

Evaluating the Role of Implicit Cognition In Marriage

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Evaluating the Role of Implicit Cognition In Marriage

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The ways in which intimate relationship partners think about one another has been shown to be associated with a wide range of relationship outcomes. This study was conducted to evaluate the cross-sectional and 6-month longitudinal associations between implicit cognition about one's partner and broad domains of marital functioning that included marital satisfaction, communication, partner behaviors, and commitment to the marriage. Participants were 89 married individuals who completed the Go/No-Go Associations Task (GNAT), an implicit performance measure, which was modified to evaluate how strongly a person associated words that describe their partner with positive or negative photographs. The GNAT stimuli consisted of two sets of photographs (couple specific: photographs of couples interacting in a positive or negative fashion; general: photographs of positive or negative non-couples content). It was hypothesized that (a) positive and negative implicit cognition would be associated with measures of marital functioning at baseline, (b) positive and negative implicit cognition would be associated with changes in marital functioning from baseline to 6-month follow-up, and (c) the associations between positive and negative implicit cognition and marital functioning would be incremental to explicit cognitions about one's partner. Results indicated that participants on average had stronger positive implicit cognitions about their partner as compared to negative implicit cognitions, and that relationship-specific implicit cognitions were more strongly associated with marital functioning than general implicit cognitions. Regression analyses

indicated that positive relationship-specific implicit cognitions were positively associated with change in marital satisfaction over the study period, and incrementally predictive of change in marital satisfaction over and above shared associations with explicit cognition about one's partner. No other associations between implicit cognition and relationship functioning were obtained.

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Introduction

In intimate relationships, the beliefs and perceptions partners hold about each other and their relationship can influence relationship outcomes, including relationship quality, relationship-related behaviors, and relationship stability (for a review, see Baucom & Epstein, 2002). Through reflection or introspection, people are able to identify many, though not all, of their beliefs and perceptions they hold about their partner and their relationship. In comparison, some partner- or relationship-specific beliefs and perceptions are difficult to access through self-reflection. Taken together, the combination of beliefs, attitudes, and perceptions people hold in the relationship domain shape relationship behavior and serve as a foundation for relationship functioning.

In nearly every social interaction, communication requires processing a certain amount of ambiguous information from others. In order to continue the flow of interaction with another, it is useful to be able to quickly make meaning of ambiguity in a given situation. To do this, people interpret information and behaviors within the contexts of stored beliefs about and expectations for another person as well as his or her relationship with them (Fincham, Garnier, Gano-Phillips, & Osborne, 1995). Broadly speaking, these relationship cognitions serve as both the backdrop of information against which a current interaction occurs, and the cognitive filters that help to rapidly attend to certain information while disregarding other information. For example, if a person expects his or her spouse to be warm and caring, inquires from the partner about the person's health would be interpreted as signs of care or concern and responded to with considered thought and warmth. Conversely, if a person expects his or her spouse to be critical or looking for a chance to point out shortcomings in the person's behavior, the same inquiry might be interpreted as a set up for an attack. Once interpreted as a sign of criticism, the person might

expectedly make a guarded or dismissive statement to the partner, thereby building and reinforcing patterns of disconnecting interactions in the relationship and over time lead to deterioration of relationship quality. Each of these different interpretations would be the result of unique sets of relationship cognitions and would likely lead to different patterns of relating in relationships over time as well as variations in satisfaction with those relationships (Murray, Holmes, & Pinkus, 2010).

Relationship cognitions include *scripts* that act as templates for how to interact with others, *standards* regarding necessary qualities the partner and relationship must meet in order to continue, *beliefs* about one's partner or relationship, *ideals* desired for the relationship, and *expectations* for how a partner will respond to various situations (Baucom, Epstein, Rankin, & Burnett, 1996; Bradbury & Fincham, 1990). An example of how beliefs in relationships influence relationship function can be found when looking at people who hold a *destiny* belief about relationships (i.e., that a relationship is destined to succeed or fail). Research has shown that for people with a destiny belief, having low satisfaction with one's current relationship was predictive of breakup of the relationship; however, for those with a *growth* belief (i.e., that a healthy relationship develops over time through the efforts of the partners) lower satisfaction did not predict the length of the relationship (Knee, 1998). This study demonstrates the complex interplay that often occurs between relationship beliefs and outcomes, and highlights a central role of relationship cognitions in relationship functioning.

Adapting views regarding cognitions in general (Greenwald & Banaji, 1995), relationship cognitions are likely to comprise both *explicit cognitions*, which are the content of thoughts about the partner or relationship and are usually within a person's self-reflective awareness (e.g., "I believe my partner has my best interest at heart"), and *implicit cognitions*, which are automatic

judgments or evaluations that are shaped by past experiences and occur outside of a person's conscious awareness or control (e.g., an implicit negative view of one's partner). Implicit relationship cognitions have been conceptualized as relatively enduring cognitive representations that can be measured along a number of dimensions including valence (i.e., positive to negative), breadth (i.e., only in specific domains or across multiple domains), and flexibility (i.e., degree it can change or is fixed and rigid) (Baldwin, 1992). Past research has demonstrated that self-reported relationship cognitions are a robust predictor of relationship outcomes (e.g., Fehr, Baldwin, Collins, Patterson, & Benditt, 1999; Fincham, 1994); however, several studies (e.g., DeHart & Murray, 2004; Scinta & Gable, 2007) have also shown that implicit cognitions are influential in relationship functioning and may provide information about relationships that is unique from what can be assessed by only looking at explicit cognitions.

Implicit Cognitions

Broadly speaking, traces of past experience shape some performance in current situations despite people's lack of awareness and often inability to recall these past events. The effects of these traces of past experience remain largely unavailable to self-report or introspection (Greenwald & Banaji, 1995). Past situations, which shape implicit cognition, can lead to unconscious interpretations (and interference) in making deliberate judgments of current events (Greenwald & Banaji, 1995). Direct measures of cognition that require accurate reporting through introspection tend to be inadequate for assessing implicit cognition. This is because implicit cognition is a rapidly occurring process of sifting and sorting information, which is difficult to observe in oneself and, therefore, requires measurement by indirect means that do not require self-reflection and are not subject to a person's deliberate override. Thus, performance-based information processing approaches have been developed to measure implicit cognition.

The information processing paradigm refers to the cognitive process by which people take in information from the environment, filter it, integrate it with other information in memory, recall it, and use it as a basis for action (Greenwald & Banaji, 1995). It is based on the premise that information consistent with a person's implicit cognition will be processed more quickly, with fewer errors, and will be recalled more easily, whereas information that does not fit well with a person's current implicit cognition will be processed more slowly, with more frequent errors, and will be more difficult to recall (Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Greenwald, McGhee, & Schwartz, 1998).

The Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) is one of several tools developed for the purpose of measuring implicit cognitions that are outside of one's awareness. The IAT is a procedure for measuring the relative strength of automatic associations between concepts. The stronger a person's association between two concepts, the quicker the person can accurately identify target items belonging to the associated concepts of interest as compared to other associations. As an example, when sorting a deck of playing cards into hearts and diamonds versus clubs and spades, a person will likely sort these suits quickly as the paired associations of suits are the same colors. By comparison, a person would likely sort hearts and clubs more slowly as they are different colors.

There is a substantial body of research finding that implicit cognitions are associated with a variety of behavioral outcomes independent of self-report assessments (e.g., Cameron, Brown-Iannuzzi, & Payne, 2012; Knock, 2010). Measuring implicit cognitions may be especially relevant for assessing behavioral outcomes in domains in which people may not be very good at accurately reporting on their own cognitive processes or may be unwilling to disclose sensitive information via self-report measures (Nisbett & Wilson, 1977). Conceptually, implicit cognitions

are the stored artifacts of past experiences, residing outside of one's introspective awareness, and when triggered in current situations, are attributed to the present stimulus. Implicit cognitions, then, serve as one kind of mediator between a stimulus and one's response (Greenwald & Banaji, 1995). For example, research by Correll et al. (2007) found that implicit racial attitudes predicted the speed and accuracy with which participants made simulated decisions whether or not to shoot armed or unarmed persons who were either Black or White. Although community members and police officers alike showed evidence for implicit racial bias, only non-police community members were more likely to act on this bias by demonstrating less reservation to shoot a Black target compared to a White target, regardless of whether the target was armed or not. Moreover, an earlier study (Correll, Park, Judd, & Wittenbrink, 2002) found that the Shooter Bias described above was not correlated with explicit scores of racial bias.

In another example, Nock and colleagues (2010) evaluated psychiatric patients' implicit attitudes towards death and found that those with stronger implicit associations between self and death/suicide showed approximately a 6-fold increase in the odds of making a suicide attempt over the next 6 months. This exceeded the predictive validity of any previously known risk factors such as depression or previous attempts. These examples illustrate that measuring implicit cognitions can provide a unique method for detecting and predicting behavior in ways that may uniquely differ from what can be observed through self-reports alone.

Implicit Cognitions and Intimate Relationships

Given the high level of investment in committed relationships and the emotional pain suffered from the decline and dissolution of a relationship, people may be unwilling to acknowledge doubts or misgivings about their partner through self-report methods. Asking people to self-reflect and report on their thoughts about their partner (i.e., measuring explicit

cognitions) may lead to somewhat biased or incomplete reports. Therefore, investigating relationship cognitions from an information processing approach (i.e., assessing implicit cognitions) may result in a better understanding of how partners perceive each other and how this may impact the functioning of their relationship.

Implicit attitudes in relationship functioning have been studied through the use of a number of information processing approaches. For example, the free-recall task (Jose, Rajaram, O’Leary, & Williams, 2010; Whisman & Delinsky, 2002) is a task in which partners were shown a series of positive and negative adjectives and asked to indicate which words described their partner. Afterwards, they were asked to write down all of the words they could recall. Positive and negative implicit cognition was determined based on the number of positive and negative words a person was able to recall that were originally identified as describing his or her partner. Comparisons were made to see if the person tended to recall more positive or negative words about the partner.

Another type of implicit cognition measure is the name letter “liking” task (DeHart, Pelham, & Murray, 2004) in which a person is asked to give a rating to each letter of the alphabet. Implicit cognition about one’s partner is then assessed based on how highly the person rated or “liked” the letters that comprised the partner’s initials. Another implicit measure used by Fincham, Garnier, Gano-Phillips, and Osborne (1995) was a response time latency task, which was somewhat similar to the IAT. In the task, a series of words were shown on a computer screen and the participant was asked to categorize each by pressing keyboard buttons labeled as *positive* or *negative*. Embedded in the words were four target words that specifically represented the participant’s partner. A score was then derived on whether the partner words were

categorized as positive or negative and how long it took the participant to respond. Faster response times were an indirect indicator of positive or negative cognition towards one's partner.

Additionally, the sequential priming tasks (Scinta & Gable, 2007) involves participants classifying words as positive or negative and measuring how quickly they make these judgments; however, just prior to showing the target word, a word that specifically describes their partner (e.g., partner's name) was very briefly shown first to prime the association between partner and positive or negative words. The faster a respondent classified the word as positive or negative immediately after the priming word was shown was used to determine the positive and negative cognitions participants had towards their partners. Overall, findings from these studies indicate that there are a variety of ways in which implicit measures can be reliably applied to evaluating relationship cognition that does not rely on introspection and self-report.

Several studies have used the IAT to study implicit attitudes in intimate relationships. For example, Zayas and Shoda (2005) evaluated the association between implicit cognitions towards one's partner and adult romantic attachment styles. Participants generated a list of words that applied directly to their partner (e.g., partner's first name and birthday), which were then used in the IAT in combination with pleasant and unpleasant words (e.g., success or disaster) in order to detect the strength of associations between partner words and pleasant or unpleasant words. They found that an implicit positive reaction to one's partner was positively correlated with secure adult romantic attachment. That is, people with more positive automatic associations towards their partner tended to have a secure adult attachment styles, whereas those with fearful, preoccupied, or dismissing attachment styles showed no association between implicit cognition and attachment style. Only partners with avoidant attachment styles showed a negative association with positive implicit cognition towards the partner.

In another study using the IAT in relationships, Banse and Kowalick (2007) found that pregnant women who were hospitalized due to complications in their pregnancy had more positive emotional well-being if they had positive implicit cognitions about their partner. Implicit cognitions about the partner were measured with counterbalanced negative and positive words as attributes and idiographic words relating to the partner (or stranger for contrast) as the target stimuli. Self-report measures of cognition towards one's partner were included to provide an explicit comparison to the construct measured by the IAT. The researchers found that whereas both implicit and explicit measures of attitudes about the partner predicted well-being for pregnant women, implicit cognition was incrementally predictive of well-being over and above explicit measures. Banse and Kowalick suggested that positive implicit cognitions towards the partner may buffer against stressful life events and serve a unique protective function to emotional well-being beyond what is provided by explicit cognition during times of high stress.

Using the IAT, Murray, Holmes, and Pinkus (2010) found evidence that spouses' current implicit cognitions were associated with experiences in conflict interactions from the first few months of marriage. The study was based on the premise that partners develop a conditioned set of associations towards their partner, or *smart unconscious* early in marriage that is shaped by the couple's style (e.g., self-protective distancing vs. connectedness-promoting behavior) for dealing with important conflicting interests. Implicit cognitions towards one's spouse were measured with a partner modification of the IAT that presented pleasant words, unpleasant words, words describing the partner, and words that were not associated with the partner (e.g., a name that was not the partner's name). Partners' implicit associations were measured four years into the marriage and correlated with styles of interacting during conflicts that occurred within the first 2-weeks of marriage. Partners who initially had more high-risk conflicts (in which

consequences for the outcome were more salient) showed fewer positive implicit cognitions towards their partner. Also, partners who exhibited more self-protective behavior in the early months of marriage held fewer positive implicit cognitions about their partner, whereas those who placed greater value on connectedness and valued their partner more on a daily basis had more positive implicit partner cognitions four years into the marriage.

Scinta and Gable (2007) used the IAT to measure implicit cognitions towards one's partner, and found that for partners with relatively low barriers to exiting a relationship, there was a positive correlation between implicit cognition and self-reported attitudes towards one's partner; however, when partners perceived there to be high barriers to exiting the relationship (i.e., high level of investment and few possible alternatives) a negative correlation was found between implicit cognition and self-reported attitudes, indicating that as positive implicit cognition towards one's partner declined self-reported positive cognition increased. The IAT used stimuli that included pleasant and unpleasant words as attributes as well as words that either did or did not describe the partner as the target and non-target categories respectively. Their findings highlight that implicit and explicit cognition towards one's significant other appear to diverge more noticeably when a person has reasons for actively overriding conditioned automatic responses such as might occur in high investment situations like marriage.

In the evolution of implicit associations measures, developments towards increased versatility in test measurement led to the Go/No-Go Association Task (GNAT; Nosek & Banaji, 2001). Similar to the IAT, the GNAT presents a series of stimuli on a computer screen that represent two categories of interest. These are presented in rapid sequence and participants are asked to press the spacebar on a keyboard whenever a member of the target categories is shown on the screen. Different from the IAT, however, the GNAT provides a test of implicit cognition

without requiring a complimentary or contrasting set of objects. The GNAT is distinct from the IAT by being able to assess a single target category. In the GNAT, the stronger someone associates a concept with an attribute (e.g., oneself with positive attributes) the fewer mistakes a person is likely to make in detecting those stimuli when they are rapidly presented. The weaker the association, the more errors a person is likely to make. Though conceptually similar to the IAT in many ways, the GNAT provides two main advantages over the IAT. First, it allows researchers to measure the strength of an association for single categories (e.g., partner and positive attributes) rather than only for pairings of categories (e.g., partner and positive attributes *relative to* non-partner and negative attributes). Second, the GNAT provides flexibility by allowing measurement of accuracy of performance rather than speed of performance, which has shown higher reliability in some studies (Payne, 2005). Similar to the IAT, the task is time pressured to limit participants' ability to actively consider their responses, thereby providing a measure of accuracy and speed of automatic information processing (Lee, Rogge, & Reis, 2010).

Lee and colleagues (2010) conducted the first and only study known to us using the GNAT to study romantic relationships. Specifically, they modified the GNAT to measure how people implicitly perceived their partner in order to better understand what role, if any, implicit cognitions about one's partner contributed to relationship dissolution. The researchers collected data from a combination of dating, cohabiting, and married college students. In Study 1, the researchers used general non-relationship related words as target attributes, such as *gift* and *peace* for positive attributes and *death* and *tragedy* as negative attributes. In Study 2, they used attribute words that were more specific to relationships, such as *accepting* and *understanding* for positive partner attributes and *attacking* and *nagging* for negative partner attributes. The target category was partner (rather than self), which was represented by words collected prior to the

start of the study that directly related to each participant's partner, such as his or her partner's first name, pet name, nickname, or distinctive characteristic. The GNAT also included a series of distractor words to help ensure participants were actively paying attention to the requirements of the task.

Lee et al. (2010) found that across both studies, partners showed better performance on the GNAT in pairing partner stimuli with positive words than with negative words, indicating that partners generally tended to have favorable attitudes towards their partner. Participants' positive and negative trials were found to be strongly correlated, indicating the presence of shared method variance as well as accounting for individual differences in ability on this type of task (i.e., some people may be more skillful at this type of task), which was controlled for in their analyses by entering positive and negative trials pair-wise in all multivariate tests. Positive implicit associations towards one's partner were negatively associated with probability of relationship breakup over a 12-month period, whereas negative implicit associations were not associated with probability of relationship breakup. The negative association between positive implicit associations and probability of relationship breakup remained statistically significant even when controlling for relationship satisfaction, which suggests that variance in breakup attributed to implicit cognition is largely incremental to self-reports of satisfaction. Additionally, Lee et al. found an interaction between partner-good trials and partner-bad trials, such that people who had both higher than average negative implicit evaluations of their partner and lower than average positive implicit evaluations were most likely to end their relationship.

Lee et al. (2010) also found that when using attribute words specific to relationships (e.g., *supportive* vs. *criticizing*) in the GNAT, positive implicit cognitions about the partner were predictive of breakup over the 12-month study period, such that partners with above average

performances on partner-good trials had only an 11% likelihood of breaking up, whereas partners with below average performances on partner-good trials had a 44% chance of ending their relationship. Partner-bad trials showed no significant predictive utility in detecting relationship breakup. Explicit measures of relationship satisfaction failed to predict relationship breakup with or without implicit measures in the model. The researchers concluded that the GNAT was an effective tool for detecting implicit cognition towards one's partner that participants were unable to report on directly through explicit measures of relationship functioning. Over and above self-reports of satisfaction, the GNAT effectively predicted likelihood of relationship breakup from implicit partner cognitions.

In summary, these findings on cognition in relationships, and more specifically on implicit beliefs and attitudes towards one's partner, are consistent with the perspective that individuals do not process all information regarding their partner in a conscious, deliberate manner. Rather, people appear to develop and utilize information processing filters about their partner that function automatically and outside of their direct awareness. This may lead partners to automatically fill in missing information, construe ambiguous information, or interpret their partner's behavior in ways that extend beyond the given information at that moment. Over time, it is possible that these implicit cognitions influence how partners come to view and interact with each other, thereby affecting the overall quality and stability of the relationship.

Current Study

The present study was designed to build on prior research evaluating implicit cognition in intimate relationships. By specifically focusing on partners' *implicit* relationship cognitions, this study sought to better understand information processing that occurs in romantic relationships,

which is outside of people's immediate awareness, and investigate how these implicit cognitions were related to marital functioning.

This study was unique from past research on implicit cognitions in several ways. First, photographs rather than words were used to represent categories of positive and negative valence in the GNAT. Couple specific stimuli as well as non-couples sets of photographic stimuli were used to elicit positive or negative implicit attitudes towards one's partner. For relationship specific stimuli, photographs were used of couples relating with each other in either affectionate interactions or in conflictual and argumentative interactions. For non-couples GNAT stimuli, positive (e.g., a tropical beach) or negative (e.g., a car accident) photographs were used. Past research on implicit cognitions has typically used adjectives to stimulate reactions in implicit association tasks. In comparison, research has shown that images are also an effective tool for implicit cognition research in other topic areas (e.g., Bradley, Cuthbert, & Lang, 1996; Park, Smith, & Correll, 2010) and may actually be better at evoking implicit cognitions in a relationship context than words (Scinta & Gable, 2007).

For example, Scinta and Gable (2007) used photographs of participants' partner that were taken just prior to the study and photographs that were not the participants' partner that were taken from the Internet. These were then used as priming stimuli in a sequential priming task. In their study, photographs were presented very briefly (17 ms) in a peripheral section of the participant's field of view on a computer screen. This was then followed by a word that the participant was asked to judge as positive, negative, or neutral. They found that the association between implicit and explicit attitudes was more pronounced when using photograph primes of the partner as compared to word primes of the partner. They suggested that this effect may be the result of images providing a more precise prime of the partner concept than partner oriented

words. For the current study, photographs were used in the GNAT for their likely ability to stimulate a more rapid affective partner-oriented response than might be elicited by words.

Second, whereas Lee et al. (2010) assessed implicit cognitions in a mix of dating, cohabiting, and married college-aged couples, we evaluated these types of cognitions in married couples. On average, married spouses are likely to have had more time to develop implicit beliefs about their partner as compared to dating couples, which could potentially provide a stronger test of the association between implicit cognition and relationship functioning. Moreover, whereas the Lee et al. study mainly assessed relationship stability, we expanded the outcomes being measured to include a more comprehensive assessment of marital functioning. Not all dissatisfying relationships end in separation or divorce, and for those that do, the decline in the relationship can take a substantial amount of time to occur. During the decline of a relationship, the quality of the marriage has been found to have a significant influence on the well-being of the partners, including increased depression (e.g., Whisman & Uebelacker, 2009) and decreased satisfaction with life (e.g., BE, Whisman, & Uebelacker, 2013). Therefore we took a broader view in evaluating marital functioning in hopes of extending our understanding of the potential ways in which implicit cognition contributes to relationship functioning that goes beyond only looking at relationship dissolution.

To accomplish this, several marital domains were assessed, including marital satisfaction, communication patterns, partner behaviors, and commitment. Each of these outcomes was thought to potentially provide a more nuanced picture of relationship health and is theoretically consistent with established predictors of marital functioning. Marital satisfaction is a global evaluation that represents the degree to which partners believe their marriage is meeting the standards, expectations, and ideals they have for a satisfying marriage. Jacobson (1985)

described relationship satisfaction as the “final common pathway” in research on intimate relationships, and is a well-established predictor of stability and health of the marriage.

Communication between partners is one of the primary types of relationship behaviors that can vary dramatically between couples. Christensen and Sullaway (1984) identified several common patterns of communication that are associated with variations in relationship functioning and range from constructive to destructive to relationships. They found that constructive communication, as measured with the Communication Patterns Questionnaire, was positively associated with couples’ marital adjustment. Additionally, Rogge and Bradbury (1999) found that communication behavior is an important predictor of relationship functioning, such as in differentiating satisfied couples from married-but-dissatisfied couples.

Behavior in marriage has been shown to be an important factor in relationship satisfaction and has been found to interact with cognitive attributions in its association with satisfaction (Johnson, Karney, Rogge, & Bradbury, 2001). Evaluating partner behavior as a component of marital functioning allows for testing how implicit cognition could directly translate into the ways in which partners act towards one another. Therefore, self-reported evaluations of the degree to which one’s partner engages in behaviors that are positive or constructive versus those that are negative or harmful were included as a potentially meaningful component of marital functioning.

Similarly, commitment has been identified as a strong correlate of relationship stability (for a review see Adams & Jones, 1999). Although it is difficult to measure marital stability over a short period of time (e.g., 6-months) due to the relatively low number of divorces that are likely to occur within a study sample in that timeframe, assessment of a person’s self-perception of commitment to his or her marriage serves as a good indicator of the stability of the marriage. Lee

et al. (2010), using stability as a primary study outcome, found that positive implicit cognition about one's partner predicted relationship breakup over a 1-year period; however, their sample was mostly composed of dating college students who were more likely than married couples to end an unsatisfying relationship within a briefer period of time. Therefore, commitment to the marriage is a useful proxy for stability in this study.

In the current study, we additionally evaluated whether implicit cognition was incremental in its association with marital functioning over and above explicit partner cognitions. Implicit measures have been shown to be associated with explicit measures of the same construct, though usually to a lesser degree than correlations with other implicit measures of the same construct, and can range from positive to negative associations (Cunningham, Preacher, & Banaji, 2001; Gawronski, 2002). Additionally, some studies have found dissociation between explicit and implicit attitudes. For example, Cunningham, Preacher, and Banaji (2001) found participants who self-reported non-prejudicial attitudes on an explicit measure of modern racism had a harder time associating Black Americans with positive attributes on two implicit measures – the IAT and a response-window priming task. In part, this is likely due to differences in the processes that implicit versus explicit measures are assessing. Explicit measures tend to assess the beliefs, values, and thoughts that people are directly aware of having and are more able to be influenced by deliberate cognitive override and social desirability effects. Implicit measures purportedly assess the speed and accuracy with which information is processed and recalled, which has less to do with the content of the beliefs and more to do with conditioned patterns of perception and interpretation. Therefore, implicit cognition tends to be outside of a person's awareness and not as vulnerable to deliberate control.

A number of past studies (e.g., Alfasi, Gramzow, & Carnelley, 2010; Gurung, Sarason, & Sarason, 2001) have demonstrated that the way spouses explicitly think about one another and are able to report on these thoughts and perceptions, as assessed with self-report measures (i.e., explicit cognitions), is associated with marital outcomes such as satisfaction. Therefore, in order to be able to understand to what degree implicit cognitions are influential in relationship functioning it is important to control for these explicit thoughts and beliefs by covarying for a measure of explicit cognition towards the spouse in multivariate models. Partialing out explicit attitudes may provide a clearer picture of the role implicit cognitions play in marital functioning. As Murray et al. (2010) explain, explicit and implicit evaluations can diverge from one another largely as a function of deliberately weighing additional factors when providing a response about one's cognitions towards someone or something. Implicit cognition is an automatic process that is the conditioned result of one's past experiences, whereas in reporting explicit cognition, one may override parts of her or his experience in order to factor in competing concerns. For example, when asked how satisfied someone is in an intimate relationship, some people may take into account the level of investment in the relationship and the number of alternative options available to them when responding, whereas her or his implicit cognition may suggest that in fact the person does not think very highly of the spouse (Scinta & Gable, 2007). Research on the association between implicit and explicit measures is mixed with some studies reporting relatively high correlations between implicit and explicit cognition (Banse, Seise, & Zerbes, 2001), whereas others found weaker associations between the two (Karpinski & Hilton, 2001).

In their study, Lee et al. (2010) controlled for explicit self-report measures of relationship satisfaction when testing for associations between implicit attitudes towards one's partner and likelihood of breakup. They found that variance due to implicit cognition was largely

independent of explicit self-reports. In the present study, the role of implicit partner cognitions as an incremental and unique predictor from self-report methods was analyzed to see if implicit and explicit cognitions differed. In the current study, the associations between implicit attitudes towards one's partner and relationship and marital functioning were examined while controlling for an explicit (i.e., self-reported) assessment of esteem towards one's partner.

Finally, the current study builds on prior research by examining the association between implicit cognition and relationship functioning both concurrently as well as longitudinally. Using a longitudinal design extended our ability to understand the nature of the association between implicit cognitions about the partner and relationship functioning by evaluating how implicit cognitions at baseline predicted changes in relationship functioning over time.

The study was designed to evaluate the following hypotheses. First, it was hypothesized that implicit cognition about one's spouse would be concurrently associated with marital functioning. More specifically, it was predicted that positive implicit partner cognition would be correlated with higher marital satisfaction, more constructive communication, more frequent positive and less frequent negative relationship behaviors, and greater commitment to the marriage. It was also predicted that negative implicit cognition would be correlated with lower marital satisfaction, less constructive communication, less frequent positive and more frequent negative relationship behaviors, and less commitment to the marriage.

Second, it was hypothesized that spouses' implicit cognitions about their partner would be predictive of changes in marital functioning over time. Specifically, it was hypothesized that positive implicit partner cognitions would predict increases in satisfaction, constructive communication, positive relationship behavior, and commitment, and decreases in negative relationship behavior; negative implicit partner cognitions were expected to predict decreases in

satisfaction, constructive communication, positive relationship behavior, and commitment, and increases in negative relationship behavior.

Third, it was hypothesized that when controlling for partner esteem, the associations between implicit partner cognitions and these various components of marital functioning would remain statistically significant. Partner esteem is similar to self-esteem in that it is a mental representation or self-concept of a person's worth or valuableness. Partner esteem is a social judgment as to the degree to which people view their partner as worthy, good, and respectable. It serves as the explicit counterpart to implicit positive and negative cognition towards one's spouse. It was hypothesized that implicit cognitions would be incrementally associated with marital functioning, over and above the effects of explicit cognitions (i.e., partner esteem).

Methods

Participants

Participants were 89 unrelated married individuals recruited from the Boulder area. Inclusion criterion for the study were (a) > 18 years of age, (b) legally married in a heterosexual relationship, and (c) living with one's spouse. Only one member of a given couple was recruited for this study. Recruitment was conducted through the online bulletin boards, flyers placed around campus, businesses in the local area (e.g., gyms, childcare, and retail stores), and postings on Craigslist. Participants received \$30 for participation in each of three waves of the study.

The study sample ($N = 89$) was composed of 61.8% women and 38.2% men. Participants had a mean age of 38.9 years old ($SD = 11.52$ years), an average of 12.36 years of marriage ($SD = 10.91$ years), and an average of 1.06 children ($SD = 1-2$, range 0-4). The racial and ethnic composition of the sample consisted of 77.5% White, 12.4% Asian, 2.2% Pacific Islander/Native Hawaiian, 1.1% Black, 1.1% Native American, 5.6% identifying as "other," with 9% of the

sample identifying as Latino. Comparisons were conducted between those who completed the follow-up assessment at 6-months ($N = 78$) and those who did not ($N = 11$). No statistically significant differences were detected between the two groups on gender, age, length of marriage, number of children, or race and ethnicity, or on measures of marital satisfaction, constructive communication, partner behaviors, or marital stability.

Procedures

Participants who contacted us by phone or email to participate in the study were screened to ensure they were over 18 years old and in a heterosexual married relationship. Eligible participants were scheduled to come to the testing location at the University of Colorado Boulder, at which time written consent was obtained. Participants then completed the Go/No-Go task and a series of self-report questionnaires on a desktop computer. Participants were recontacted to return to the testing facility for 6-month and 12-month follow-up assessments, which involved completion of the identical measures administered at baseline. Data from the 12-month follow-up was not included in this study.

Measures

Implicit Cognition. A partner-specific version of the Go/No-Go Task (GNAT; Nosek & Banaji, 2001) was developed to measure implicit cognitions about one's spouse. The general format of the GNAT evaluates implicit associations between attributes of interests and a target group. In general, a participant would be asked to press the spacebar on a computer keyboard only when they saw a word or picture from the attribute or target category. The proposed study used a partner-specific modification of the GNAT in which a combination of picture and word stimuli were used to elicit positive and negative relationship cognitions rather than word stimuli alone. In order to make the task as relevant to the participant as possible, participants provided

words that represented their partner (i.e., partner's name, nickname, and birthday) at the start of the study, which were then entered into the GNAT program in order to present these partner-specific words during the task. General words relating to the partner category were also used, which included the words *partner* and *husband* or *wife* (depending on which one described the participant's partner). Distractor words were also used, which included a name that was not his or her partner's name but was of the same gender (e.g., *Margot* or *Trevor*), a date that was not the partner's birthday (e.g., *February 29*), and *wife* or *husband* (whichever one did not describe the participant's spouse).

The stimuli chosen for the GNAT to represent relationship-specific positive or negative attributes were 20 photographs of caring and affectionate couples and 20 photographs of disengaged or arguing couples, respectively. In the second experimental block, pictures included 20 positive and 20 negative non-couples photographs. Additionally, 10 photographs of birds were interspersed in the task, which were used as distractor items. All images were selected by the researchers from a stock photography website for their fit with each of the four attribute categories (i.e., Positive and Negative Couples; and Positive and Negative Non-couples). Research colleagues reviewed the photographs to confirm that they met the intended valence, fit, and clarity of content for each of the four GNAT blocks.

Participants began the task by viewing written instructions on the screen and completing a series of three training blocks comprising 76 trials of the Go/No-Go task using non-couples stimuli in order to ensure clear understanding of the task. The critical GNAT blocks consisted of identifying descriptor words of the participant's partner and photographs that represented positive or negative attributes. The first experimental block asked participants to press the space bar when they saw a word describing their partner or a photograph of a positive couple

interaction; the second block asked participants to do the same except press the space bar if a partner word or negative couple interaction was shown. In the second two-block experiment, rather than being shown pictures of couples interacting, participants were shown non-couple pictures and asked to identify either positively or negatively valenced photographs. The five partner words and five non-partner words were each reused four times so as to have the same number of words and photographs displayed in each block. Photographs and words were presented in random order and the presentation order of these blocks was counterbalanced so as to avoid an order bias. Participants completed the two GNAT sets, composed of two blocks each, for a total of 180 critical trials in the relationship specific blocks and 160 critical trials for the non-couples blocks (the non-couples blocks did not contain the 20 distractor trials containing pictures of birds as they would likely have been confused for target stimuli).

Photographs and words were presented to the participants for 650 ms with a 140 ms interval between pictures (Nosek & Banaji, 2001). If participants did not respond within this time window, the trial was recorded as an error (i.e., a miss). The target label (e.g., *Partner Words*) and attribute label (e.g., *Happy Couples*) remained in the top corners of the screen to remind the participant which pictures and words they were supposed to identify when they appeared. The photographs were presented at the center of the screen, on a black background, and were sized to fill approximately one third of the screen. Participants were given feedback after each picture or word to provide ongoing feedback to the participant. Correct responses received a green circle displayed in place of the picture or word. Incorrect responses received a red X in place of the picture or word. In general, the more strongly the two categories were associated for participants the easier it was for them to keep both categories in mind, thus leading to better performance on

those GNAT blocks. Given that the stimuli were presented very quickly, participants were expected to make a number of mistakes, which provided suitable variance in GNAT scores.

Based on signal detection theory (e.g., Green & Swets, 1974), responses for each trial were recorded as either a hit, miss, false alarm, or correct rejection. A hit ratio was calculated as the number of hits within a GNAT block divided by the sum of hits plus misses; and a false alarm ratio was calculated as the number of false alarms divided by the sum of false alarms plus correct rejections. D-prime values were computed by subtracting the z-score of the false alarm rate from the z-score of the hit rate. Scores are reported as a d-prime value for each of the four GNAT blocks.

Marital Satisfaction. Marital satisfaction was assessed with the Couples Satisfaction Index-16 (CSI-16; Funk & Rogge, 2007). It is composed of 16 items that assess global marital satisfaction on 6- and 7-point Likert-type scales. Ratings are summed, with higher ratings indicated higher marital satisfaction. Possible scores ranged from 0 – 81 with a recommended cutoff score of <52 to indicate relationship distress. This measure included items such as, “Please indicate the degree of happiness, all things considered, of your relationship,” “I really feel like part of a team with my partner,” and “In general, how satisfied are you with your partner?” The CSI-16 demonstrated good internal consistency ($\alpha = .98$ at T1 and T2) in the current sample.

Communication. The Constructive Communication Subscale of the Communication Patterns Questionnaire (CPQ; Christensen & Sullaway, 1984) was used as a self-report measure of couples’ problem-solving communication style. The Constructive Communication subscale specifically measures the degree to which partners interact in a positive or constructive manner during a conflict. The scale is composed of the sum of positive communication behaviors such as mutual discussion, mutual expression of feelings, and mutual problem-solving and

compromising, minus the sum of negative communication behaviors such as blame, threat, and verbal aggression. The measure asks couples to identify what happens during three stages of their communication: when a problem arises, during the discussion, and after the discussion. Participants then indicate to what extent various communication patterns occur at each of these stages on a Likert-type scale ranging from *very unlikely* (1) to *very likely* (9). Possible scores range from -33 to 23. The CPQ-CC demonstrated good internal consistency in the current sample ($\alpha = .78$ at T1 and $.83$ at T2).

Behaviors in Marriage. Huston and Vangelisti's (1991) 13-item partner behavior questionnaire was used to measure the frequency of 6 negative and 7 positive partner behaviors. Respondents rate how often the behaviors occur in their relationship with their partner on a 5-point scale ranging from 1=*Almost Never* to 5=*Almost Always*. Sample items include, "Partner approved or complimented me," "Partner made me laugh," "Partner did things that annoyed me (e.g., habits)," and "Partner failed to do something I asked." Negative items were reverse coded and a total score was then created by summing item responses. Higher scores indicated more positive partner behaviors with a possible range in scores of 13 to 65. The scale demonstrated good internal consistency ($\alpha = .84$ at T1 and $.88$ at T2) in the current sample.

Commitment. The 15-Item Commitment Measure (Rusbult, Martz, & Agnew, 1998) was used to assess partners' self-report assessment of their level of commitment to their marriage. Sample items include, "I will do everything I can to make our relationship last for the rest of our lives," "I frequently imagine life with my partner in the distant future," and "I intend to do everything humanly possible to make our relationship persist." Items were rated on 9-point scale (0 = *Do Not Agree At All* to 8 = *Completely Agree*). The Range of possible scores on the measure

was 0 to 120. The Commitment Measure demonstrated good internal consistency in the current sample ($\alpha = .89$ at T1 and $.91$ at T2).

The Esteem of Significant Other measure (Esteem-SO; Gurung, Sarason, & Sarason, 2001) is a modified version of the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1989), which was adapted to measure esteem towards one's partner rather than oneself. Words that were self-referential in the RSE were converted to partner-referential for the Esteem-SO. The Esteem-SO was used as an explicit self-report measure of how participants regard their spouse. Sample items include, "At times I think my partner is no good at all," "I feel that my partner has a number of good qualities," and "I feel my partner does not have much to be proud of." The Esteem-SO is a 10-question measure rated on a 1 (*Strongly disagree*) to 4 (*Strongly agree*) scale, with higher scores indicating more positive perceptions of one's partner. Possible scores ranged from 10 to 40. The Esteem-SO demonstrated good internal consistency in the current sample ($\alpha = .87$ at T1 at T2).

Data Analysis

To evaluate the cross-sectional association between implicit partner cognition and relationship outcomes (Hypothesis 1), multiple regression analyses were conducted by regressing baseline marital outcome variables (e.g., relationship satisfaction, constructive communication) on baseline scores of implicit partner cognition for each of the four GNAT blocks (i.e., positive couples, negative couples, positive non-couples, and negative non-couples). In all regression models, positive and negative implicit cognition scores were entered pair-wise into the models to control for shared method variance and individual differences in ability on this task, similar to the analyses conducted by Lee et al. (2010). In addition, a series of within-subject variables were created that tested the combined scores of the main implicit cognition categories: couples blocks

(computed as positive couples + negative couples – positive non-couples - negative non-couples), positive valence (computed as positive couples + positive non-couples – negative couples - negative non-couples), and the interaction of these blocks. These variables served as new dependent variables that were regressed on each of the marital functioning variables to test for cross-sectional association between marital functioning and combined scores across GNAT blocks of couples vs. non-couples, positive vs. negative stimuli, and their interaction.

To test Hypothesis 2, regarding the longitudinal association between baseline implicit partner cognition and follow-up marital outcomes, multiple regression analysis were conducted in which Time 2 scores on the marital outcome variables were regressed on Time 1 scores for the marital outcome and (a) Time 1 GNAT blocks; and (b) the aggregate within-subject scores for couple, positive valence, and their interaction. Finally, to evaluate whether implicit partner cognitions were incrementally associated with marital outcome variables, over and above explicit partner cognition (Hypothesis 3), the above multiple regression analyses were conducted while statistically adjusting for ratings of explicit partner-esteem.

Results

Means and standard deviations for the implicit cognition measures and marital functioning measures are presented in Table 1. The means and standard deviations in this sample were similar to those found in past studies. The scores presented in Table 1 for the Go/No-Go Associations Task were within the d-prime value range recommended by Nosek and Banaji (2001), indicating that the difficulty level of the task was set appropriately so as to allow for sufficient variance in assessing positive and negative implicit cognitions. Means and standard deviations for marital satisfaction (as measured with the CSI16) in the present study were highly similar to those found by Funk and Rogge (2007) in a sample of 5,315 participants ($M = 61$, SD

= 17). They recommend using a cutoff score of 51.5 on the CSI16 to identify distressed from non-distressed couples. Applying this recommended cutoff score to the current study, approximately 18% of the participants in the present study fell into the distressed range.

Table 1
Means And Standard Deviations For Study Measures

Variables	Time 1		Time 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
PC	2.21	0.71	-	-
NC	1.66	0.06	-	-
PNC	2.48	0.75	-	-
NNC	1.95	0.78	-	-
CSI16	62.02	16.21	62.84	15.06
CC	11.03	8.96	11.42	9.37
PBQ	50.63	7.90	51.13	8.35
COM	84.80	16.99	85.13	17.37

Note. Time 1 = baseline data collection. Time 2 = 6-month follow-up data collection. PC = Positive Couples GNAT d-prime value. NC = Negative Couples GNAT d-prime value. PNC = Positive Non-Couples GNAT d-prime value. NNC = Negative Non-Couples GNAT d-prime value. CSI16 = Couples Satisfaction Index-16. CC = Constructive Communication subscale of the Communication Patterns Questionnaire. PBQ = Partner Behavior Questionnaire. COM = Commitment in Marriage scale.

To test if participants scored differently on the four different types of GNAT blocks, a 2×2 analysis of variance (ANOVA) was conducted comparing couples with non-couples blocks, positive with negative blocks, and the interaction of the two. Results indicated partners showed better performance in pairing partner words with positive pictures than with negative pictures, $F(1,88) = 34.22, p < .001, \eta^2 = .28$, and in pairing partner words with couples pictures than with non-couples pictures, $F(1,88) = 102.58, p < .001, \eta^2 = .54$. There was no significant interaction

between the two task types, $F(1,88) = .03, p = .85, \eta^2 = .00$. These results suggest that participants on average had positive implicit attitudes towards their partners and had stronger implicit partner associations for stimuli depicting couples.

Pearson product moment correlations were computed to evaluate the associations among the self-report measures of marital functioning; these results are presented in Table 2.

Intercorrelations among measures of marital functioning indicated a high degree of covariation between marital satisfaction, constructive communication, partner behavior, and marital commitment at baseline and at the 6-month follow-up (see Table 2).

Table 2
Intercorrelations Between Measures Of Marital Functioning At Time 1 And Time 2.

Variables	1	2	3	4	5	6	7	8
1. T1 CSI16								
2. T1 CC	.67							
3. T1 PBQ	.76	.68						
4. T1 COM	.73	.59	.69					
5. T2 CSI16	.87	.59	.71	.66				
6. T2 CC	.61	.76	.62	.51	.72			
7. T2 PBQ	.67	.59	.84	.58	.77	.70		
8. T2 COM	.63	.47	.62	.77	.74	.58	.72	

Note. All correlations are significant at $p < .001$. T1 = time 1 baseline data collection. T2 = time 2 6-month follow-up data collection. CSI16 = Couples Satisfaction Index-16. CC = Constructive Communication subscale of the Communication Patterns Questionnaire. PBQ = Partner Behavior Questionnaire. COM = Commitment in Marriage scale.

Pearson product moment correlations were computed between Positive and Negative Couples blocks and Positive and Negative Non-Couples blocks to assess the degree to which

positive and negative implicit cognitions covaried within the two sets. Within the couples GNAT and the non-couples GNAT, performance on partner-positive GNAT block was correlated with the partner-negative block indicating a high degree of shared method variance as well as individual differences in ability levels in completing the computer-based task (Couples block: $r(87) = .57, p < .001$; Non-Couples block: $r(87) = .52, p < .001$). Additionally, a difference score was derived by subtracting Negative Couples scores from Positive Couples scores and this was correlated with the difference score of Negative Non-couples score subtracted from Positive Non-couples score. This test assessed to what degree the difference between positive and negative associations towards one's partner on the two types of GNAT tasks (i.e., couples and non-couples) was due to general positive and negative cognitions towards one's partner independent of the types of pictures used. There was no significant correlation between these difference scores, $r(87) = .06, p = .61$, suggesting that the GNAT measures are specific to couples function.

Age was significantly and negatively correlated with performance on the negative stimuli on the GNAT task (Negative Couples: $r = -.24, p = .04$; Negative Non-couples: $r = -.44, p < .01$) but not on the positive stimuli on the GNAT task (Positive Couples: $r = -.20, p = .09$; Positive Non-couples: $r = -.17, p = .16$), indicating that, compared to older participants, younger participants on average made more correct responses and fewer errors in detecting pictures and words in the target categories on the two negatively-valenced blocks. Therefore, age was entered as a covariate in regression models. A mixed model ANOVA was conducted to test for gender differences in performance for women and men on the four GNAT blocks. There was no significant effect of gender on GNAT performance, $F(1,88) = 0.56, p = .64, \eta^2 = .02$, suggesting that men and women on average performed similarly across the four GNAT blocks and did not

systematically differ in their implicit cognition about their spouse. In addition, including gender as a covariate in the analyses did not substantially change the results from those presented.

Therefore, scores for women and men were combined in all remaining analyses.

Next, separate multiple regression analyses were computed in which each measure of marital functioning was regressed on the four GNAT blocks, controlling for age. Positive and negative blocks were entered pairwise into each regression analysis (e.g., Positive Couples and Negative Couples d-prime scores were entered simultaneously into the regression model). This approach has been shown to effectively control for shared method variance and individual differences in task performance ability (Boldero, Rawlings, & Haslam, 2007), which allows for a more direct test of associations between implicit cognitions and marital functioning.

Contrary to Hypothesis 1, baseline implicit cognitions about one's spouse were not associated with baseline marital outcomes (results presented in Table 3).

Table 3
Results From Regression Analyses Examining Cross-Sectional Association Between Implicit Cognition And Marital Outcomes

Measures	PC		NC		PNC		NNC	
	<i>B</i>	β	<i>B</i>	β	<i>B</i>	β	<i>B</i>	β
CSI16	-4.86	-.17	0.68	.03	-0.69	-.03	0.09	.00
CPQ-CC	0.36	.02	0.02	.00	2.31	.19	-1.11	-.09
PBQ	-0.64	-.05	-0.75	-.06	0.81	.07	-1.13	-.10
COM	-3.87	-.13	-0.89	-.04	-1.75	-.07	-1.45	-.06

Note. All results include age as a covariate. PC = Positive Couples GNAT d-prime value. NC = Negative Couples GNAT d-prime value. PNC = Positive Non-Couples GNAT d-prime value. NNC = Negative Non-Couples GNAT d-prime value. CSI16 = Couples Satisfaction Index-16. CC = Constructive Communication subscale of the Communication Patterns Questionnaire. PBQ = Partner Behavior Questionnaire. COM = Commitment in Marriage scale.

* $p < .05$. ** $p < .01$.

Specifically, Hypothesis 1 predicted that positive implicit cognitions about one's partner would be positively associated with greater marital satisfaction, constructive communication, positive partner behaviors, and commitment as well as negatively associated with negative partner behaviors, and that the reverse would be true for negative implicit cognitions. However, none of these associations were statistically significant.

Hypothesis 2 predicted that baseline implicit cognitions would be associated with change in relationship functioning over the study period. Time 1 scores were found to correlate highly with Time 2 scores for all measures, indicating a high degree of stability on measures of marital functioning (results presented in Table 2). To test Hypothesis 2, Time 2 marital functioning scores were regressed on Time 1 implicit cognition scores, controlling for the corresponding marital functioning measure at Time 1 and age, to evaluate residual change in each measure of marital functioning. As can be seen in Table 4, only one regression was significant. Specifically, at the 6-month follow-up time point, regression analyses found that scores on the Positive Couples implicit cognition block at baseline were positively associated with changes in marital satisfaction: the more positive one's implicit cognitions towards one's partner were at Time 1, the more satisfied the person was 6 months later. This was true only when using the couples' stimulus set to measure implicit positive cognition and was not found when using the non-couples stimulus set. Negative implicit cognitions about one's partner did not predict changes in satisfaction over time. Implicit partner cognition at baseline did not predict any other changes in measures of relationship functioning.

Table 4
Results From Regression Analyses Evaluating Change In Marital Outcomes From Time 1 To Time 2

Measures	PC		NC		PNC		NNC	
	<i>B</i>	β	<i>B</i>	β	<i>B</i>	β	<i>B</i>	β
CSI16	5.69**	.21	-2.20	-.10	-0.90	-.04	2.02	.10
CPQ-CC	3.50	.22	-0.96	-.07	0.76	.06	1.77	.14
PBQ	1.92	.14	-0.14	-.01	0.88	.08	0.50	.04
COM	5.23	.18	-1.63	-.07	1.76	.07	0.63	.03

Note. All results include age as a covariate. Time 1 = baseline data collection. Time 2 = 6-month follow-up data collection. PC = Positive Couples GNAT Block. NC = Negative Couples GNAT Block. PNC = Positive Non-Couples GNAT Block. NNC = Negative Non-Couples GNAT Block. CSI16 = Couples Satisfaction Index-16. CC = Constructive Communication subscale of the Communication Patterns Questionnaire. PBQ = Partner Behavior Questionnaire. COM = Commitment in Marriage scale.

* $p < .05$. ** $p < .01$.

To test Hypothesis 3, that associations between implicit cognition and relationship functioning would remain significant when controlling for explicit (i.e., self-report) attitudes towards one's partner, self-reported esteem of one's partner was added into the regression analyses assessing for the association between implicit cognitions and change in marital satisfaction from baseline to follow-up. When controlling for self-reported esteem of partner, positive implicit cognitions, as measured with the couple interactions pictures stimulus set (i.e., Positive Couples), continued to predict changes in relationship satisfaction at the 6-month follow-up, $b = .21$, $p = .01$. This suggests that implicit cognitions about one's partner predicted unique variance in relationship satisfaction over time that was not accounted for by self-reported attitudes toward one's partner.

Additional, within subjects analyses were conducted to test for associations between marital functioning and broader implicit cognition categories of couples (versus non-couples),

positivity (versus negativity), and their interaction. These aggregate variables composed of baseline GNAT scores on the four GNAT blocks (i.e., Positive Couples, Negative Couples, Positive Non-Couples, and Negative Non-Couples) were regressed on baseline marital functioning scores. Additionally, regression analyses were conducted to test for the association between aggregated implicit cognition scores and change in marital functioning from baseline to Time 2. Results of these analyses, presented in Table 5, suggest that there were no significant main effects at baseline or change from baseline to Time 2 for Couples or Positivity aggregated implicit cognition variables in their association with any of the measures of marital functioning.

Table 5
Results From Regression Analyses Evaluating Within Subjects Aggregate Tests of Implicit Cognition at Baseline and Change from Time 1 to Time 2

Measures	Positivity		Couples		Interaction	
	<i>B</i>	β	<i>B</i>	β	<i>B</i>	β
CSI16	-.01	-.14	-.01	-.21	.00	.01
CPQ-CC	-.00	-.02	-.01	-.05	-.01	-.10
PBQ	.00	.02	-.02	-.13	.00	-.00
COM	-.00	-.02	-.00	-.01	.00	.06
CSI16T2	1.68	.10	-.37	-.02	2.18*	.13
CPQ-CCT2	.88	.09	-.46	-.04	1.36	.13
PBQT2	.61	.07	.24	.02	.40	.05
COMT2	2.00	.10	.46	.02	1.44	.08

Note. Time 1 = baseline data collection. Time 2 = 6-month follow-up data collection. Positivity = (Positive Couples + Positive Non-Couples) – (Negative Couples + Negative Non-Couples) GNAT d-prime value. Couples = (Positive Couples + Negative Couples) – (Positive Non-couples + Negative Non-Couples) GNAT d-prime value. Interaction = (Positive Couples + Negative Non-Couples) – Negative Couples + Positive Non-Couples) GNAT d-prime values. CSI16 = Couples Satisfaction Index-16. CC = Constructive Communication subscale of the Communication Patterns Questionnaire. PBQ = Partner Behavior Questionnaire. COM = Commitment in Marriage scale.

* $p < .05$. ** $p < .01$.

One significant interaction was observed when testing for change in marital satisfaction, such that the degree to which Positivity was associated with change in marital satisfaction depended on whether the task contained couples photographs. This finding was consistent with the earlier-mentioned regression results for Hypothesis 2, in which positive implicit cognitions in the couples GNAT was positively associated with change in marital satisfaction over the study period.

Discussion

Past research has shown that assessment of implicit cognition can compliment and provide incremental information to more traditionally used explicit, or self-report, measurement of attitudes, beliefs, and behavior. The current study was conducted to examine the degree to which implicit relationship cognition was associated with concurrent and longitudinal changes in marital functioning. It was hypothesized that positive and negative implicit cognitions about one's partner, as measured with the GNAT, would be (a) cross-sectionally associated with multiple domains of marital functioning, including relationship satisfaction, positive and negative marital quality, communication between partners, partner behavior, and commitment to the marriage; (b) longitudinally associated with changes in these domains of marital functioning over time; and (c) incrementally associated with marital functioning over and above explicit (self-reported) attitudes towards one's partner.

Findings from this study provided limited support for the hypothesized associations between implicit cognitions about one's partner and marital functioning. Only one association between implicit cognition and self-reported marital functioning reached conventional levels of statistical significance. In the longitudinal analysis testing whether implicit partner cognitions were associated with change in marital functioning over time, positive implicit cognitions about

one's partner at baseline, specifically those measured with couples images (as opposed to non-couples images), were positively associated with changes in relationship satisfaction. This suggests that when controlling for baseline levels of marital satisfaction, stronger initial positive implicit cognition towards one's partner was associated with higher marital satisfaction over time. People who tended to more easily associate their spouse with positive interactions saw the most positive change in marital satisfaction over time.

When looking more specifically at implicit cognition, the GNAT association block that was found to be associated with change in marital satisfaction consisted of pictures of couples interacting in happy or loving ways. These pictures were chosen for use in the GNAT to evoke implicit cognitions towards one's partner that were more relationship specific. The nature of the effects found in this study suggest that photographs of happy couples are more likely than any of the other GNAT blocks to account for variance in marital functioning. Part of what sets the couples GNAT set apart from the general valence GNAT set is that it may be targeting implicit cognition that is specific to one's *interactions* with her or his partner. This is because the photographs depict couples interacting with one another in ways that are consistent with what most people would hope for in their relationships (e.g., showing affection, having fun together, and enjoying each others company). It is possible that this means that people who are more likely to implicitly perceive their spouse as fulfilling their part in these types of interactions show more positive change in marital satisfaction over time; people who do not as strongly implicitly perceive their partner as interacting in a positive manner may be less likely to experience increases in satisfaction over time.

Another important aim of this study was to evaluate whether implicit relationship cognitions were uniquely associated with relationship functioning in ways not detected with self-

report measures alone. Past research has shown that in certain circumstances, implicit cognition reveals unique patterns of association that are not detected through traditional self-report methods (e.g., Nock et al., 2010). Moreover, studies have shown that people are not always good reporters of their inner experience for a number of reasons, including that it is not easy to observe how we take in, store, and recall information from life experiences, and in some instances, people may be unwilling to acknowledge undesirable or socially unacceptable thoughts (Baldwin, 1992). Considering that this study found a longitudinal association between positive implicit cognition and change in marital satisfaction, this association was again tested while statistically adjusting for self-reported evaluation about one's partner, or explicit partner esteem. When controlling for explicit cognition about one's partner, positive implicit cognition was incrementally associated with 6-month change in marital satisfaction, over and above any shared association with explicit cognition. This suggests that positive implicit cognitions about one's partner accounts for unique variance in marital satisfaction that is not captured by self-report measures alone and indicates that there is something uniquely important about the implicit ways people process information about their partner that is related to the degree to which they are satisfied with their relationship. This is important to consider insofar as it suggests processes are occurring in intimate relationships that are largely outside of partners' awareness and may be of benefit to further explore when working with couples to help them improve the quality of their relationship (for additional discussion see Riso, DuToit, Stein, & Young, 2007).

Although we measured a number of domains of marital functioning as representations of marital health, implicit cognition was associated only with changes in satisfaction from baseline to 6-month follow-up. It was speculated that positive and negative implicit cognition would also be related to self-reports of interpersonal behaviors in marriage such as how partners

communicated with one another, the frequency of partner's positive and negative behavioral exchanges, and overall commitment to the marriage. One possibility considered at the outset of this study was that positive and negative implicit cognition would be related to communication styles and relationship behaviors, which could then have a downstream effect on satisfaction and ultimately on the stability of the marriage. Satisfaction in relationships has often been considered to be a final common pathway in the stability of a relationship (Jacobson, 1985). The pathway from positive implicit partner cognition to marital satisfaction is yet unknown. In future research it would be helpful to better understand the mechanisms through which positive implicit cognition is related to satisfaction. Although all of the relationship domains measured in this study were highly correlated with one another, there were no significant cross-sectional or longitudinal associations between implicit cognition and any of the other marital constructs that were assessed that could potentially have acted as mediators of the association between implicit cognition and changes in marital satisfaction. It may be that implicit cognition has subtler or more indirect associations with the marital functioning domains evaluated in this study or that it occurs over a different time interval than was measured in this study.

When considering the lack of association between implicit cognition and other domains of relationship functioning, it is possible that self-reports of marital behaviors do not adequately capture the true nature of the marital interactions that are occurring between spouses, which might be obtained in a behavioral observation study of partners interacting with one another. Given that all of the outcome measures of marital functioning in this study were self-report questionnaires, they may not have adequately captured the actual ways in which implicit cognition influences marital function. Future research may benefit from using observational

markers of marital functioning (e.g., observational coding of specific behaviors partners engage in during a problem-solving interaction).

In considering why couple-specific implicit positive cognitions were longitudinally associated with marital functioning but negative implicit cognitions were neither cross-sectionally nor longitudinally related, there are a few considerations to mention. First, prior research had found mixed results with regard to the role of negative implicit cognitions. Whisman and Delinsky (2002) found that negative implicit cognitions about one's partner were inversely associated with satisfaction in a cross-sectional study using an incidental recall task of positive and negative adjectives rated as describing the partner. In comparison, Lee et al. (2010) found that negative implicit partner cognitions, assessed with the GNAT, were not cross-sectionally or longitudinally associated with relationship stability.

Second, there is some evidence to suggest that positive and negative implicit cognition specific to relationships shows different patterns of association within different groups of people. For example, Banse and Kowalick (2007) compared implicit and explicit cognition among three groups of women: abused women living in a refuge, women who had recently fallen in love, and women who were hospitalized due to pregnancy complications. They found that women newly in love showed the most positive cognition towards their partner relative to the other two groups of women but this was only found on explicit measures of partner cognition, not on implicit measures. Women who had been abused showed more negative explicit and implicit cognition towards their partner than the other two groups of women. When examining the association for implicit and explicit cognition with well-being of the women in all three groups, implicit cognition towards the partner was found to be associated with well-being over and above explicit attitudes towards the partner only for hospitalized pregnant women. There was no association

between well-being and implicit cognition towards one's partner for women who had been abused or those recently in love. Their findings suggest that variation in life circumstance (for example during major life transitions or illnesses) and the nature of the relationship with one's partner can change the salience of positive and negative implicit and explicit cognition towards one's partner. The present study did not assess for major life transitions, therefore, it was not possible to test for interactions between implicit cognitions and life events like those mentioned above. However, in future research it would be interesting to evaluate whether the associations between implicit relationship cognitions and marital outcomes vary as a function of life events.

Third, the lack of association for negative implicit cognition in the current study may be due in part to the fact that the majority of participants fell within the satisfied range on the measure of marital satisfaction. Furthermore, participants on average had significantly stronger positive than negative implicit cognition towards their partner. This means that it is possible that for this group of largely non-distressed, or only moderately distressed spouses in our sample, the number of severely distressed spouses may have been insufficient to show significant associations between their negative implicit cognition towards their partner and their relationship functioning.

Similarly, the photographs of unhappy partner interactions used in the GNAT may have depicted negative interactions that were overly conflictual to realistically represent the kinds of conflict interactions most relatively satisfied couples are likely to exhibit. That is to say, many of the negative couple interactions showed partners in full-blown arguments, with raised hands and shouting at one another. Other negative photographs showed couples positioned facing away from each other with unhappy expressions on their face in an apparent standoff. It may have been easier for satisfied couples to associate their partner with the happy couples interactions

depicted in the GNAT photographs, whereas partners may need to be more significantly distressed in their marriage to associate their spouse with the kinds of negative interactions shown in the GNAT photographs. Therefore, negative implicit cognitions may be more relevant or salient to relationship functioning for people who are more severely distressed than the participants in this study.

One possible modification that could be made to the GNAT couples photos that might better measure implicit cognition about one's partner would be to use actual photographs of one's partner. Stock photographs were used to depict different types of couple interactions; however, stock photographs tend to be stylized to achieve a particular effect and contain pictures of individuals that are not one's own spouse. It is possible that these photographs, while being effective at representing positive or negative interactions, were more difficult for participants to relate to since they did not show a participant's actual partner.

Moreover, to simplify the complexity of the images, simple facial expression, rather than interaction scenes, could be used in the GNAT. In support of this potential future modification to the GNAT, past research has shown that simple photographs can be effective stimuli in tests of implicit associations. Specifically, Nosek and Banaji (2001) effectively used Black, White, or Asian faces of men and women in the GNAT to study preference for race as well as preference for gender. Additionally, Park et al. (2010) studied gender differences in parental roles using images representing professional and parent roles (e.g., stroller and lunch box versus briefcase and executive desk). One common factor across these previous studies was that the photographs were relatively simple. Photographs used in both GNAT set types in the present study were more complex in that the images required participants to register a number of factors such as posture, facial expressions, or other elements of the scene that made it positive or negative. It is possible

that these pictures made it more difficult for participants to identify, in the 650 ms time period, the critical dimension on which each picture was to be rated. It could potentially lead to stronger results in future research to use less complex photographs.

In addition to modifying the photographs, it may be helpful with future GNAT designs to eliminate the feedback image that was shown after each trial. After each image or word was shown on the screen a red “X” or green “O” appeared indicating whether he or she responded correctly to that stimuli. Although this was intended to ensure participants were following the directions correctly and putting forth a good effort, it may have unintentionally created a performance anxiety that distracted from focusing on one’s relationship, thus reducing the activation of implicit relationship cognitions.

Another consideration for future research is that it may be useful to study not only the “absolute value” of a person’s implicit cognition but also how these map onto his or her expectations for the relationship. It is possible that specific relationship beliefs and expectations moderate the association between implicit cognition and marital functioning. For example, Thibaut and Kelley (1959) proposed that relationship satisfaction is not a direct function of the specific outcomes one receives from his or her partner but rather is a comparison between the direct outcomes they experience and the standards they hold for relationships. In other words, the same experiences should have different effects on partners’ emotions and reactions based on how well it compares with their relationship beliefs, values, and perceptions of the partner (e.g., Fincham, Harold, Gano-Phillips, 2000). This is one possibility for why implicit cognition in the present study was not found to be directly associated with most of the specific relationship outcomes measured but rather was found to be related to global perceptions of marital satisfaction over time. It may be that implicit cognition is less related to specific patterns of

behavior in relationships and instead is related to more distal outcomes (e.g., satisfaction or breakup) because the specific behaviors partners do can be interpreted in different ways. In future research it may be useful to assess how expectations moderate the association between implicit cognitions and relationship outcomes.

Additionally, this study measured relationship related implicit cognition as broad positive or negative attributes about one's partner. This approach was consistent with prior implicit relationships research (e.g., Lee, et al., 2010) that also used categories of global positive and negative cognition; however, this approach may lack specificity in detecting the types of cognitions that might be more likely associated with relationship functioning. For example, implicit cognitions about the degree to which one's partner is viewed as criticizing, demanding, defensive, supportive, or safe could well be more specifically associated with aspects of relationship functioning than global positive and negative attributes. It is possible that implicitly viewing one's partner as "positive" or "negative" may fail to take into account the true complexity of implicit relationship cognitions. Therefore, it may be useful in future research designs to test for associations between more specific, theory-driven types of implicit cognitions with relationship functioning.

Another possible way to enhance the effectiveness of the present version of the GNAT in future relationship research would be to include a priming component to activate relationship schema just prior to taking the GNAT. There is strong evidence in prior research to indicate that priming effects activate specific cognitive responses to situations (Cameron, Brown-Iannuzzi, & Payne, 2012). Priming participants with relationship related input just prior to completing the GNAT could create a more activated response pattern about one's partner, similar to what is likely to occur in actual marital interactions. The context of the interpersonal interaction may

matter in determining how implicit cognition towards one's partner is related to specific behavior. Being in the university laboratory setting, a potentially stress-provoking situation, may not as strongly invoke implicit cognition about one's spouse as intended. Adding a priming task might increase the salience of the positive and negative associations towards one's partner in the GNAT.

Though the findings of this study were limited, the area of implicit cognitions as they relate to marital function remains a potentially rich area for further empirical investigation. This study provided some evidence indicating that positive implicit cognition is associated with marital satisfaction over time and is incrementally associated with satisfaction over and above self-reported cognition about one's partner. Given that there a number of factors that could have influenced the results of this study, including that implicit cognitions about one's partner are largely outside of one's awareness and cannot easily be measured, that different patterns of association may emerge at different levels of marital adjustment, and that these may vary with important life events, it would be useful to conduct further research to better understand the role of implicit partner cognition and how it is associated with marital functioning.

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