Baron, 1999). In other words, sometimes there is no quantitative amount one could buy, sell, or trade for that would motivate the respondent to give up the protected value. Applied to this study, participants demonstrate this sort of noncompensatory decision behavior about protecting identity against the threat of risk, even when the risk is a small chance of death.

In sum, the current findings demonstrate that gender identity is a protected value and that identity, as a protected value, predicts noncompensatory decision making in dilemmas that involve a trade-off. More specifically, the current findings demonstrate that gender identity is a

predictor of self-preserving decision making in gender relevant medical contexts even when the identity preserving context involves greater risk than an alternative choice. These data also provide an empirical test of two dual process cognitive manipulations, standard dual process theory and fuzzy-trace theory, in the same experimental paradigm that tests noncompensatory decision making.

### **Standard dual process theory**

Although, analyses revealed a significant crossover interaction for standard dual process condition by problem type, contrary to expectations, respondents in the calculation standard dual process condition did not seem to make their choices based on the expected utility of the outcomes. Rather the expected effect was only observed in the prostate cancer problem, which explicitly paired the identity preserving option with a chance (albeit a low chance) of certain death within ten years. Moreover, it is possible that the expected effect for this one problem was not particularly due to the standard dual process calculation prime, but rather due to an overwhelming aversion to a risk of death over and above the higher identity threat alternative of erectile dysfunction and male breast development. Although data revealed a three way interaction of problem type by standard dual process condition by gender, closer examination of the data suggest that the pooled means across the problems even when split by gender are also due to the pooled means that included the prostate cancer problem, where again, participants may have been more risk averse to the chance of death in the identity preserving option than simply rejecting the greater identity threat in the alternative.

The literature on omission bias provides some context for understanding this strange finding. Omission bias is “the preference for harm caused by omissions over equal or lesser harm caused by acts” (Baron & Ritov, 2004, p. 74). In one study, participants were asked to

make a choice whether to vaccinate their only child with a new vaccine against a virulent flu. Similar to the prostate cancer scenario in the current study where the prostatectomy option states that the surgery will completely remove the cancer, but that there is a chance of recurrence that could lead to death, Baron and Ritov's participants were told that the vaccine "completely prevents the flu, but it sometimes causes side effects that can be fatal" (Baron & Ritov, 1994, p. 491). Results demonstrated that even at very small fatality risk estimates of 1 in 10,000, less than 50% of participants were willing to accept the vaccine against the virulent flu.

Although similar results emerged in this study as in Baron and Ritov (1994), there are methodological differences that still leave more to be examined. The choice options presented in Baron and Ritov's experiment were between an action (choosing the vaccine) and an inaction (not having the vaccine); whereas in the present study, participants were choosing between two unequal actions – one of which threatened a male gender identity by carrying a significant risk of breast development and a smaller risk of erectile dysfunction, and the other of which carried one small risk, albeit a risk of death. Thus, this study is not a direct comparison to a test of omission bias which pits an inactive against an active choice. However, the choice trends among participants suggest that as seen in tests of omission bias, the risk of death is likely weighted more than other risks – even protected values.

Somewhat in line with predictions, participants selected the identity preserving option more than half the time when they received the feeling prime, but contrary to expectations, there were mostly no gender difference across problem type. Both men and women selected the identity preserving options more in the man gender oriented problems (gynecomastia and gender transition) than in the non-man gender oriented problems (breast cancer and prostate cancer). Again, this effect could have been due to the low identity preserving choices in the prostate

cancer problems, in which participants may have been showing a general aversion to even a small risk of death.

A slightly different interpretation of the problem by standard dual process condition crossover effect suggests that respondents are overall more sensitive to biological male identity threats (and thus selected the identity preserving option more often in the gynecomastia and prostate cancer problems) when primed to reason by calculation, but respondents are conversely more sensitive overall to biological female identity threats (and thus selected the identity preserving option more often in the breast cancer and gender transition problems) when primed to reason by feeling.

The literature on gender nonconformity describes that,gender nonconforming youth, especially boys who do not display the normative range of masculine dress style or behaviors by Western societal standards, typically endure an atmosphere of intimidation in their daily lives (Reis & Saewyc, 1999). Moreover, anti-gay bullying often originates from judgments about gender expression rather than sexual orientation (Reis & Saewyc, 1999; D'Augelli, Pilkington, & Hershberger, 2002). Harassment may be used as a means of aggressively reinforcing a particular style of masculinity (Tharinger, 2008); and whereas gender nonconforming (tomboy) girls benefit from being the “best athletes” or other stereotypically masculine traits, gender nonconforming boys frequently bear intense harassment and discrimination (Brooks, 2000; Remafedi, Farrow, & Deisher, 1994). This literature, however, does not explain why respondents would show a greater sensitivity to identity threat in the natal female oriented problems when randomized to the feeling condition. Thus, further research is warranted to examine this difference more carefully.

We do know from the available literature, however, that prior research with dual process manipulations has demonstrated reversals in decision making (Mills, Reyna, Estrada, 2008). In particular, when cued to use verbatim processing, participants' risk perceptions positively correlated with risk taking, whereas when cued to use gist processing, participants' risk perception negatively correlated with risk taking ; high perception of the gist of risk, in turn, was associated with more risk-avoidant behaviors. In addition, judgment research that tested the influence of affect found that positive emotions lead to risk aversion while negative emotions such as anger resulted in risk seeking (Hsee & Rottenstreich, 2004). Thus, as affect is made more salient, regardless of valence, participants display reliance on those emotions when making decisions, which may lead to differential emphasis on the utility (weighed risks vs. benefits) of the outcome and thus different choices (Mano, 1992).

Applied here, the three-way interaction of problem gender orientation by standard dual process condition by participant gender revealed that when primed to calculate, men selected the identity preserving option about 16% less often than women across the man-oriented problems (gynecomastia and gender transition), but when primed to use feeling, the gender differences in response patterns for the gynecomastia and gender transition problems disappeared. It is possible that, similar to the behavioral patterns observed in Mills et al, (2008), when primed to use analytical processing, men were more attentive to the quantitative risk comparisons between the two choices, and chose the option that had a better quantitative risk profile (less quantitative risk), and were less attentive to the more affective-based, identity threat. Indeed, when primed to evaluate by feeling, men showed similar proportions of identity preserving choices as women. Moreover, when primed with the feeling cognitive manipulation, men selected the identity

preserving option 10% more often in the man-oriented problems (gynecomastia and gender transition) than when primed with the calculation cognitive manipulation.

Prior research supports this pattern. Mano (1992) tested how affect influences decision making and found that when primed to experience distress (via negative affect induction techniques), participants engaged in simpler decision strategies and formed more polarized judgments. According to fuzzy-trace theory, simpler, affective-based decision strategies are an example of gist processing, and thus, applied here, may result in greater proportions of identity preserving choices; this was confirmed in the present study.

### **Fuzzy-trace theory**

Fuzzy-trace theory predicts that when using gist processing, individuals think automatically, effortlessly, based on experience, expertise, and in line with their personal values. It was predicted that if identity is an experience-based, and value-based construct, then when primed to use gist representations for the decision problems, respondents should select the choice in line with the protagonist's identity; in other words, the fuzzy-trace theory models should reveal a main effect of gist whereby respondents will choose the identity preserving options more overall across problems when they receive a gist prime over when they do not. However, it is possible that survival was a more fundamental value to participants.

Contrary to predictions, there was no main effect of gist, but there did emerge an interaction of gist by problem type. When participants did not receive a gist prime, they displayed differential choice patterns, whereby they selected the identity preserving option more in the non-man oriented problems (prostate cancer and breast cancer) than the man-oriented problems (gynecomastia and gender transition). However, this difference was eliminated when participants received a gist prime. These data suggest that participants were responding to the



identity threats differentially across problem when not primed to consider the gist of the choices, but when respondents received a prompt to consider what the decision boiled down to, the gist prime may have equalized the preference for identity preservation across problems.

It is interesting, though not surprising, that gist equalized the differential response pattern across problems for identity preserving choices. According to fuzzy-trace theory, gist representations are vague and capture the bottom-line meaning of information (Mills et al, 2008; Reyna & Farley, 2006). Thus, in contrast to verbatim representations (which focus on the literal surface details of the information presented), gist allows for a subjective interpretation of information through a variety of individual lenses including those of experience, emotion, education, culture, and identity.

As an example of the kind of subjective flexibility gist provides when interpreting medical risk and how an individual's own identity-based processing plays a role in decision making, Reyna (2008) discusses a scenario where a 49-year-old woman calculates her lifetime breast cancer risk as 22.2% using an online risk estimation tool. On a likelihood scale from 0% (not likely at all) to 100% absolutely likely, 22.2% is less likely to occur than even by chance at 50%. However, given that the average risk for a 49-year-old woman is only 11.3%, then this woman is about twice as likely than any other woman her age to be diagnosed with breast cancer. In discussing the gist of the risk, the woman's contextual and individual factors play a great role in how she interprets her lifetime risk estimate. These contextual and individual factors may include, education (or how well she deals with numbers, or numeracy), her interpretation of her own physical health and well being, or whether she has young dependents, for example, who may still require her long term care and attention. In this study, age and education differences did not explain the differential choice patterns across the problems. However, gender identity

was a significant predictor, suggesting that individually-based differences (that is, differences rooted in who one *is*) had an effect on participants' choices.

Gist, then, as a subjective, meaning-based construct allows individuals with similar principles to draw similar meanings across contexts even if the surface form of the information in the context might be different. For example, as in this study, when presented with two identical medical decision scenarios with the same treatment options (e.g., mastectomy vs. chest compression) that are differentiated only by reason for surgery (e.g., gynecomastia vs. gender transition), all participants in this study demonstrated with their responses that they understood that the gist was the same for each protagonist in these two medical scenarios. In other words, the protagonist in the gynecomastia problem as in the gender transition problem each identify as a man, even though the former was born biologically male and the latter was born biologically female. Thus, the identity preserving option in both scenarios is to select mastectomy to remove the breast.

In contrast, when presented with a third similar scenario that pits breast conservation against breast removal, but for a female protagonist whose gender identity is congruent with her birthsex and who must make a decision after being diagnosed with breast cancer, participants should produce the opposite choice pattern if the gist of the scenario is well understood. In other words, according to fuzzy-trace theory, if study participants consider that the meaning of the decision for the female protagonist is to preserve a natural component of her identity as a woman, study participants should reverse their choices and select lumpectomy over mastectomy for the woman in this scenario. Among men and women, although the signed confidence results did not demonstrate a strong choice preference, both men and women selected the identity

preserving option at least half of the time. These results are consistent with the predictions of fuzzy-trace theory.

Among transmen, who almost never selected the identity preserving option for the protagonist in the breast cancer scenario, it is possible that as experts in rejecting their own natal sex as female, they were more sensitive to their own identity principles than empathetic to the protagonist in the scenario. Therefore, although the transmen in this study showed strong identity preserving preferences in the male oriented problems, consistent with their own identities over that of the protagonist in the decision scenario, transmen choose mastectomy more often than the identity preserving option of lumpectomy for the protagonist in the breast cancer scenario. Alternatively, perhaps merely being asked to rate what one would do in a hypothetical scenario involving another person's perspective is enough to create greater variations in rates of identity preserving choices. For example, similar to research based on fuzzy-trace theory's gist processing, research examining the effects of psychological or social distance suggests that self-other differences might be explained by differences in knowledge, experience, or perspective-taking (Libby & Eibach, 2002; Trope & Liberman, 2010). First, regarding knowledge, people generally know more about themselves than others. Second, people often pay more attention to situational contexts rather their own specific behaviors; the latter, is more salient from a third-person perspective (Libby & Eibach, 2002). Thus, when participants are asked to imagine themselves in a scenario, and to make a decision from a first-person perspective, research suggests that participants engage more vivid imagery of the decision details and may engage in more cost-benefit and analytical processes, in other words, missing the forest for the trees. Applied to this study, it is possible that the hypothetical nature of the decision problems and the type of perspective taking led to greater analytical processing among participants for whom there

was a protagonist-participant gender mismatch. That is, men and transmen may have engaged more detail oriented processing for the breast cancer scenario, and consistent with fuzzy-trace theory, thereby attenuated their identity preserving choices. Moreover, although men and transmen both had male gender identities, transmen also have personal experience with *rejecting* their natal sex as female. This additional rejection of the female-self identity may have resulted in *even more* detail oriented processing and a stronger choice preference for mastectomy (the threat option) over breast conservation (the identity preserving option).

Fuzzy-trace theory predicts that gist processing is the more accessible, automatic, default type of processing that occurs when people reason in an advanced way (Reyna & Casillas, 2009). In this study, the control condition does not provide respondents with a cognitive manipulation; thus, if respondents randomized to the control condition in this study are using the most accessible and automatic processing, then they are using gist processing when making their decisions. It follows then, that if participants in the control group are using gist processing as a default reasoning process, then individuals in the control condition are expected to show similar choice patterns as respondents in the gist condition. In support of this prediction, in this study there was no main effect of gist manipulation, suggesting that choice patterns between respondents who received a gist prime and those who did not responded with the same identity preserving choice proportions. In applying fuzzy-trace theory to explain similar moral dilemmas to the ones presented in this study, Reyna and Casillas (2009) noted that gist processing produces insensitivity to quantity, and thus noncompensatory decision making.

### **Standard dual process theory vs. Fuzzy-trace theory**

These data provide the first empirical test of two dual process cognitive manipulations, standard dual process theory and fuzzy-trace theory, in the same experimental paradigm that tests

noncompensatory decision making. Overall, the data support some, but not all, of the predictions from each of the dual process models tested in this study. This study does extend the current literature on the operational components of gist, namely that identity is a component of gist processing. The “protected identity effect” across problem and between respondents of varying genders suggests that gender identity as an experience and meaning-based construct is a component of gist. This study also raises more questions about how gist processing is different from affective processing. Differential choice patterns emerged between non-transgender men and women in this sample when respondents received standard dual process manipulations compared to when they received fuzzy-trace theory manipulations. Most simply, the data suggest that gist is different from but inclusive of affect; however further research is warranted to examine the mechanisms of gist processing versus affective processing across gendered groups.

To process a tradeoff that involves a decision between an identity preserving option paired with a greater risk against an identity threat option paired with a lesser risk is in part determined by one’s gist of the decision and how relevant the decision is to either the person in question or to themselves. Moreover, such a decision involves more than just affect. Indeed, life is full of moral dilemmas and subtle contradictions, and when forced to contemplate trade-offs, people become uncomfortable when the choices tug at our sacred values, in particular ones pointed at our selves. In a sense, such decisions require us to give up (or trade-off) a part of who we are, and most people are not willing to compromise who they are, even when protecting the integrity of the self incurs greater risk. The data here suggest that fuzzy-trace theory when compared to standard dual process theory is a more consistent predictor of the protected identity effect.

### **Research limitations**

The absence of the protected identity effect in the prostate cancer problem was curious. However, the literature on omission bias may provide some insight for why the protected identity effect did not emerge for the prostate cancer problem (Baron & Ritov, 2009; Cushman, Young, & Hauser, 2006). Specifically, Cushman and colleagues demonstrated that moral principles are triggered when a problem evokes thoughts of the decision maker causing more harm with a behavior than without. In this study, the prostate cancer problem was designed, in theory, to provoke doing harm to identity integrity to some degree in both choice options, but one choice was designed to suggest it offered less threat to the self than the alternative. Unfortunately, when the lesser identity-threat option was paired with even a small risk of “death” as the theoretically more identity preserving option, this pairing negated the salience of the lesser threat actually being a lesser threat, because identity has no meaning if one is not living. Future research should modify the choice options in this scenario such that the paired risk for the lesser identity threatening option is not an absolute risk that triggers alternate core values (e.g., suicide is bad).

The design of this study also failed to include a third fuzzy trace verbatim condition to test how priming of the details of the contrasting options in the decision problem may have effected respondent decisions. This omission paired with a gist effect in the control condition, which validates fuzzy-trace theory’s prediction that gist reasoning is a kind of default reasoning in adults (Reyna & Casillas, 2009), suggests that there was no alternative to the gist and identity prime conditions for this experiment. Perhaps a more carefully controlled control condition and/or the inclusion of a clear verbatim condition would produce a greater range of significant effects.

It was important to run the analysis models after controlling for additional demographic variables such as age and education. Age, for example, had a relatively young mean given the

range of the distribution. This suggests a right-skew to the data and calls for it to be included as a covariate. Moreover, transmen were slightly older on average than the non-transgender men and women in this study. Previous research exploring developmental differences in framing effects has demonstrated age effects (Reyna & Farley, 1994; Reyna et al, 2003); that is, with age, people rely more on gist processing than verbatim processing. However, after controlling for both age and education in the repeated measures ANOVA models, the results remained the same.

Analysis of the control group revealed that the default processing may have been based on gist representations, suggesting that a third fuzzy trace verbatim condition (separate from a control condition) was required, but missing from this design. Future research should thus reexamine these data considering gist versus verbatim processing versus control for effects on identity motivated risky decision making. Moreover, even though the sample was predominantly white, there was a reasonably diverse racial distribution. Thus, future analyses should also confirm these findings with a greater ethnically diverse sample.

It is important to note that in many experiments there is a trade-off between experimental control and external validity. To further maximize the external validity of this study, the decision paradigms presented medical decision scenarios that are prevalent in everyday life. The most recent report of national health statistics demonstrated that over 46 million inpatient surgical procedures are documented annually (DeFrances, Lucas, Buie, & Golosinskiy, 2006). Of these procedures, over 200,000 are breast cancer diagnoses in women, and an additional 200,000 are prostate cancer diagnoses in men. Moreover, medical decisions such as those involved in cancer treatments often involve identity trade-offs. Although the decision problems were hypothetical in presentation, the decision problems presented realistic medical scenarios, decision options, and side effect or prevalence statistics to maximize internal validity.

Despite these notable limitations, this study presents several empirical replications and adds new findings to the body of knowledge on risk perception and medical decision making. Most notably, it is one of the first studies to explore medical decision making and risk appraisals in transgender samples. Moreover, this study joins a limited body of research that explores identity as a significant predictor of risk perception and medical decision making, in particular in contexts that involve a core value tradeoff.

Individuals are typically unwilling to compromise a fundamental aspect of the self (that is, some core components of one's identity) even when the alternative is less risky. Respondents in this study showed differential choices in favor of the identity preserving options when they received an identity prime than when they did not. These results are consistent with the work of Ritov and Baron (1999, 2008), who found correlations between protected values and biases of omission; that is, respondents were not willing to act in contrast to their moral principles, even when the act would "kill some" in order to result in "more lives saved overall." In other words, when one holds absolute moral principles "thou shalt not kill," individuals find it more difficult to kill some to save more than to not do anything and take a chance that a few will die. These results also draw some similarity to risk aversion in framing paradigms (Reyna & Casillas, 2009), in which people are willing to take greater risks when a decision problem is framed as a potential loss than when it is framed as a gain.



## CONCLUSION

The series of experiments in my dissertation make several unique contributions to the current literature. First, these experiments are the first to test the central concept that identity is a protected value. Second, the experiments test dual process implications for surgical decision-making. Third, the experiments test how identity is taken into account in decisions regarding risky surgical procedures, especially when there is a trade-off between identity and surgical risk; and fourth, because studies often assume similarities across the dual process theories these experiments are the first to test for differences in the constructs by evaluating alternative dual process models in the same study.

Using empirically motivated hypothesis-driven research, my dissertation research directly addresses a current gap in the empirical literature on protected values. Moreover, the results of this study are readily applicable in clinical contexts. Moreover, this research has applications in cognitive, social, and developmental psychology. For instance, the current study provides greater predictive insight for clinicians working with transgender clients who are contemplating a medical transition. The current study may also help clinicians who work with non-transgender clients who currently struggle with life course decisions (especially decisions involving an important trade-off) that may have a fundamental consequence for the self, such as when a patient is diagnosed with cancer. Thus, in applied settings, this research fills a major gap in the current literature on protected values and the role of identity in medical decision making.

Moreover, although this study is a much needed first step in testing the role of identity in medical decision making, further research is warranted regarding the mechanisms for how cognitive processes and identity as a protected value interact to motivate judgments and

decision-making, particularly in contexts that involve important health implications such as sex reassignment surgeries or cancer surgeries (prophylactic or as post-hoc treatment).

## REFERENCES

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*. (4<sup>th</sup> ed., rev.). Washington, D.C.: Author.
- Baron, J. & Ritov, I. (2004). Omission bias, individual differences, and normality. *Organizational Behavior and Human Decision Processes*, 94, 74-85.
- Baron, J. & Ritov, I. (2009). Protected values and omission bias as deontological judgments. In D. M. Bartels, C. W. Bauman, L. J. Skitka, & D. L. Medin (Eds.), *Moral judgment and decision making Vol 50* in B. H. Ross (series editor), *Psychology of Learning and Motivation*, pp. 133-167. San Diego, CA: Academic Press.
- Bartels, D. M. & Medin, D. L. (2007). Are morally motivated decision makers insensitive to the consequences of their choices? *Psychological Science*, 18(1), 24-28.
- Batson, C. D., Sympson, S. C., Hindman, J. L., Decruz, P., Todd, R. M., Weeks, J. L. ... Burns, C. T. (1995). "I've been there, too": Effect on empathy of prior experience with a need. *Personality and Social Psychology Bulletin*, 22(5), 474-482.
- Bem, S. L. (1982). Gender schema theory and self-schema theory compared: A comment on Markus, Crane, Bernstein, and Siladi's "Self-schemas and gender," *Journal of Personality and Social Psychology*, 43(6), 1192-1194.
- Bem, S. L. (1989). Genital knowledge and gender constancy in pre-school children. *Child Development*, 60, 649-662.
- Bettocchi, C., Ralph, D. J., & Pryor, J. P. (2004). Pedicled pubic phalloplasty in females with gender dysphoria. *British Journal of Urology International*, 95, 120-124.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.

- Brainerd, C. B., Wright, R. & Reyna, V. F. (2002). Dual-retrieval processes in free and associative recall. *Journal of Memory and Language*, 46, 120-152.
- Britton, J. R., Britton, H. L., & Gronwaldt, V. (2006). Breastfeeding, sensitivity, and attachment. *Pediatrics*, 118, 1436-1443.
- Brooks, F. L. (2000). Beneath contempt: The mistreatment of non-traditional/gender atypical boys. *Journal of Gay & Lesbian Social Services*, 12(1/2), 107-115.
- Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control-theory approach to human behavior*. New York: Springer.
- Cohen-Kettenis, P. T. & Gooren, L. J. (1999). Transsexualism: A review of etiology diagnosis and treatment, *Journal of Psychosomatic Research*, 46(4), 315-333.
- Collins, J. F. (2000). Biracial-bisexual individuals: Identity coming of age. *International Journal of Sexuality and Gender Studies*, 5(3), 221-253.
- Currah, P., Juang, R., & Minter, S. (2006). *Transgender rights*. Minneapolis, MN: Univeristy of Minnesota Press.
- Cushman, F., Young, L., & Hauser, M. (2006). The role of conscious reasoning and intuition in moral judgments: Three principles of harm. *Psychological Science*, 12, 1082–1089.
- D'Augelli, A. R., Pilkington, N. W., Hershberger, S. L. (2002). Incidence and mental health impact of sexual orientation victimization of lesbian, gay, and bisexual youths in high school. *School Psychology Quarterly*, 17(2), 148-167.
- Deaux, K. (1993). Commentary: Sorry, wrong number – A reply to Gentile's call (Special Section: Sex or gender?). *Psychological Science*, 4(2), 125-126.

- DeFrances, C. J., Lucas, C. A., Buie, V. C., & Golosinskiy, A. (2006, July 30). National Hospital discharge Survey. *National Health Statistics Reports*, 5, Accessed online July 20, 2009 at <http://www.cdc.gov/nchs/data/nhsr/nhsr005.pdf>
- Eigsti, I., Zayas, V., Mischel, W., Shoda, Y., Ayduk, O., Dadlani, M. B., Davidson, M. C., Aber, J. L., Casey, B. J. (2006). Predicting cognitive control from preschool to late adolescence and young adulthood. *Psychological Science*, 17(6), 478-484
- Erblich, J., Bovbjerg, D. H., & Valdimarsdottir, H. B. (2000). Psychological distress, health beliefs, and frequency of breast self-examination. *Journal of Behavioral Medicine*, 23(3), 277-292.
- Eriksen, T. H. (2001). Ethnic identity, national identity, and intergroup conflict: The significance of personal experiences. In R. D. Ashmore, L. Jussim, & D. Wilder (Eds.), *Social Identity, Intergroup Conflict, and Conflict Reduction*. New York: Oxford University Press.
- Feinberg, L. (1997). *Transgender warriors: Making history from Joan of Arc to Dennis Rodman*. Boston: Beacon Press.
- Foster, S. F., Slade, P., & Wilson, K. (1996). Body image, maternal fetal attachment, and breast feeding. *Journal of Psychosomatic Research*, 41(2), 181-184.
- Frale, D. E. S. (1997). Gender, racial, ethnic, sexual, and class identities. *Annual Review of Psychology*, 48, 139–163.
- Fujita, K. & Han, A. (2009). Moving beyond deliberative control of impulses. *Psychological Science*, 20(7), 799-804.
- Fujita, K., Trope, Y., Liberman, N., & Levin-Sagi, M. (2006). Construal levels and self-control. *Journal of Personality and Social Psychology*, 90, 351–367.
- Gold, J. M. & Rogers, J. D. (1995). Intimacy and isolation: A validation study of Erikson's

- theory. *Journal of Humanistic Psychology*, 35, 78-86.
- Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science*, 293(5537), 2105-2108.
- Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review*, 94(3), 319-340.
- Higgins, E. T., Klein, R., & Strauman, T. (1985). Self-concept discrepancy theory: A psychological model for distinguishing among different aspects of depression and anxiety. *Social Cognition*, 3, 51 -76.
- Hines, M., Brook, C., & Conway, G. (2004). Androgen and psychosexual development: Core gender identity, sexual orientation, and recalled childhood gender role behavior in women and men with congenital adrenal hyperplasia (CAH). *The Journal of Sex Research*, 41, 75-82.
- Hoffman, R. M., Borders, L., D., Hattie, J. A. (2000). Reconceptualizing femininity and masculinity from gender roles to gender self-confidence. *Journal of Social Behavior and Personality*, 15(4), 475-503.
- Hsee, C. K., & Rottenstreich, Y. (2004). Music, pandas, and muggers: On the affective psychology of value. *Journal of Experimental Psychology: General*, 133(1), 23-30.
- James, W. (1890). *Principles of psychology*: Volume 1. New York: Holt and Company.
- Krege, S., Bex, A., Lümmer, G., & Rübber, H. (2001). Male-to-female transsexualism: A technique, results and long-term follow-up in 66 patients. *British Journal of Urology Interantional*, 88(4), 396-402.

- Kuiper, A. J. & Cohen-Kettenis, P. T. (1998). Gender role reversal among postoperative transsexuals. *International Journal of Transgenderism*, 2(3), Retrieved from <http://www.symposion.com/ijt/ijtc0502.htm>
- Libby, L. K., & Eibach, R. P. (2002). Looking back in time: Self-concept change affects visual perspective in autobiographical memory. *Journal of Personality and Social Psychology*, 82(2), 167-179.
- Lloyd, F. J., & Reyna, V. R. (2001). A web exercise in evidence-based medicine using cognitive theory. *Journal of General Internal Medicine*, 16(2), 94-99.
- Lloyd, A., Hayes, P., Bell, P. R. F., & Naylor, A. R. (2001). The Role of Risk and Benefit Perception in Informed Consent for Surgery, *Medical Decision Making*, 21(2), 141-149.
- Loewenstein, G., & O'Donoghue, T. (2007). *The heat of the moment: Modeling interactions between affect and deliberation*. Working paper.
- Mano, H. (1992). Judgments under distress: assessing the role of unpleasantness and arousal in judgment formation. *Organizational Behavior and Human Decision Processes*, 52, 216–245.
- Markus, H. (1990). On splitting the universe. *Psychological Science*, 1, 181–185.
- Mate-Kole, C., Freschi, M., & Robin, A. (1990). A controlled study of psychological and social change after surgical gender reassignment in selected male transsexuals. *The British Journal of Psychiatry*, 157, 261-264. doi: 10.1192/bjp.157.2.261
- McGlone, M. S., & Aronson, J. (2006). Stereotype threat, identity salience, and spatial reasoning. *Journal of Applied Developmental Psychology*, 27(5), 486-493.
- Mead, G. H. (1934). *Mind, self, and society*. Chicago: University of Chicago Press.
- Meyer, W., Bockting, W. O., Cohen-Kettenis, P., Coleman, E., DiCeglie, D., Devor, H. et al. (2001, February). The Standards of Care for Gender Identity Disorders – Sixth Version.

- International Journal of Transgenderism*, 5(1). Retrieved August 8, 2007, from [http://www.symposion.com/ijt/soc\\_2001/index.htm](http://www.symposion.com/ijt/soc_2001/index.htm).
- Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, 80(4), 252-283.
- Mills, B. A., Reyna, V. F., & Estrada, S. M. (2008). Explaining contradictory relations between risk perception and risk taking. *Psychological Science*, 19(5), 429-433.
- National Cancer Institute, Accessed online 7/10/2009 at <http://www.cancer.gov/cancertopics/prostate-cancer-treatment-choices/page3#thinking-3>  
<http://www.cancer.gov/cancertopics/pdq/treatment/breast/Patient/page5/>  
<http://www.cancer.gov/cancertopics/prostate-cancer-treatment-choices/page9>
- Pardo, S. T. (2009). *Fuzzy-trace theory in risk perception and medical decision making: Applications to trans and sexual minority populations*. Unpublished A-Exam, Cornell University, Ithaca, NY.
- Pardo, T. (2008). *An exploratory study of identity conceptualization and development in a sample of gender nonconforming biological females*. Unpublished Master's thesis, Cornell University, Ithaca, NY.
- Peters, E., McCaul, K. D., Stefanek, M., & Nelson, W. (2006). A heuristics approach to understanding cancer risk perception: Contributions from judgment and decision-making research. *Annals of Behavioral Medicine*, 31(1), 45-52.
- Preves, S. E. (2000). Negotiating the constraints of gender binarism: Intersexuals' challenge to gender categorization. *Current Sociology* 48(3), 27-50.



- Rachlin, K. (1999) Factors which influence individual's decisions when considering female-to-male genital reconstructive surgery. *International Journal of Transgenderism* 3(3)  
Retrieved from <http://www.symposion.com/ijt/ijt990302.htm>.
- Reis, B. & Saewyc, E. (1999). *Eighty-three thousand youth: Selected findings of eight population-based studies*. Retrieved September 5, 2008 from  
<http://www.safeschoolscoalition.org/83000youth.pdf>
- Remafedi, G., Farrow, J. A., & Deisher, R. W. (1994). Risk factors for attempted suicide in gay and bisexual youth. In G. Remafedi (Ed.), *Death by denial: Studies of suicide in gay and lesbian teenagers* (pp. 123-137). Boston, MA: Alyson Publications.
- Reyna, V. F. (2004). How people make decisions that involve risk: A dual process approach. *Current Directions in Psychological Science*, 13, 60-66.
- Reyna, V. F. (2008). A theory of medical decision making and health: Fuzzy trace theory. *Medical Decision Making*, 28, 850-865. doi: 10.1177/0272989X08327066
- Reyna, V. F. & Adam, M. B. (2003). Fuzzy-trace theory, risk communication, and product labeling in sexually transmitted diseases. *Risk Analysis*, 23(2), 325-342.
- Reyna, V. F. & Brainerd, C. J. (1994). The origins of probability judgment. A review of data and theories. In G. Wright & P. Ayton (Eds.). *Subjective Probability*
- Reyna, V. F. & Brainerd, C. J. (1995). Fuzzy-trace theory: An interim synthesis. *Learning and Individual Differences*, 7, 1-75.
- Reyna, V. F. & Brainerd, C. J. (2008). Numeracy, ratio bias, and denominator neglect in judgments of risk and probability. *Learning and Individual Differences*, 18, 89-107.
- Reyna, V. F., & Casillas, W. (2009). Development and dual processes in moral reasoning: A fuzzy-trace theory approach. In D. Bartels, C. W. Bauman, L. J. Skitka, & D. L. Medin,

- (Eds). *Psychology of Learning and Motivation: Moral Judgment and Decision Making*. San Diego, CA: Elsevier.
- Reyna, V. F. & Ellis, S. C. (1994). Fuzzy-trace theory and framing effects in children's risky decision making. *Psychological Science*, 5, 275-279.
- Reyna, V. F. & Farley, F. (2006). Risk and rationality in adolescent decision making: Implications for theory, practice, and public policy. *Psychological Science in the Public Interest*, 7, 1-44.
- Reyna, V. F. & Hamilton, A. J. (2001). The importance of memory in informed consent for surgical risk. *Medical Decision Making*, 21(2), 152-155.
- Reyna, V. F., & Kiernan, B. (1994). The development of gist versus verbatim memory in sentence recognition: Effects of lexical familiarity, semantic content, encoding instruction, and retention interval. *Developmental Psychology*, 30, 178-191.
- Reyna, V. F., & Lloyd, F. J. (2006). Physician decision making and cardiac risk: Effects of knowledge, risk perception, risk tolerance, and fuzzy processing. *Journal of Experimental Psychology: Applied*, 12(3), 179-195.
- Reyna, V. F., Lloyd, F. J., & Brainerd, C. J. (2003). Memory, development, and rationality: An integrative theory of judgment and decision making. (pp. 201-245), In S. L. Schneider & J. Shanteau, *Emerging Perspectives on Judgment and Decision Research*. Cambridge, UK: Cambridge University Press.
- Reyna, V. F., Lloyd, F. J., Whalen, P. (2001). Genetic testing and medical decision making. *Archives of Internal Medicine*, 161, 2406-2408.

- Reyna, V. F., Nelson, W. L., Han, P. K., & Dieckmann, N. F. (2009). How numeracy influences risk comprehension and medical decision making. *Psychological Bulletin*, *135*(6), 943-973.
- Riggle, E. D. B., Rostosky, S. S., McCants, L. E., & Pascale-Hague, D. (2011). The positive aspects of a transgender self-identification. *Psychology & Sexuality*, *2*(2), 147-158.
- Ritov, I. & Baron, J. (1999). Protected values and omission bias. *Organizational Behavior and Human Decision Processes*, *79*(2), 79-94.
- Rivers, S. E., Reyna, V. F., & Mills, B. A. (2008). Risk taking under the influence: A fuzzy-trace theory of emotion in adolescence. *Developmental Review*, *28*, 107-144.
- Ruble, D. N., Martin, C., & Berenbaum, S. A. (2007). Gender development. In N. Eisenberg (Ed.), *Handbook of Child Psychology* (6th ed., Vol. 3, pp. 858-932). New York: Wiley.
- Shih, M., Pittinsky, T. L., Ambady, N. (1999). Stereotype Susceptibility: Identity salience and shifts in quantitative performance. *Psychological Science*, *10*(1), 80-83.
- Slaby, R. G., & Frey, K. S. (1975). Development of gender constancy and selective attention to same-sex models. *Child Development*, *52*, 849-856.
- Smith, E. R. & DeCoster, J. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review*, *4*(2), 108-131.
- Sullivan, H. S. (1940). *Conceptions of modern psychiatry*. New York: Norton
- Sutcliffe, P. A., Dixon, S., Akehurst, R. L., Wilkinson, A., Shippam, A., White, S., Richards, R. & Caddy, C. M. (2009). *Journal of Plastic, Reconstructive & Aesthetic Surgery*, *62*(3), 294-306.

- Tajfel, H. (1981). *Human groups and social categories*. Cambridge, England: Cambridge University
- Tetlock, P. E. (2003). Thinking the unthinkable: Sacred values and taboo cognitions, *Trends in Cognitive Sciences*, 7(7), 320-324.
- Tharinger, D. J. (2008). Maintaining the hegemonic masculinity through selective attachment, homophobia, and gay-baiting in schools: Challenges to intervention. *School Psychology Review*, 37(2), 221-227.
- Titcomb, A. L. & Reyna, V. F. (1995). Memory interference and misinformation effects. In F. N. Dempster & C. J. Brainerd (Eds.), *Interference and inhibition in cognition* (pp. 263-294). San Diego, CA: Academic Press.
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, 110, 403-421.
- Veronesi, U., Cascinelli, Mariani, L, Greco, M., Saccozzi, R., Luini, A., Aguilar, M., & Marubini, E. (2002). Twenty-year follow-up of a randomized study comparing breast-conserving surgery with radical mastectomy for early breast cancer. *The New England Journal of Medicine*, 347(16), 1227-1232.
- Wang, Q. (2001). Culture effects on adults' earliest childhood recollection and self-description: Implications for the relation between memory and the self. *Journal of Personality and Social Psychology*, 81(2), 220-233.
- Wang, Q. & Brockmeier, J. (2002). Autobiographical remembering as cultural practice: Understanding the interplay between memory, self, and culture. *Culture & Psychology*, 8, 45-64.
- Wilmoth, M. C. (2001). Aftermath of breast cancer: An altered sexual self. *Cancer Nursing*, 24(4), 278-286.

APPENDIX A

Hoffman Gender Scale Revised Form A: Femininity (14-item)

**Instructions:** Please indicate your level of agreement with each of the following statements by rating it on the 6-point scale below:

- (1) Strongly Disagree
- (2) Disagree
- (3) Somewhat Disagree
- (4) Somewhat Agree
- (5) Agree
- (6) Strongly Agree

- 1. When I am asked to describe myself, being female is one of the first things I think of.
- 2. I am confident in my femininity.
- 3. I meet my personal standards for femininity.
- 4. My perception of myself is positively associated with my biological sex.
- 5. I am secure in my femininity.
- 6. I define myself largely in terms of my femininity.
- 7. My identity is strongly tied to my femininity.
- 8. I have a high regard for myself as a female.
- 9. Being a female is a critical part of how I view myself.
- 10. I am happy with myself as a female.
- 11. I am very comfortable being a female.
- 12. Femininity is an important aspect of my self-concept.
- 13. My sense of myself as a female is positive.
- 14. Being a female contributes a great deal to my sense of confidence.

What do you mean by femininity?

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Hoffman Gender Scale Revised Form B: Masculinity

**Instructions:** Please indicate your level of agreement with each of the following statements by rating it on the 6-point scale below:

- (1) Strongly Disagree
- (2) Disagree
- (3) Somewhat Disagree
- (4) Somewhat Agree
- (5) Agree
- (6) Strongly Agree

- 1. When I am asked to describe myself, being male is one of the first things I think of.
- 2. I am confident in my masculinity.
- 3. I meet my personal standards for masculinity.
- 4. My perception of myself is positively associated with my biological sex.
- 5. I am secure in my masculinity.
- 6. I define myself largely in terms of my masculinity.
- 7. My identity is strongly tied to my masculinity.
- 8. I have a high regard for myself as a male.
- 9. Being a male is a critical part of how I view myself.
- 10. I am happy with myself as a male.
- 11. I am very comfortable being a male.
- 12. Masculinity is an important aspect of my self-concept.
- 13. My sense of myself as a male is positive.
- 14. Being a male contributes a great deal to my sense of confidence.

What do you mean by masculinity?

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## APPENDIX B

**Note: Highlighted choices mark the predicted choice in the identity prime condition**

### **DECISION PROBLEM #1 (breast cancer)**

**Preamble:** Imagine that at your most recent doctor's appointment you were found to have early stage breast cancer. The cancer has formed in the breast but it has not yet spread. There are two contemporary treatment options for treatment of this disease (breast conserving surgery or total mastectomy).

If you choose breast conserving surgery, the cancerous tumor will be removed using a small incision to preserve the natural breast, but there is a higher risk of cancer recurrence (8-14%).

If you choose mastectomy, the cancer, the surrounding vulnerable tissue, and the breasts will all be surgically removed, but there is very little (4%) risk of cancer recurrence.

**A) Breast Conserving Surgery.**

**B) Total mastectomy.**

Assuming that whatever option you choose will be provided free of charge, from the above available options, which would you choose (*pick as if you had to choose one of the above in real life*)?

Choice: \_\_\_\_\_

What factor(s) influenced your decision?

## DECISION PROBLEM #2 – PROSTATE CANCER

**Preamble:** Imagine that you are a man and that at your most recent doctor's appointment your doctor confirmed with a biopsy that you have early stage prostate cancer, and that it is still confined to the prostate gland. There are two contemporary treatment options for treatment of this disease (hormone therapy and prostatectomy).

If you choose hormone therapy, 62% of cases result in enlarged breasts and 30% of cases result in erectile problems.

If you choose prostatectomy the prostate gland and the cancer will be completely removed, but there is up to 35% recurrence risk of a more aggressive cancer within 10 years that will kill you for sure.

**A) Hormone therapy.**

**B) Prostatectomy.**

Assuming that whatever option you choose will be provided free of charge, from the above available options, which would you choose (*pick as if you had to choose one of the above in real life*)?

Choice: \_\_\_\_\_



### **DECISION PROBLEM #3 – GYNECOMASTIA (non-cancerous)**

**Preamble:** Imagine that you are a man, and that at your most recent doctor’s appointment your doctor confirmed that you have gynecomastia. Gynecomastia is characterized by an overgrowth of breast tissue in males. Your doctor tells you that your options are to bind your breasts using a chest compression vest or to pursue surgical mastectomy.

If you choose chest compression, you may be able to hide your breasts and there is no immediate threat to your health, but you will have to bind every day in order to not appear to have breasts. The vest may restrict ease of breathing, may be uncomfortable in the warmer seasons, and there is no action to permanently remove the breasts, so there is always the risk that someone will find out that your body has breasts.

If you choose a mastectomy, the breast tissue will be permanently removed giving you a flat male chest, but there are serious risks including blood loss during surgery, surgical site infection, permanent scarring, and anesthesia-related death (1 in 1800 cases).

**A) Binding/chest compression vest.**

**B) Modified mastectomy.**

Assuming that whatever option you choose will be provided free of charge, from the above available options, which would you choose (*pick as if you had to choose one of the above in real life*)?

Choice: \_\_\_\_\_

## DECISION PROBLEM #4 – FTM GENDER TRANSITION

**Preamble:** Imagine that although you were born female, you identify as transgender and experience extreme discomfort with being seen as a woman, and you have a strong desire to live as a man and be read as male. Your behaviors, thoughts, and dress style preferences differ from the societal norms and expectations of women, and you regularly feel like your “trapped in the wrong body.”

You are deciding whether (or not) to undergo sex reassignment to live as a male. Your treating therapist confirms that you might benefit from sex reassignment, but that the decision to transition is completely up to you. Your doctor tells you that your options are to bind your breasts using a chest compression vest or to pursue surgical mastectomy.

If you choose chest compression, you may be able to hide your breasts and there is no immediate threat to your health, but you will have to bind every day in order to not appear to have breasts. The vest may restrict ease of breathing, may be uncomfortable in the warmer seasons, and there is no action to permanently remove the breasts, so there is always the risk that someone will find out that your body has breasts.

If you choose a mastectomy, the breast tissue will be permanently removed giving you a flat male chest, but there are serious risks including blood loss during surgery, surgical site infection, permanent scarring, and anesthesia-related death (1 in 1800 cases).

A) **Binding/chest compression vest.**

**B) Modified mastectomy.**

Assuming that whatever option you choose will be provided free of charge, from the above available options, which would you choose (*pick as if you had to choose one of the above in real life*)?

Choice: \_\_\_\_\_

TABLES

Table 1. Sample Demographics

	<b>MEN (N=187)</b>	<b>WOMEN (N=471)</b>	<b>TRANSGENDER (N=229)</b>	<b>TOTAL (N=887)</b>
<b>AGE (mean ± SD [range])</b>	21.0±4.7 [18-54]	21.2±6.0 [18-72]	28.2±9.5 [18-62]	22.3±7.5 [18-72]
<b>BIRTHSEX</b>				
MALE	185(99%)	-	11(5%)	196(21%)
FEMALE	2(1%)	466(99%)	215(94%)	683(73%)
INTERSEX	-	4(1%)	3(1%)	7(1%)
<b>RACE</b>				
ASIAN	17(9%)	18(4%)	1(<1%)	73(8%)
BLACK	5(3%)	55(12%)	3(1%)	26(3%)
WHITE	78(42%)	186(40%)	177(77%)	441(47%)
SOUTH AMERICAN/LATINO	3(2%)	7(2%)	7(3%)	17(2%)
MEXICAN				
AMERICAN/CHICANO	1(1%)	3(1%)	5(2%)	9(1%)
MIXED ETHNICITY	3(2%)	12(3%)	30(13%)	45(5%)
<b>EDUCATION</b>				
DID NOT FINISH HIGH SCHOOL	-	-	6(3%)	6(1%)
HIGH SCHOOL DIPLOMA (or GED)	81(43%)	211(45%)	96(42%)	388 (42%)
BACHELORS	13(7%)	33(7%)	69(30%)	115(12%)
MASTERS	8(4%)	26(6%)	37(16%)	71(8%)
DOCTORATE or PROFESSIONAL	5(3%)	10(2%)	14(6%)	29(3%)
<b>SEXUAL ORIENTATION LABEL</b>				
ASEXUAL	7(4%)	5(1%)	10(4%)	12 (1%)

BISEXUAL	4(2%)	15(3%)	12(5%)	19 (2%)
GAY	14(8%)	3(1%)	26(11%)	17 (2%)
HETEROSEXUAL	124(66%)	384(82%)	30(13%)	508 (54.4)
LESBIAN	1(1%)	9(2%)	5(2%)	10 (1%)
MAN-AMOROUS	-	18(4%)	4(2%)	18 (2%)
PANSEXUAL	1(1%)	7(2%)	43(19%)	8 (1%)
WOMAN-AMOROUS	14(8%)	2(<1%)	2(1%)	16 (2%)
OTHER	1(1%)	3(1%)	25(11%)	4 (<1%)
<b>SEXUAL ATTRACTIONS</b>				
<b>(mean ± SD [range])</b>				
MEN	13.5±31.0 [0-100]	91.3±20.7 [0-100]	35.1±32.5 [0-100]	62.6±42.8 [0-100]
WOMEN	83.9±33.9 [0-100]	6.7±16.5 [0-100]	41.4±36.2 [0-100]	30.5±40.5 [0-100]
TRANSGENDER	.8±4.4 [0-45]	1.0±6.7 [0-90]	18.6±21.5 [0-80]	4.5±13.2 [0-90]
<b>SEXUAL BEHAVIORS</b>				
MEN	9.3±28.3 [0-100]	78.4±40.0 [0-100]	23.7±39.1 [0-100]	52.0±48.7 [0-100]
WOMEN	73.6±43.6 [0-100]	3.5±17.3 [0-100]	39.1±46.9 [0-80]	26.0±43 [0-100]
TRANSGENDER	.03±.4 [0-5]	.6±7.1 [0-100]	13.0±30.0 [0-100]	3.0±15.4 [0-100]
<b>HOFFMAN GENDER SCALE</b>				
TOTAL_FEMALE	1.8±.9 [1-6]	5.0±.7 [1-6]	1.8±1.0 [1-5.6]	3.66±1.76 [1-6]
TOTAL_MALE	4.9±.9 [1-6]	1.4±.7 [1-5.9]	4.4±1.0 [1-6]	2.95±1.83 [1-6]
SELF-DEFINITION_FEMALE	1.9±.8 [1-6]	4.6±.9 [1-6]	1.6±.9 [1-5.3]	3.41±1.68 [1-6]
SELF-DEFINITION_MALE	4.7±1.1 [1-6]	1.5±.6 [1-6]	4.1±1.1 [1-6]	2.84±1.70 [1-6]
SELF-ACCEPTANCE_FEMALE	1.8±1.0 [1-6]	5.4±.7 [1-6]	2.0±1.2 [1-6]	3.90±1.93 [1-6]
SELF-ACCEPTANCE_MALE	5.2±.9 [1-6]	1.4±.7 [1-5.7]	4.8±1.1 [1-6]	3.08±2.01 [1-6]

Table 2

A 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on identity preserving choice

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Problem gender identity	12.91	1	12.91	61.34	0.00	0.193
Problem gender identity * Gender	0.58	1	0.58	2.75	0.10	0.011
Problem gender identity * Standard dual process condition	0.22	1	0.22	1.05	0.31	0.004
Problem gender identity* Magnitude	0.10	1	0.10	0.47	0.50	0.002
Problem gender identity* Gender * Standard dual process condition	1.06	1	1.06	5.03	0.03	0.019
Problem gender identity * Gender * Magnitude	0.97	1	0.97	4.59	0.03	0.018
Problem gender identity * Standard dual process condition * Magnitude	0.02	1	0.02	0.10	0.75	0.000
Problem gender identity * Gender * Standard dual process condition * Magnitude	0.11	1	0.11	0.51	0.48	0.002
Error(problem gender identity)	53.89	256	0.21			
Problem natal sex	0.04	1	0.04	0.21	0.65	0.001
Problem natal sex * Gender	0.59	1	0.59	3.08	0.08	0.012
Problem natal sex * Standard dual process condition	1.04	1	1.04	5.44	0.02	0.021
Problem natal sex * Magnitude	0.28	1	0.28	1.47	0.23	0.006
Problem natal sex * Gender * Standard dual process condition	0.38	1	0.38	1.99	0.16	0.008

Problem natal sex * Gender * Magnitude	0.01	1	0.01	0.04	0.84	0.000
Problem natal sex * standard dual process condition * Magnitude	0.08	1	0.08	0.41	0.53	0.002
Problem natal sex * Gender * Standard dual process condition * Magnitude	0.00	1	0.00	0.00	0.99	0.000
Error(Problem natal sex)	48.89	256	0.19			
Problem gender identity * Problem natal sex	5.93	1	5.93	33.50	0.00	0.116
Problem gender identity * Problem natal sex * Gender	0.05	1	0.05	0.28	0.60	0.001
Problem gender identity * Problem natal sex * standard dual process condition	0.26	1	0.26	1.47	0.23	0.006
Problem gender identity * Problem natal sex * Magnitude	0.32	1	0.32	1.81	0.18	0.007
Problem gender identity * Problem natal sex * Gender * Standard dual process condition	0.04	1	0.04	0.22	0.64	0.001
Problem gender identity * Problem natal sex * Gender * Magnitude	0.05	1	0.05	0.25	0.62	0.001
Problem gender identity * Problem natal sex * standard dual process condition * Magnitude	0.02	1	0.02	0.12	0.73	0.000
Gender	0.19	1	0.19	0.78	0.38	0.003
Standard dual process condition	0.02	1	0.02	0.10	0.75	0.000
Magnitude	0.76	1	0.76	3.10	0.08	0.012
Gender * Standard dual process condition	0.01	1	0.01	0.05	0.83	0.000
Gender * Magnitude	0.19	1	0.19	0.76	0.38	0.003
Standard dual process condition * Magnitude	0.49	1	0.49	1.98	0.16	0.008

Gender * Standard dual process condition * Magnitude	0.79	1	0.79	3.21	0.07	0.012
Error	62.61	256	0.25			

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Table 3

A 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on signed confidence

<b>Source</b>	<b>SS</b>	<b>df</b>	<b>MS</b>	<b>F</b>	<b>Sig.</b>	<b>Partial Eta Squared</b>
Problem gender identity	324038.03	1	324038.03	72.03	0.00	0.253
Problem gender identity * Gender	13920.59	1	13920.59	3.10	0.08	0.014
Problem gender identity * standard dual process condition	2929.58	1	2929.58	0.65	0.42	0.003
Problem gender identity * Magnitude	7192.35	1	7192.35	1.60	0.21	0.007
Problem gender identity * Gender * standard dual process condition	14500.77	1	14500.77	3.22	0.07	0.015
Problem gender identity * Gender * Magnitude	10286.89	1	10286.89	2.29	0.13	0.011
Problem gender identity * standard dual process condition * Magnitude	0.80	1	0.80	0.00	0.99	0.000
Problem gender identity * Gender * standard dual process condition * Magnitude	1144.14	1	1144.14	0.25	0.62	0.001
Error(Problem gender identity)	958162.48	213	4498.42			
Problem natal sex	1243.88	1	1243.88	0.37	0.54	0.002
Problem natal sex * Gender	3559.39	1	3559.39	1.06	0.30	0.005
Problem natal sex * standard dual process condition	4657.12	1	4657.12	1.39	0.24	0.006
Problem natal sex * Magnitude	11384.02	1	11384.02	3.40	0.07	0.016
Problem natal sex * Gender * standard dual process condition	2890.68	1	2890.68	0.86	0.35	0.004



Problem natal sex * Gender * Magnitude	1481.94	1	1481.94	0.44	0.51	0.002
Problem natal sex * standard dual process condition * Magnitude	3280.80	1	3280.80	0.98	0.32	0.005
Problem natal sex * Gender * standard dual process condition * Magnitude	958.34	1	958.34	0.29	0.59	0.001
Error(Problem natal sex)	712788.95	213	3346.43			
Problem gender identity * Problem natal sex	116271.63	1	116271.63	36.21	0.00	0.145
Problem gender identity * Problem natal sex * Gender	291.89	1	291.89	0.09	0.76	0.000
Problem gender identity * Problem natal sex * standard dual process condition	1587.10	1	1587.10	0.49	0.48	0.002
Problem gender identity * Problem natal sex * Magnitude	10050.30	1	10050.30	3.13	0.08	0.014
Problem gender identity * Problem natal sex * Gender * standard dual process condition	3060.56	1	3060.56	0.95	0.33	0.004
Problem gender identity * Problem natal sex * Gender * Magnitude	10.86	1	10.86	0.00	0.95	0.000
Problem gender identity * Problem natal sex * standard dual process condition * Magnitude	1126.77	1	1126.77	0.35	0.55	0.002
Gender	5555.93	1	5555.93	1.03	0.31	0.005
standard dual process condition	2679.88	1	2679.88	0.50	0.48	0.002
Magnitude	10938.04	1	10938.04	2.03	0.16	0.009
Gender * standard dual process condition	1.62	1	1.62	0.00	0.99	0.000
Gender * Magnitude	10060.92	1	10060.92	1.87	0.17	0.009

standard dual process condition *						
Magnitude	9489.06	1	9489.06	1.76	0.19	0.008
Gender * standard dual process condition * Magnitude	14159.75	1	14159.75	2.63	0.11	0.012
Error	1149000.00	213	5395.20			

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Table 4

A 2(problem gender orientation) x 2(problem natal sex orientation) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Problem gender identity	95.63	1	95.63	457.52	0.00	0.36
Problem gender identity * Gender	19.25	2	9.62	46.04	0.00	0.10
Problem gender identity * Gist	0.04	1	0.04	0.17	0.68	0.00
Problem gender identity * Identity	0.38	1	0.38	1.80	0.18	0.00
Problem gender identity * Gender * Gist	0.70	2	0.35	1.67	0.19	0.00
Problem gender identity * Gender * Identity	0.11	2	0.06	0.27	0.76	0.00
Problem gender identity * Gist * Identity	0.34	1	0.34	1.63	0.20	0.00
Problem gender identity * Gender * Gist * Identity	0.12	2	0.06	0.29	0.75	0.00
Error(Problem gender identity)	171.60	821	0.21			
Problem natal sex	0.49	1	0.49	3.16	0.08	0.00
Problem natal sex * Gender	7.14	2	3.57	22.89	0.00	0.05
Problem natal sex * Gist	0.60	1	0.60	3.81	0.05	0.01
Problem natal sex * Identity	0.58	1	0.58	3.72	0.05	0.01
Problem natal sex * Gender * Gist	0.12	2	0.06	0.38	0.69	0.00
Problem natal sex * Gender * Identity	0.55	2	0.28	1.77	0.17	0.00
Problem natal sex * Gist * Identity	0.11	1	0.11	0.68	0.41	0.00
Problem natal sex * Gender * Gist * Identity	0.07	2	0.04	0.24	0.79	0.00

Error(Problem natal sex)	128.09	821	0.16			
Problem gender identity* Problem natal sex	0.08	1	0.08	0.50	0.48	0.00
Problem gender identity* Problem natal sex * Gender	14.50	2	7.25	43.78	0.00	0.10
Problem gender identity* Problem natal sex * Gist	0.02	1	0.02	0.10	0.75	0.00
Problem gender identity* Problem natal sex * Identity	0.22	1	0.22	1.35	0.25	0.00
Problem gender identity* Problem natal sex * Gender * Gist	0.15	2	0.07	0.44	0.65	0.00
Problem gender identity* Problem natal sex * Gender * Identity	0.17	2	0.08	0.51	0.60	0.00
Problem gender identity* Problem natal sex * Gist * Identity	0.02	1	0.02	0.12	0.73	0.00
Gender	0.26	2	0.13	0.58	0.56	0.00
Gist	0.07	1	0.07	0.32	0.57	0.00
Identity	0.04	1	0.04	0.18	0.67	0.00
Gender * Gist	0.01	2	0.00	0.02	0.99	0.00
Gender * Identity	0.54	2	0.27	1.17	0.31	0.00
Gist * Identity	0.00	1	0.00	0.01	0.93	0.00
Gender * Gist * Identity	0.29	2	0.14	0.62	0.54	0.00
Error	188.47	821	0.23			

Table 5

A 2(problem gender orientation) x 2(problem natal sex orientation) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measures ANOVA on signed confidence

Source	SS	df	MS	F	Sig.	Partial Eta Squared
Problem gender identity	2918289.23	1	2918289.23	602.31	.00	.444
Problem gender identity * Gender	826848.54	2	413424.27	85.33	.00	.185
Problem gender identity * Gist	368.79	1	368.79	.08	.78	.000
Problem gender identity * Identity	4186.18	1	4186.18	.86	.35	.001
Problem gender identity * Gender * Gist	26863.99	2	13432.00	2.77	.06	.007
Problem gender identity * Gender * Identity	3833.02	2	1916.51	.40	.67	.001
Problem gender identity * Gist * Identity	5943.45	1	5943.45	1.23	.27	.002
Problem gender identity * Gender * Gist * Identity	465.38	2	232.69	.05	.95	.000
Error(Problem gender identity)	3648383.10	753	4845.13			
Problem natal sex	55350.99	1	55350.99	17.18	.00	.022
Problem natal sex* Gender	186746.60	2	93373.30	28.97	.00	.071
Problem natal sex* Gist	16340.59	1	16340.59	5.07	.02	.007
Problem natal sex* Identity	10023.03	1	10023.03	3.11	.08	.004
Problem natal sex* Gender * Gist	1420.99	2	710.50	.22	.80	.001
Problem natal sex* Gender * Identity	14895.06	2	7447.53	2.31	.10	.006
Problem natal sex* Gist * Identity	1199.14	1	1199.14	.37	.54	.000
Problem natal sex* Gender * Gist * Identity	1165.03	2	582.52	.18	.83	.000

Error(Problem natal sex)	2426648.87	753	3222.64			
Problem gender identity * Problem natal sex	5669.64	1	5669.64	1.63	.20	.002
Problem gender identity * Problem natal sex * Gender	492825.59	2	246412.80	70.97	.00	.159
Problem gender identity * Problem natal sex * Gist	864.97	1	864.97	.25	.62	.000
Problem gender identity * Problem natal sex * Identity	749.76	1	749.76	.22	.64	.000
Problem gender identity * Problem natal sex * Gender * Gist	7540.63	2	3770.31	1.09	.34	.003
Problem gender identity * Problem natal sex * Gender * Identity	4246.05	2	2123.03	.61	.54	.002
Problem gender identity * Problem natal sex * Gist * Identity	3246.31	1	3246.31	.94	.33	.001
Problem gender identity * Problem natal sex * Gender * Gist * Identity	1371.66	2	685.83	.20	.82	.001
Error(Problem gender identity * Problem natal sex)	2614328.61	753.00	3471.88			
Gender	16679.57	2.00	8339.79	1.65	.19	.004
Gist	1355.26	1.00	1355.26	.27	.60	.000
Identity	14.68	1.00	14.68	.00	.96	.000
Gender * Gist	51.96	2.00	25.98	.01	.99	.000
Gender * Identity	6400.38	2.00	3200.19	.63	.53	.002
Gist * Identity	710.55	1.00	710.55	.14	.71	.000
Gender * Gist * Identity	7703.01	2.00	3851.50	.76	.47	.002
Error	3799430.187	753	5045.72			

Table 6

A 2(problem gender orientation) x 2(problem natal sex orientation) x 3(gender) x 3(randomization) repeated measures ANOVA on identity preserving choice

<b>Source</b>	<b>SS</b>	<b>df</b>	<b>MS</b>	<b>F</b>	<b>Sig.</b>	<b>Partial Eta Squared</b>
Problem gender identity	31.00	1	31.00	131.01	.00	.174
Problem gender identity * Gender	.07	1	.07	.28	.60	.000
Problem gender identity * Randomization	.55	2	.27	1.16	.31	.004
Problem gender identity * Gender * Randomization	1.27	2	.64	2.69	.07	.009
Error(Problem gender identity)	147.64	624	.24			
Problem natal sex	.98	1	.98	5.66	.02	.009
Problem natal sex * Gender	1.11	1	1.11	6.40	.01	.010
Problem natal sex * Randomization	.59	2	.30	1.71	.18	.005
Problem natal sex * Gender * Randomization	.00	2	.00	.00	1.00	.000
Error(Problem natal sex)	108.14	624	.17			
Problem gender identity * Problem natal sex	5.99	1	5.99	33.06	.00	.050
Problem gender identity * Problem natal sex * Gender	.50	1	.50	2.75	.10	.004
Problem gender identity * Problem natal sex * Randomization	.30	2	.15	.81	.44	.003
Problem gender identity * Problem natal sex * Gender * Randomization	.05	2	.03	.14	.87	.000

Error(Problem gender identity * Problem natal sex)	113.13	624	.18				
Intercept	547.65	1	547.65	2079.09	.00	.769	
Gender	.00	1	.00	.01	.92	.000	
Randomization	.94	2	.47	1.78	.17	.006	
Gender * Randomization	.78	2	.39	1.48	.23	.005	
Error	164.37	624	.26				

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Table 7

Means by gender group and decision problem for each value rating

	Prostate Cancer			Breast Cancer		
	transgender	male	female	transgender	male	female
1. surviving cancer	8.70	9.03	9.31	8.95	9.15	9.38
2. living in the wrong body for your gender identity	7.28	5.85	5.69	7.97	5.96	5.69
3. uncomfortable in the warmer seasons	4.53	4.52	4.28	5.39	4.75	4.70
4. enlarged breasts	5.29	5.71	5.29	4.85	5.33	4.57
5. surgical risks (e.g., blood loss, surgical site infection, anesthesia-related death)	5.30	7.08	7.58	5.16	6.76	7.31
6. pain	4.82	5.99	6.77	4.56	5.61	6.69
7. being able to hide your breasts if you are male	7.16	6.22	5.75	7.53	6.34	5.06
8. conserving the breast	1.72	4.12	4.17	1.87	5.25	6.55
9. disability	5.55	7.04	7.15	5.68	7.40	7.28
10. having a flat chest if you see yourself as male	7.42	6.25	5.68	8.50	6.09	5.00
11. conserving erectile function	5.78	7.65	6.72	4.84	7.21	5.00
12. cancer recurrence	8.40	8.52	9.10	8.29	8.72	8.98
13. my identity as male, or as a man	7.91	7.70	6.67	7.97	7.38	4.14
14. my identity as female, or as a woman	1.81	3.63	5.07	2.29	4.26	7.90

*Note.* Values were rated on a 10-point Likert scale from 1 = Least important and 10 = Most important.

Table 7 (cont)

Means by gender group and decision problem for each value rating

	Gynecomastia			Gender Transition		
	transgender	male	female	transgender	male	female
1. surviving cancer	7.23	8.01	7.63	6.11	7.29	6.41
2. living in the wrong body for your gender identity	8.23	6.14	6.21	8.89	6.86	7.88
3. uncomfortable in the warmer seasons	5.80	5.12	5.43	5.93	4.80	5.23
4. enlarged breasts	5.66	5.88	5.81	5.04	5.29	5.24
5. surgical risks (e.g., blood loss, surgical site infection, anesthesia-related death)	5.25	7.02	7.62	5.00	6.90	7.61
6. pain	4.92	5.94	6.74	4.43	5.98	6.69
7. being able to hide your breasts if you are male	8.38	6.76	6.94	8.48	6.40	6.39
8. conserving the breast	1.73	4.22	4.33	1.71	4.36	4.14
9. disability	5.27	6.81	6.82	4.79	6.67	6.42
10. having a flat chest if you see yourself as male	8.82	7.04	6.91	8.95	6.91	7.10
11. conserving erectile function	4.69	6.90	5.28	3.93	6.17	4.44
12. cancer recurrence	6.89	7.47	7.39	5.82	7.01	6.17
13. my identity as male, or as a man	8.48	7.76	7.10	8.98	7.83	7.28
14. my identity as female, or as a woman	1.93	3.52	5.30	2.00	4.03	5.54

*Note.* Values were rated on a 10-point Likert scale from 1 = Least important and 10 = Most important.

Table 8

A 4(decision problem) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on value rating

Source	SS	df	MS	F	Sig.	Partial Eta Squared
<b>Surgical Risk Value Rating</b>						
gender	1940.82	2	970.41	49.56	.000	.123
problem * gender	16.82	6	2.80	2.19	.04	.006
problem * gender * gist	17.81	6	2.97	2.32	.03	.007
Error	13864.32	708	19.58			
<b>Conserving the Breast Value Rating</b>						
gender	3187.79	2	1593.90	85.31	.000	.199
problem	424.97	3	141.66	41.69	.000	.057
problem * gender	339.53	6	56.59	16.66	.000	.046
Error	12836.41	687	18.69			
<b>Cancer Recurrence Value Rating</b>						
gender	131.90	2	65.95	4.07	.02	.012
problem	2006.23	3	668.75	136.61	.000	.168
problem * gender	64.34	6	10.72	2.19	.04	.006
gist prime * identity prime	61.52	1	61.52	3.80	.05	.006
problem * gist prime * identity prime	110.79	3	36.93	7.54	.000	.011

Error

**Conserving Erectile Function Value Rating**

gender	1164.72	2	582.36	24.09	.000	.066
problem	849.86	3	283.29	77.84	.000	.103
problem * gender	72.86	6	12.14	3.34	.003	.010
gist prime * gender	170.27	2	85.13	3.52	.03	.010
gist prime * identity prime	104.36	1	104.36	4.32	.04	.006
problem * gist prime * identity prime	35.19	3	11.73	3.22	.02	.005
problem * gender * gist prime * identity prime	50.22	6	8.37	3.00	.03	.007

---

Table 9

Correlations table of value ratings and choice across the four decision problems

	<b>Breast Cancer</b>	<b>Prostate Cancer</b>
1. surviving cancer	-.150**	-.148**
2. living in the wrong body for your gender identity	-.159**	.103**
3. uncomfortable in the warmer seasons	-0.046	.078*
4. enlarged breasts	.086*	.117**
5. surgical risks (e.g., blood loss, surgical site infection, anesthesia-related death)	.143**	-0.036
6. pain	.126**	-0.035
7. being able to hide your breasts if you are male	-.118**	.142**
8. conserving the breast	.616**	-0.071
9. disability	.096**	-0.032
10. having a flat chest if you see yourself as male	-.222**	.175**
11. conserving erectile function	.113**	0.049
12. cancer recurrence	-.236**	-.142**
13. my identity as male, or as a man	-.125**	.122**
14. my identity as female, or as a woman	.277**	-0.038

Note. \*p<.05, \*\*p<.01, \*\*\*p<.001

Table 9 (cont)

Correlations table of value ratings and choice across the four decision problems

	<b>Gynecomastia</b>	<b>Gender Transition</b>
1. surviving cancer	0.006	-0.056
2. living in the wrong body for your gender identity	.157**	.293**
3. uncomfortable in the warmer seasons	.100**	.137**
4. enlarged breasts	.090*	0.069
5. surgical risks (e.g., blood loss, surgical site infection, anesthesia-related death)	-.263**	-.294**
6. pain	-.120**	-.133**
7. being able to hide your breasts if you are male	.269**	.260**
8. conserving the breast	-.152**	-.211**
9. disability	-.112**	-.127**
10. having a flat chest if you see yourself as male	.308**	.316**
11. conserving erectile function	0.043	0.01
12. cancer recurrence	-0.047	-.074*
13. my identity as male, or as a man	.252**	.265**
14. my identity as female, or as a woman	-.138**	-.168**

Note. \*p<.05, \*\*p<.01, \*\*\*p<.001

## FIGURES

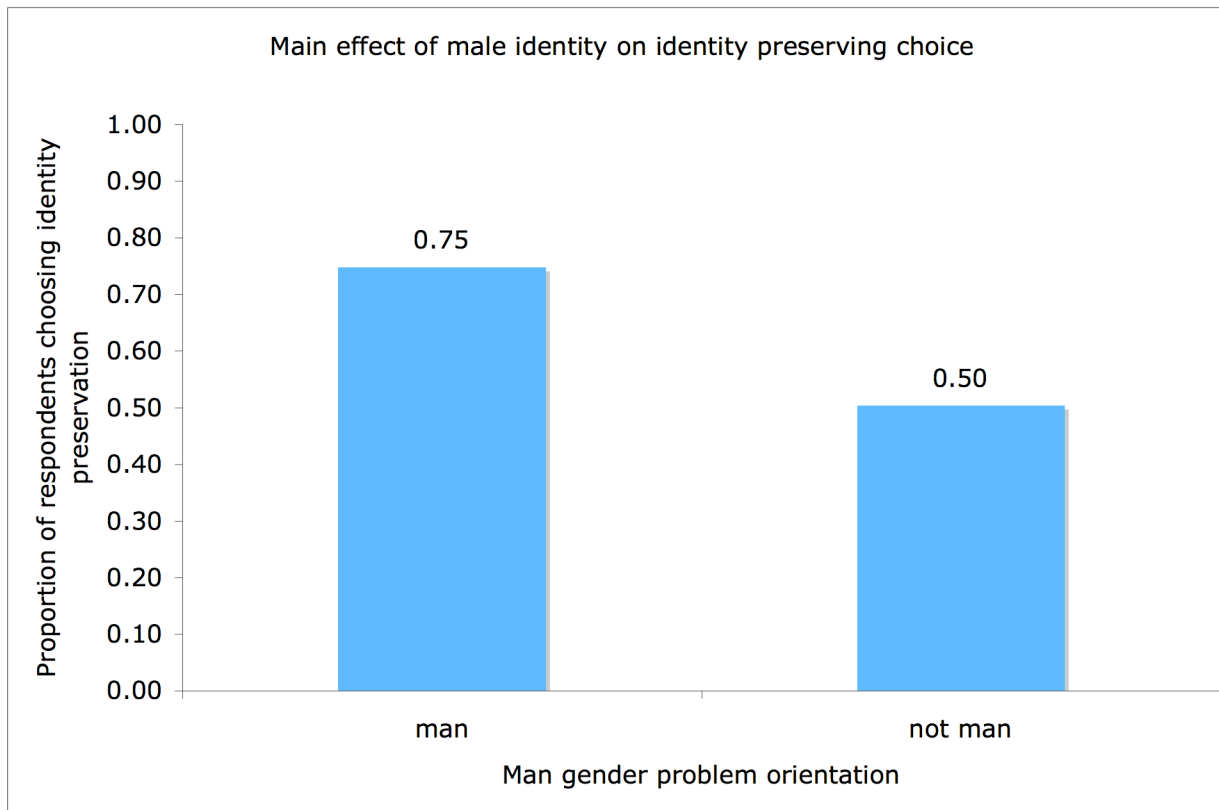


Figure 1. Main effect of problem gender orientation from a 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on identity preserving choice

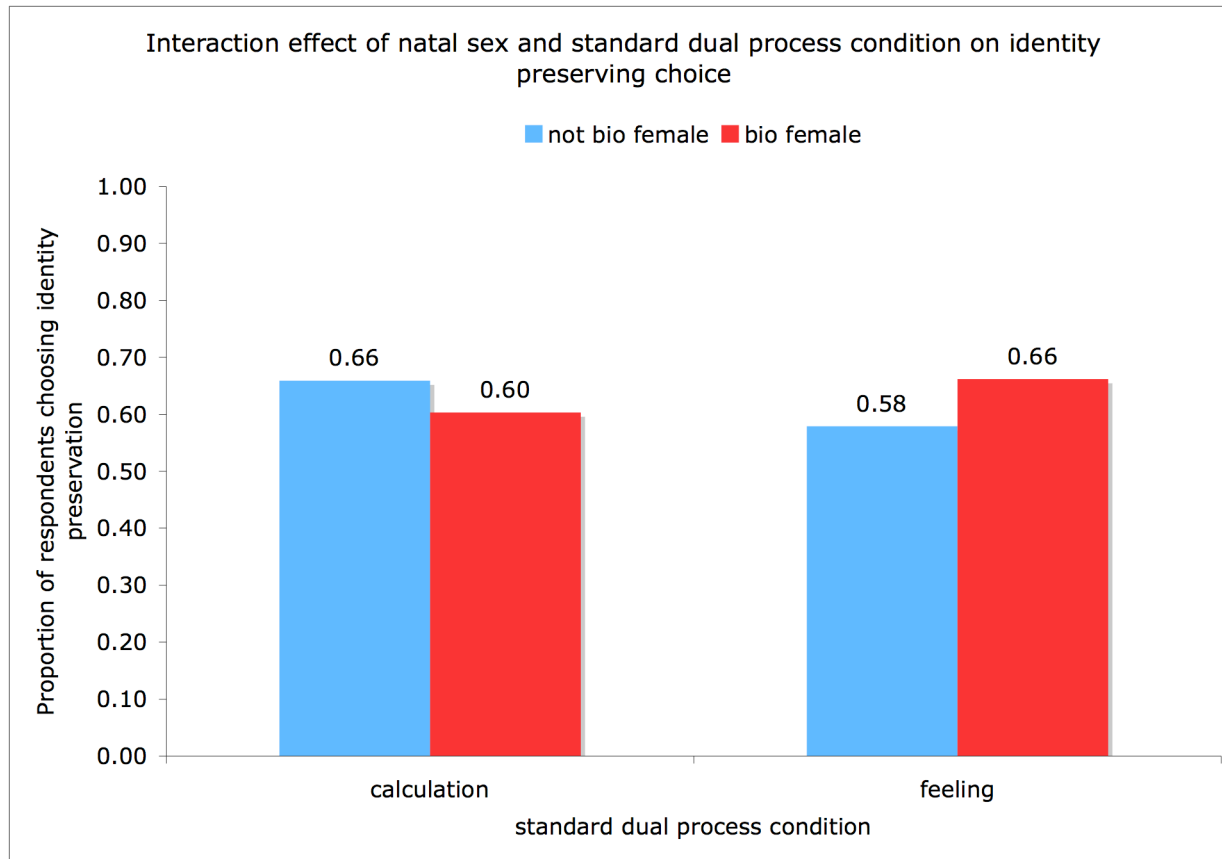
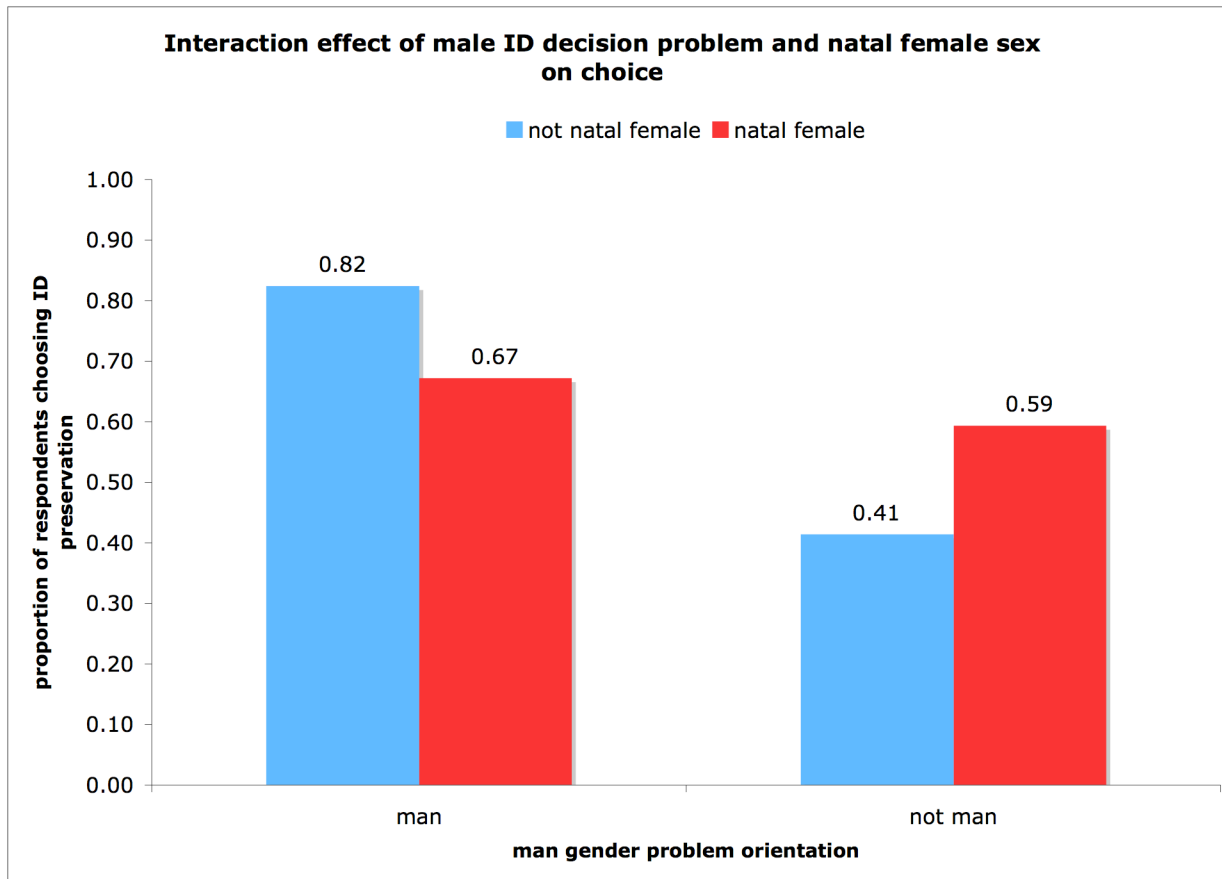


Figure 2. Interaction effect of problem natal sex by standard dual process condition from a 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on identity preserving choice





*Figure 3.* Interaction effect of problem natal sex by problem gender orientation from a 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on identity preserving choice

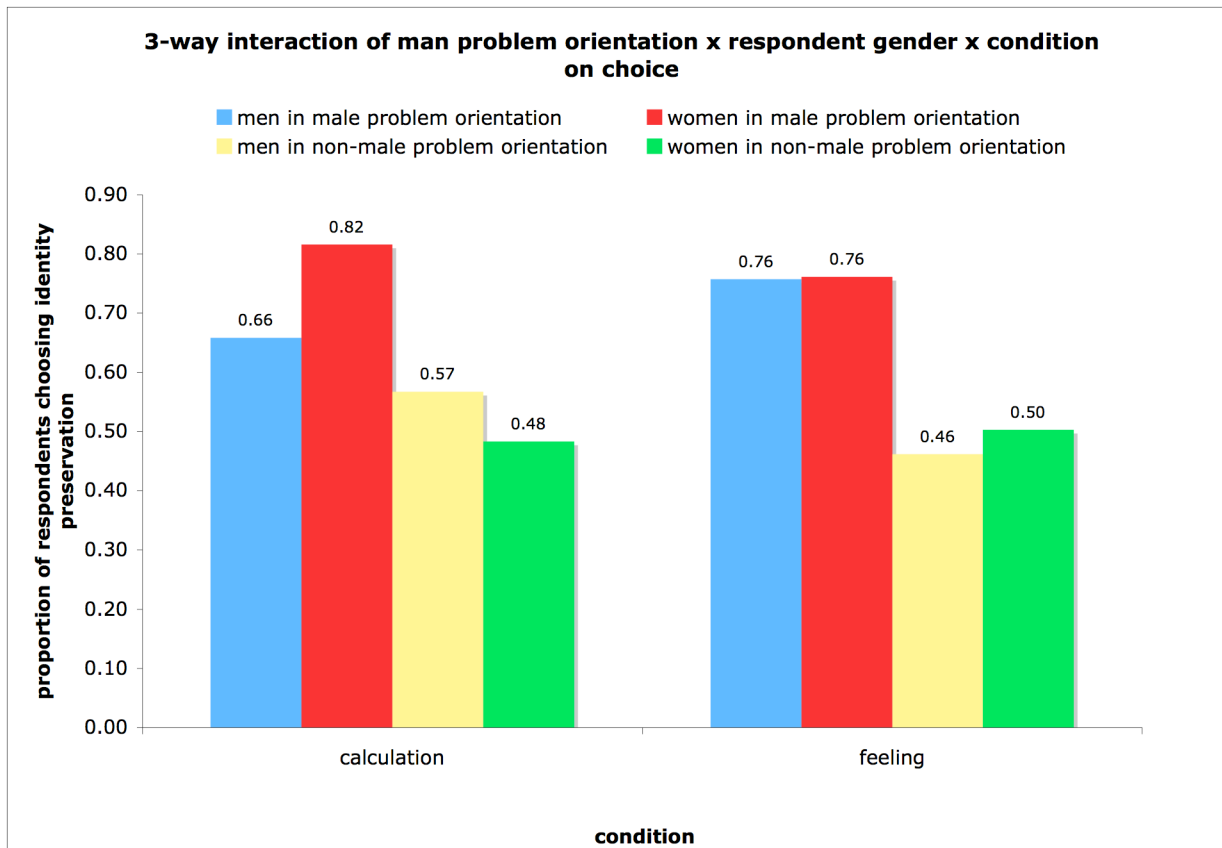
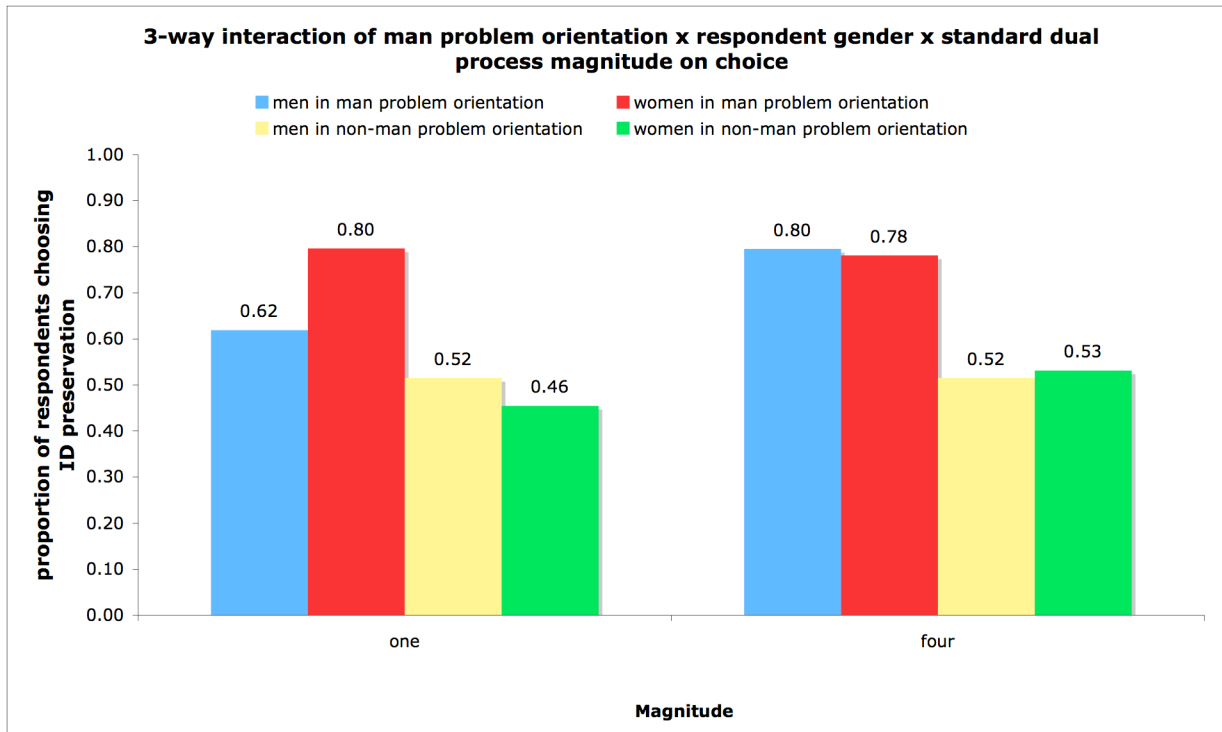


Figure 4. Interaction effect of problem gender orientation by participant gender by standard dual process condition from a 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on identity preserving choice



*Figure 5.* Interaction effect of problem gender orientation by participant gender by standard dual process magnitude from a 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on identity preserving choice

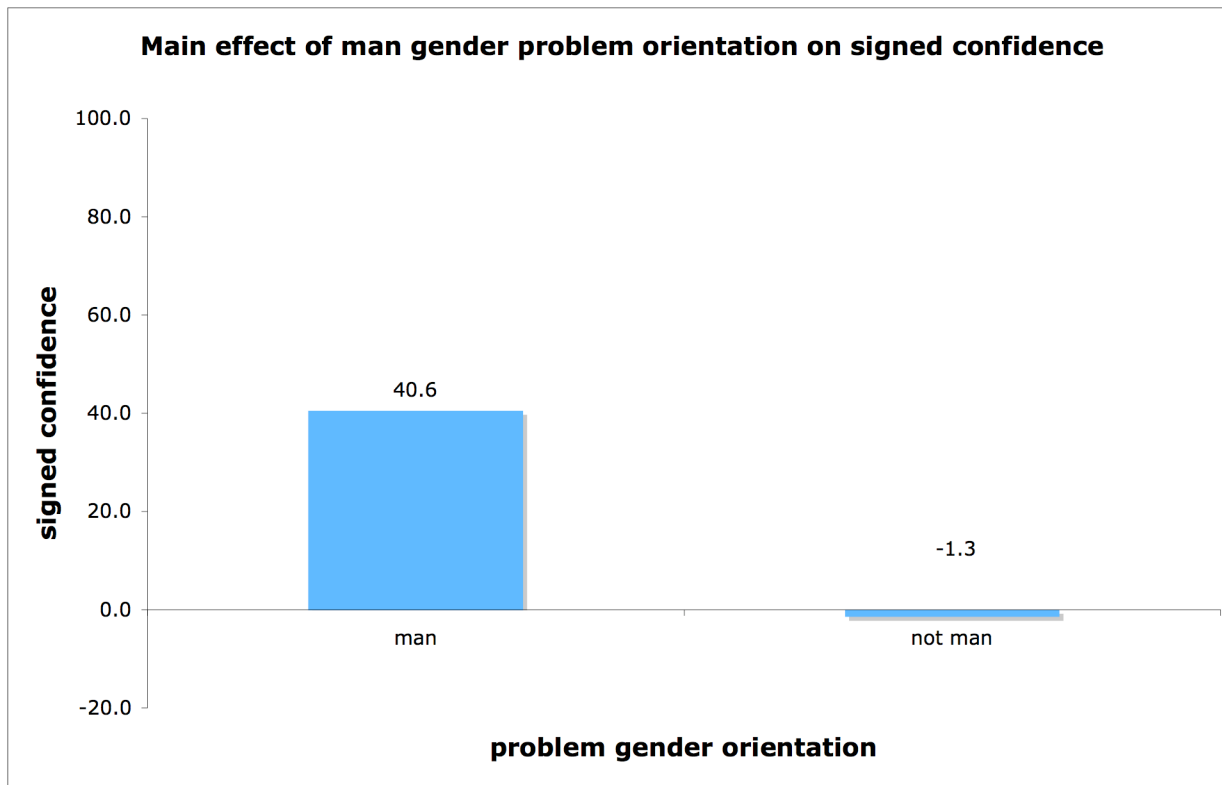


Figure 6. Main effect of problem gender orientation from a 2(problem gender orientation) x 2(problem natal sex) x 2(magnitude) x 2(standard dual process condition) x 2(gender) repeated measure ANOVA on signed confidence

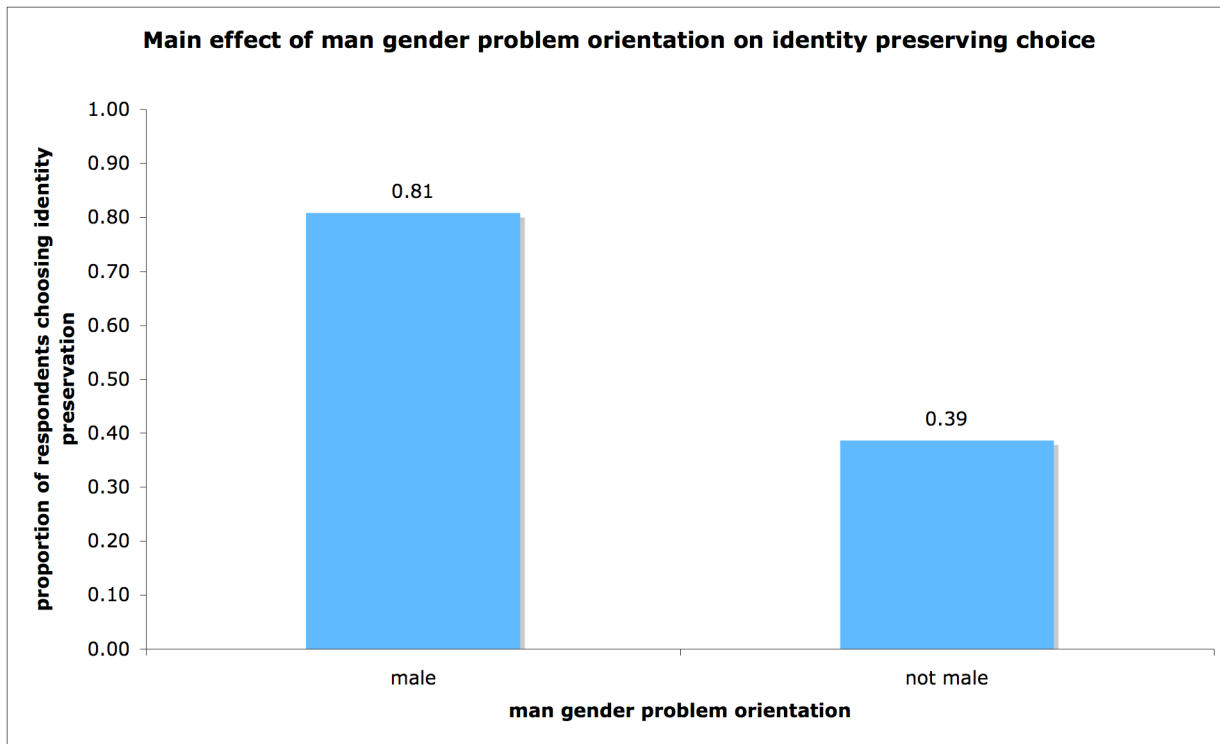


Figure 7. Main effect of problem gender orientation from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice

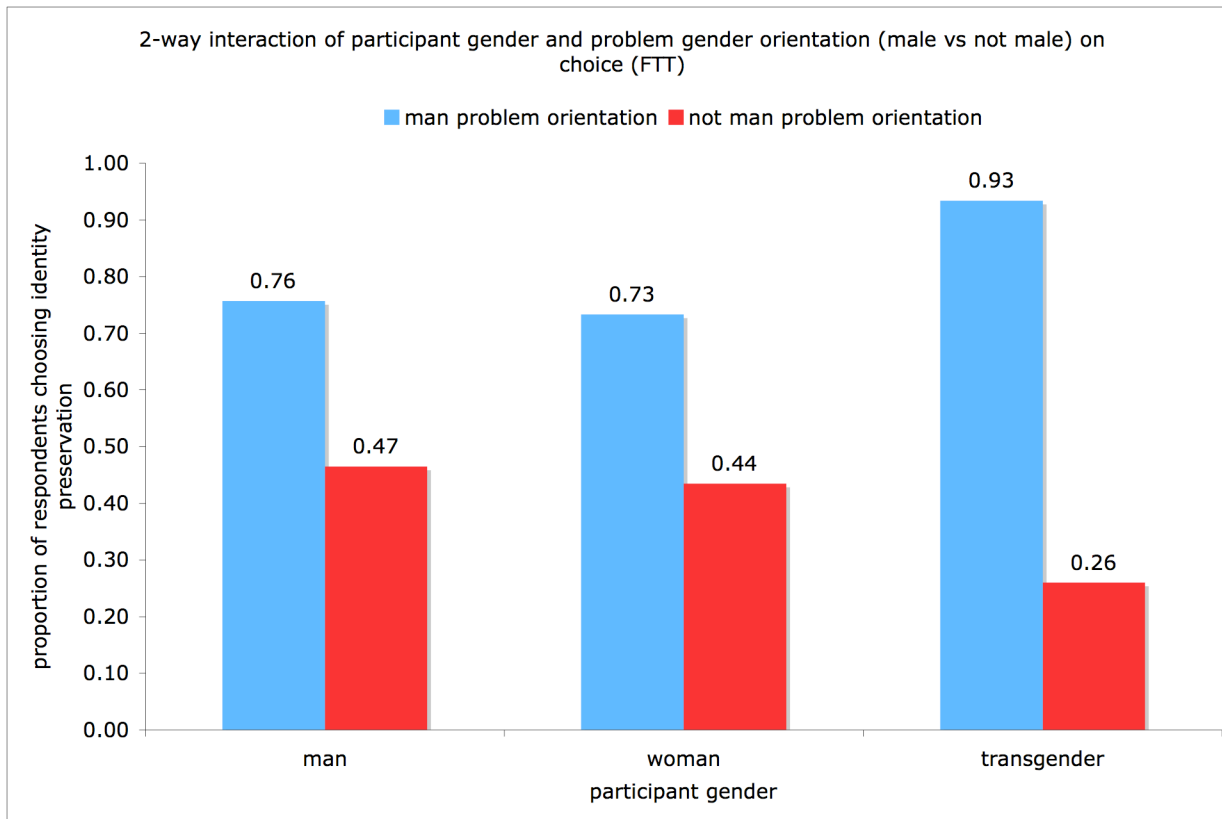


Figure 8. Interaction effect of problem gender orientation by participant gender from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice

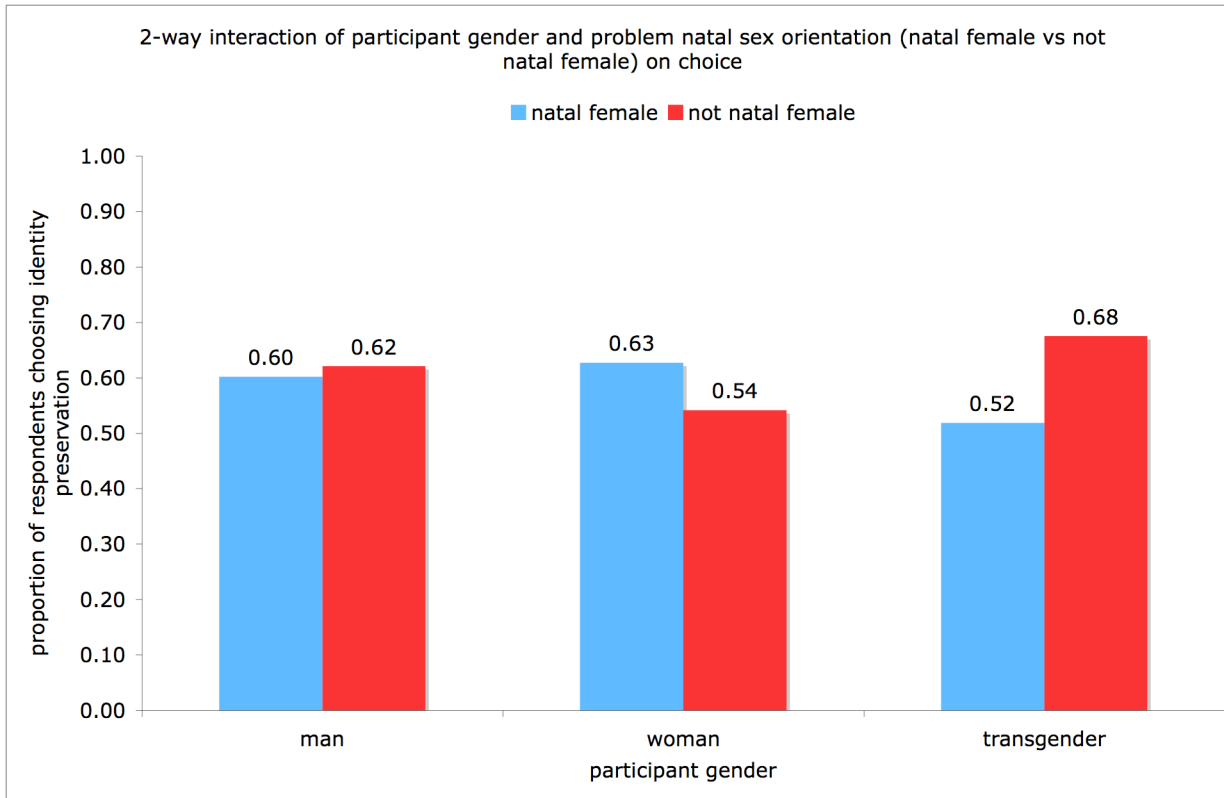


Figure 9. Interaction effect of problem natal sex by participant gender from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice

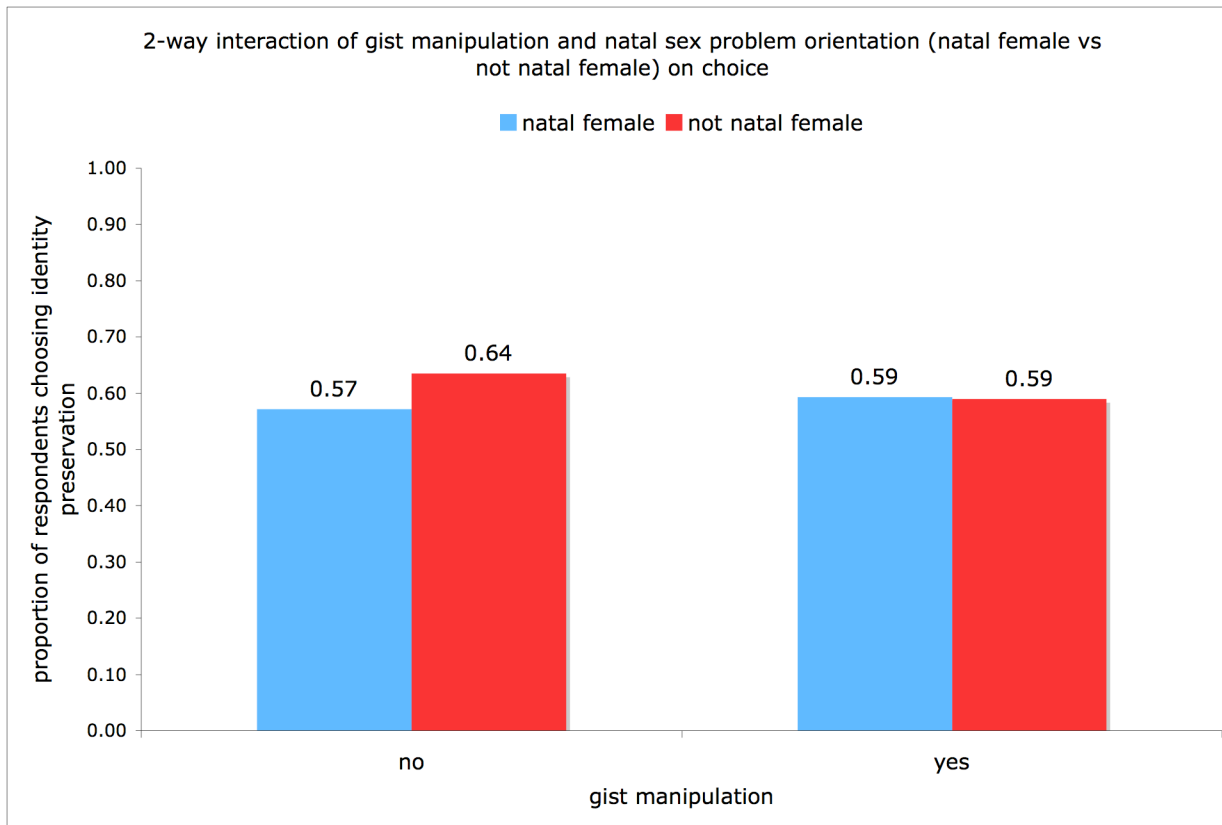


Figure 10. Interaction effect of problem natal sex by gist prime from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice



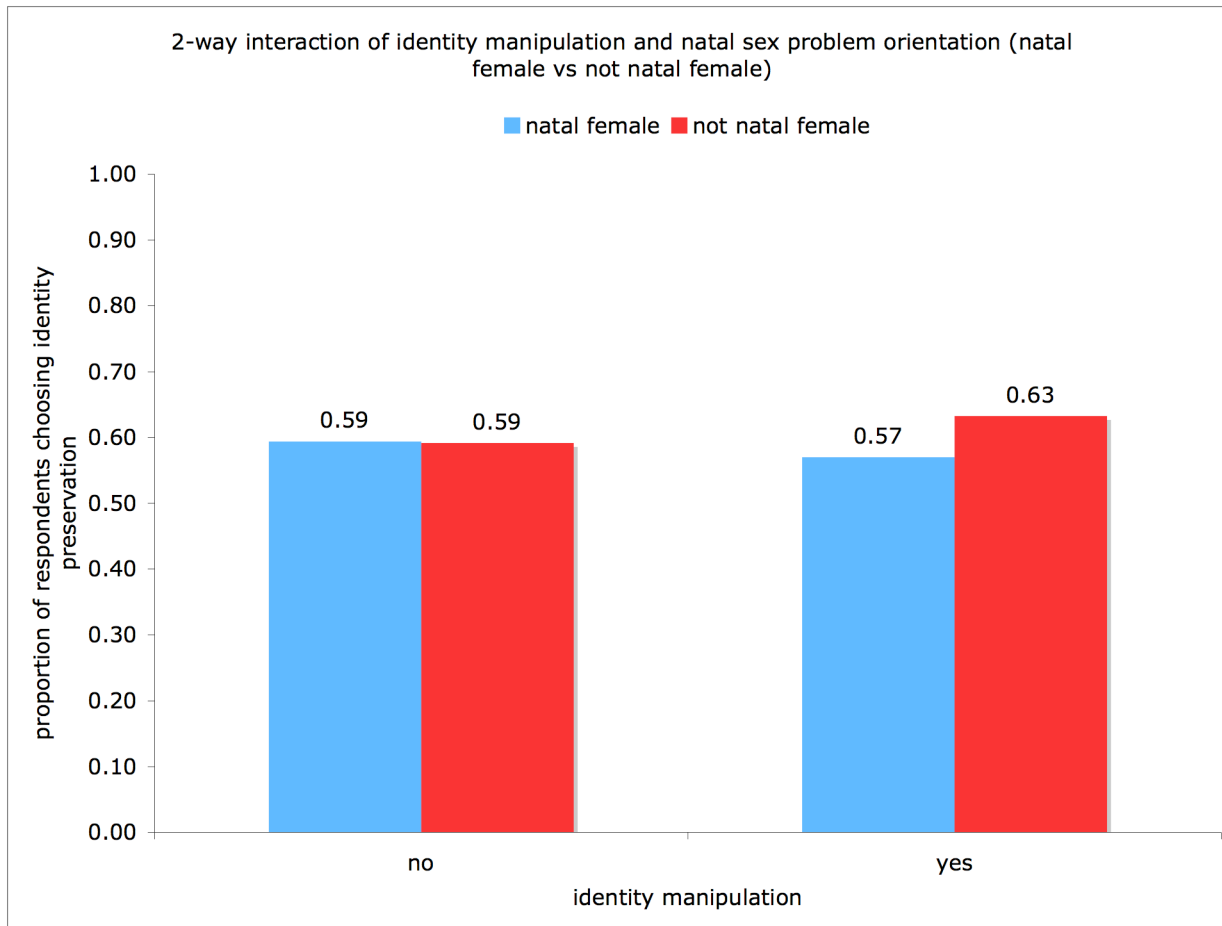


Figure 11. Interaction effect of problem natal sex by identity prime from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice

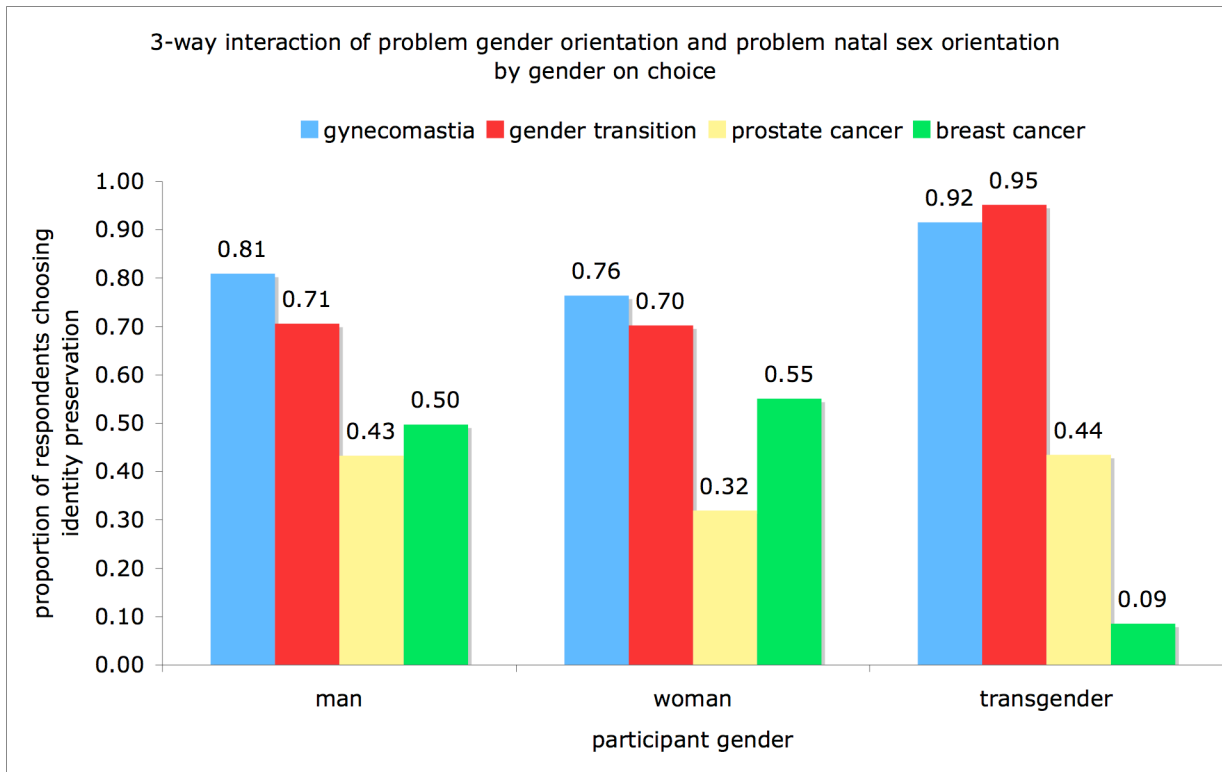


Figure 12. Interaction effect of problem natal sex by problem gender orientation by participant gender from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on identity preserving choice

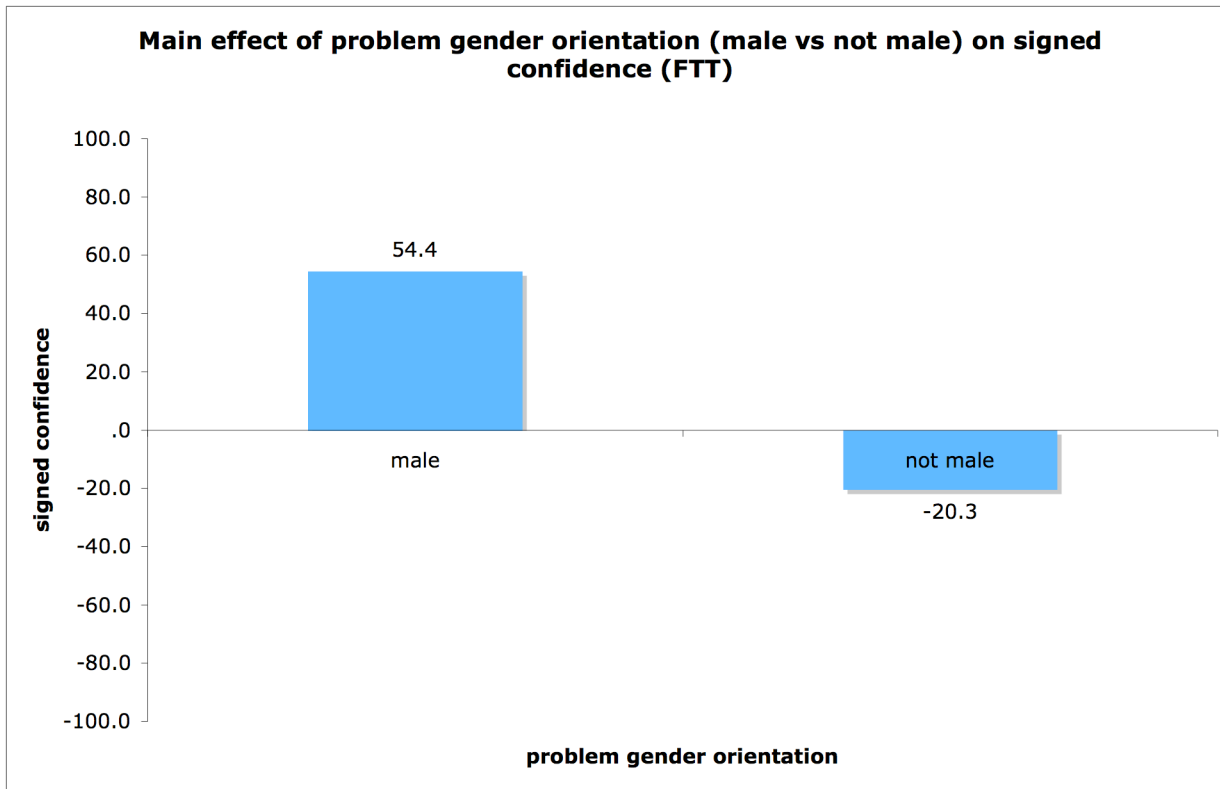


Figure 13. Main effect of problem gender orientation from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on signed confidence

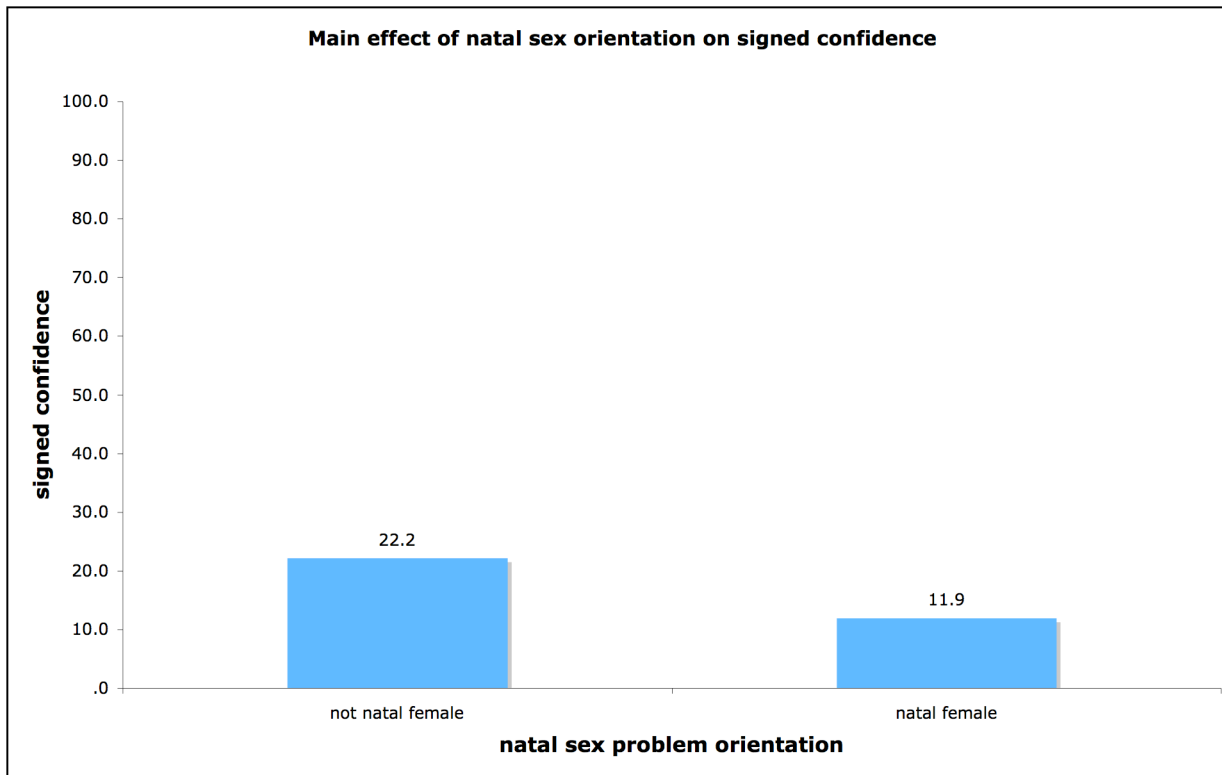


Figure 14. Main effect of problem natal sex from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on signed confidence

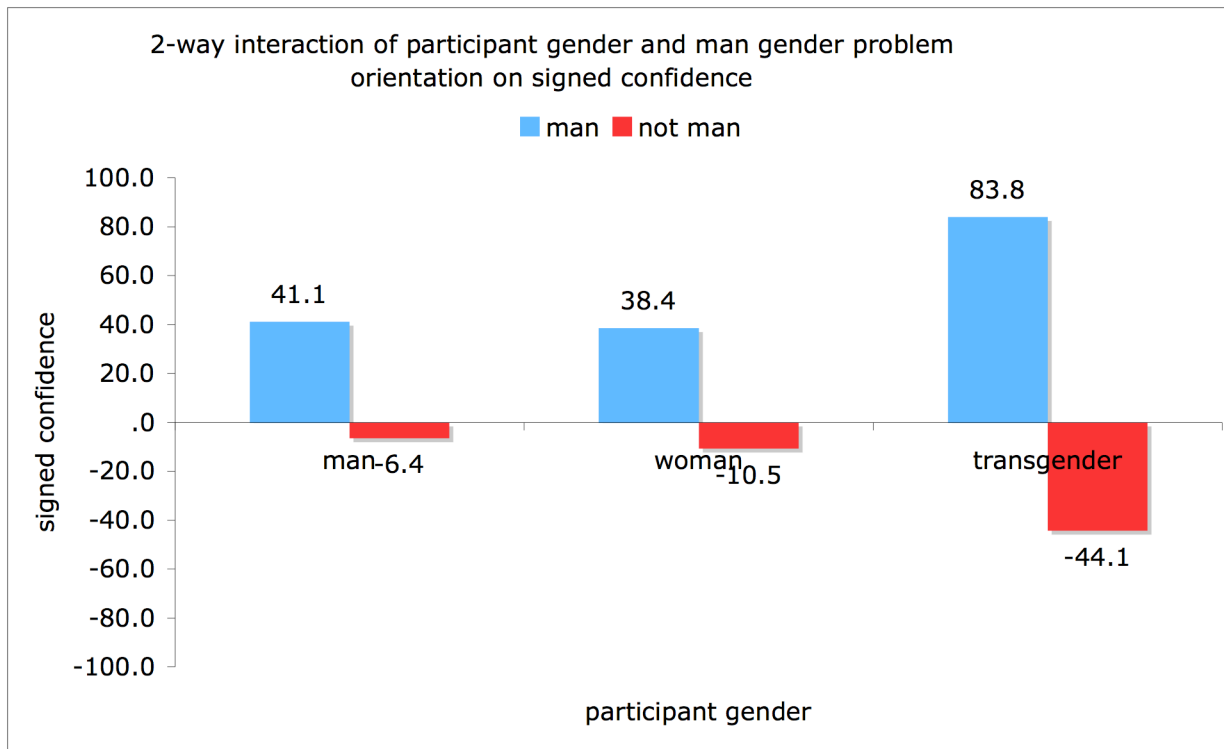


Figure 15. Interaction effect of problem gender orientation by participant gender from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on signed confidence

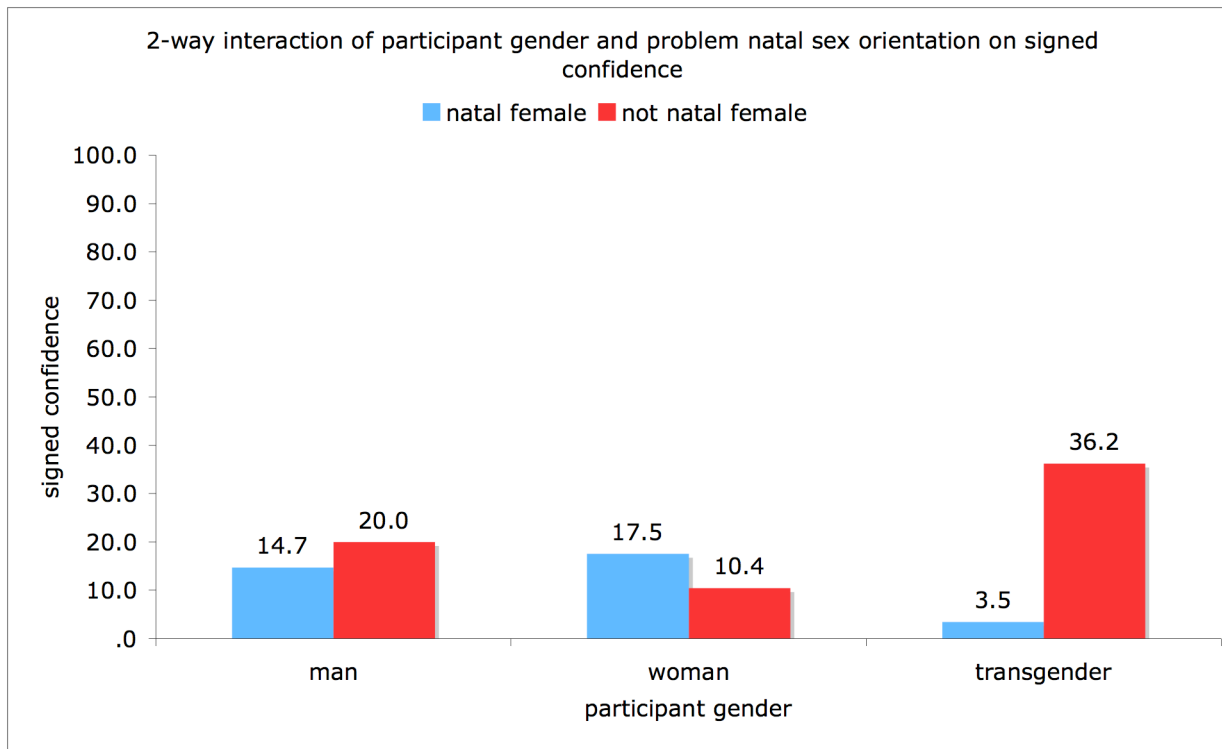


Figure 16. Interaction effect of problem natal sex by participant gender from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on signed confidence

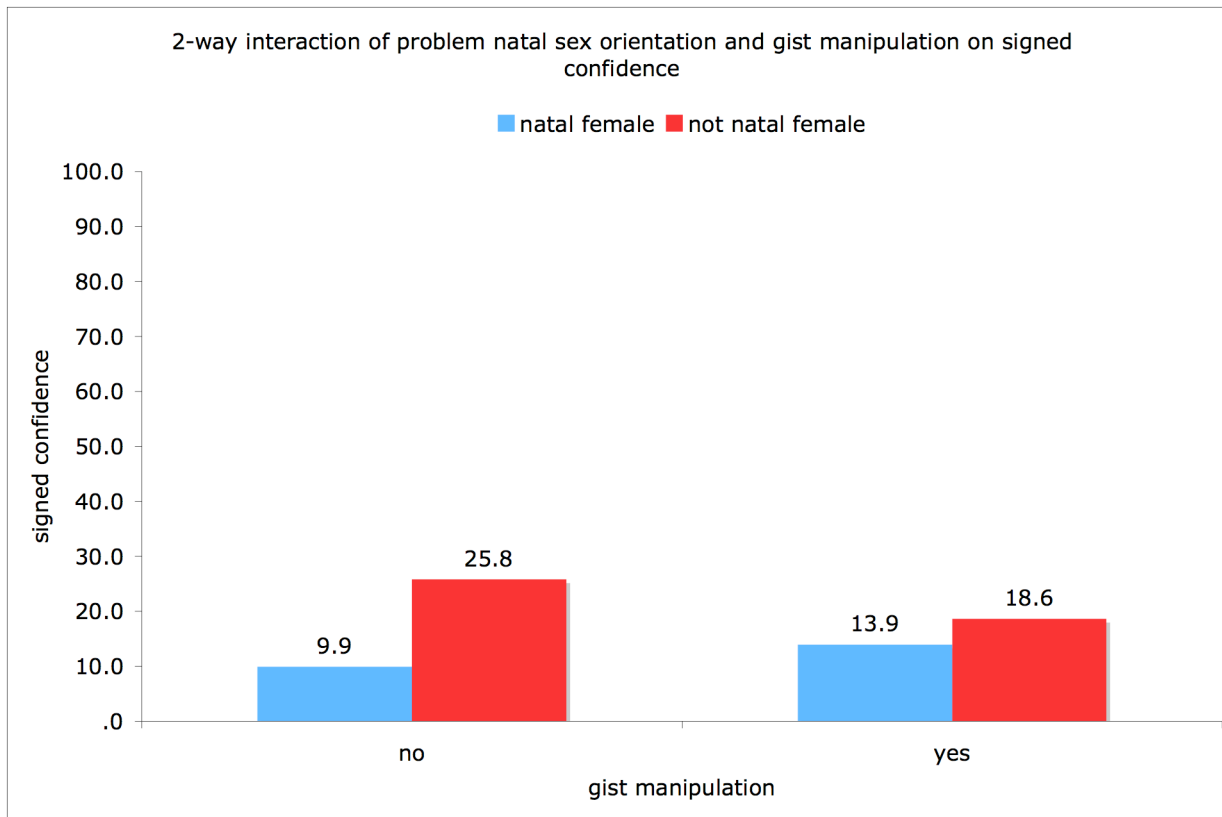


Figure 17. Interaction effect of problem natal sex by gist prime from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on signed confidence

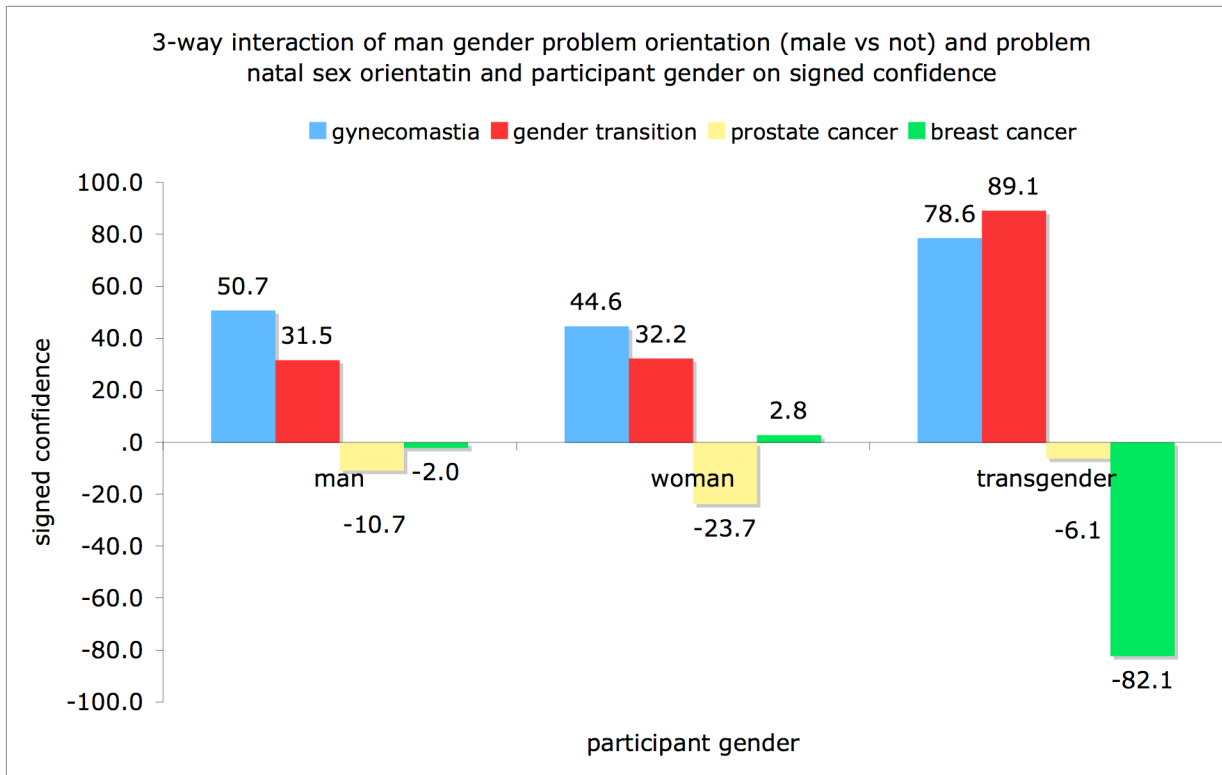


Figure 18. Interaction effect of problem natal sex by problem gender orientation by participant gender from a 2(problem gender orientation) x 2(problem natal sex) x 2(gist prime) x 2(identity prime) x 3(gender) repeated measure ANOVA on signed confidence