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The role of implicit sexual desire in romantic relationships

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ABSTRACT

People might not be able or willing to accurately report how much they sexually desire their romantic partners due to concerns over the well-being of one's relationship or impression management. This research assessed the predictive validity of a sexual desire implicit association task. First, a pilot study determined the psychometrically optimal length for the task. Study 1, using a dyadic weekly diary method, found that people with higher implicit desire experienced more intimacy during sex, were more responsive to their partner during sex, and perceived that their partners felt more desire, arousal, and intimacy during sex. In Study 2, higher implicit desire predicted quicker attentional disengagement from attractive alternatives for women; however, among men, higher implicit desire predicted slower attentional disengagement from attractive alternatives. Implications for understanding sexual desire in romantic relationships are discussed.

1. Introduction

1.1. Background

In contemporary Western society, most people want romantic relationships that are infused with mutual sexual desire. This is not surprising, considering that sexual desire is a central component of romantic passion and that sexual activity is an opportunity for intimacy and intense pleasure (Birnbaum, 2017). However, sexual desire can be elusive in long-term romantic relationships—the intense desire typical of early-stage relationships tends to fade over time (e.g., Carvalheira, Brotto, & Leal, 2010; Carvalheira, Traeen, & Štulhofer, 2014; Klusmann, 2002). Even though this decline is common, people may be reluctant to acknowledge that their desire for their partner has dissipated because doing so may raise uncomfortable doubts about the future of their sex life or the relationship itself. To quell those doubts, responses on self-report measures of sexual desire for romantic partners may be influenced by the need to believe or leave the impression that one's relationship is lusty, sexy, and in turn, valuable and secure (Birnbaum, 2017; de Jong & Reis, 2014, 2015).

To the best of our knowledge, previous research into sexual desire in romantic relationships has relied solely on self-report measures of sexual desire. However, the possibility that self-reported sexual desire may be biased by relationship concerns, impression management, or lack of interoceptive awareness of sexual responses raises questions regarding the ability of these measures to adequately uncover the causes and consequences of sexual desire in romantic relationships. The Implicit Association Test (IAT; Greenwald, Nosek, & Banaji, 2003) offers an alternative approach to measuring socially sensitive thoughts and feelings by assessing automatic and spontaneous appraisals in a way that reduces the ability to control responses (De Houwer & Moors, 2010). We theorize that the IAT can be used to tap into automatic and spontaneous sexual appraisals of romantic partners before those appraisals are modified by various biases. Our research utilized a novel implicit measure of sexual desire, the sexual desire implicit association test (SD-IAT), to investigate the role of sexual desire in romantic relationships. Specifically, we examined whether the SD-IAT predicted several key features of couples' sex lives (e.g., intimacy, pleasure) and a key relationship maintenance mechanism (attentional disengagement from attractive non-partner targets; Maner, Gailliot, & Miller, 2009).

1.2. Sexual desire

The term sexual desire is operationalized in two ways in the literature. The first conceptualizes sexual desire as the impulse to engage in sexual behavior *in general* (e.g., Fisher, Aron, Mashek, Li, & Brown, 2002). The second, which we use here, describes the impulse to engage in sex *with a particular person* (e.g., Birnbaum & Reis, 2012). Incentive

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motivation theory frames sexual desire as the automatic and pre-attentive activation of the sexual response system by a sexually attractive stimulus, such as the sight, touch, or thought of one's partner. First, a stimulus is matched with implicit or explicit memories, such as conditioned responses, preferences, or expectations for sexual rewards (Spiering & Everaerd, 2007). Upon matching with memories, if the stimulus is appraised as a sexual incentive, the individual is pushed towards sexual activity and may experience genital arousal (Toates, 2009). Thus, from an incentive motivation perspective, sexual desire is a motivational state, triggered by automatic appraisals of a stimulus as a sexual incentive, that propels an individual towards sexual behavior (Toates, 2009). The implicit association test developed for the present research was designed to tap into these automatic sexual appraisals, which we term *implicit sexual desire*.

1.3. The role of sexual desire in romantic relationships

Sexual desire plays a central role in relationship formation. For most couples, sexual desire is fundamental to falling in love, and first sex marks a turning point in the development of passionate love. In long-term relationships, sexual desire is intertwined with passion and feeling in love, and the benefits of sex, such as pleasure and closeness, contribute to relationship satisfaction and stability (Birnbaum, 2017).

Low or absent sexual desire brings challenges to romantic relationships. A lack of desire may dampen sexual initiation or receptivity, leading to less frequent sex, and in turn, may threaten the romantic bond by depriving partners of the many benefits of sex, such as intimacy, pleasure, and excitement (Sprecher & Cate, 2004). Low desire may impede genital arousal, and in turn, may cause sex to be painful for women or impossible for men, leading to sexual avoidance, conflict, and resentment. Accordingly, low or absent sexual desire may lead to conflict, infidelity, or breakup (Blow & Hartnett, 2005).

1.4. Over- and under-reporting of sexual desire

Past research into sexual desire for romantic partners has relied on self-reports. For example, the commonly used Hurlbert Index of Sexual Desire (Apt & Hurlbert, 1992) includes items such as “My desire for sex with my partner is strong,” and “Just thinking about having sex with my partner excites me.” As another example, in several studies Birnbaum et al. (2011, 2014) measured sexual desire by asking participants to rate their partners on adjectives such as sexually desirable, hot, and attractive. However, explicit reports of desire may be affected by various biases arising from relationship concerns or impression management.

Considering the relationship problems associated with low sexual desire, explicitly acknowledging low desire may threaten partners' sense of the value and health of their relationship (King, Holt, & Nazareth, 2007). Exaggerating sexual desire for one's partner may promote a sense of security in the relationship. This possibility accords with research into motivated relationship maintenance mechanisms, which shows that relationship-enhancing cognitions bolster partners' sense of the quality of their relationship and helps sustain a sense of comfort and security (Rusbult, Olsen, Davis, & Hannon, 2001). For example, de Jong and Reis (2015) found that committed partners are prone to positive illusions of sexual compatibility. Positive sexual illusions, in turn, may foster sexual satisfaction (de Jong & Reis, 2014; Maxwell, Rossi, Barranti, & MacDonald, 2018).

Inflated self-reports of sexual desire may also reflect impression management (Paulhus, 1984). Most people believe that good sex is requisite in healthy relationships and that low sexual desire indicates relationship problems (Regan, 1998). Accordingly, people may exaggerate the desire they feel for their partner to create the impression that their relationship is strong.

People may also be motivated to downplay the sexual desire felt for their romantic partners. Many people need to feel secure in their relationship in order to become sexually aroused and enjoy sex (Birnbaum, Mikulincer, Szepsenwol, Shaver, & Mizrahi, 2014), and relationship uncertainty may lead to denial of desire to avoid risking rejection. Additionally, for some people, sexual desire is accompanied by anxiety due to past experiences, such as sexual abuse, unwanted pregnancy, or childhood messages that sexual feelings are shameful (Woo, Brotto, & Gorzalka, 2012). For these people, reporting less sexual desire may be a strategy to avoid negative associations with sex.

Lack of interoceptive awareness of automatic and spontaneous sexual responses may also contribute to underreporting of sexual desire (Handy & Meston, 2016). In laboratory settings, experimentally induced genital sexual arousal also triggers self-reports of subjective sexual arousal in men, but less so for women (Chivers, Seto, Lalumiere, Laan, & Grimbos, 2010). In other words, women, compared to men, tend to exhibit lower concordance between physiological and subjective sexual arousal. Accordingly, people who lack subjective awareness of the sexual arousal triggered within them by their partner may report feeling little desire for their partner.

For researchers, over- or under-reporting of sexual desire may obscure the causes and consequences of sexual desire in romantic relationships. We suggest that implicit measures may be able to assess automatic and spontaneous sexual appraisals of romantic partners. If so, they may improve our ability to predict the correlates of sexual desire by tapping into variance in sexual desire that is not captured by explicit measures.

1.5. Use of implicit measures to predict socially sensitive constructs

Self-report measures access consciously accessible thoughts and may be influenced by the relationship concerns and impression management efforts described above. Implicit measures aim to overcome these limitations by assessing automatic and spontaneous appraisals, using measurement strategies that are difficult to control. By tapping into automatic appraisals, implicit measures may predict behaviors that are influenced by automatic processes, especially when the ability, motivation, or opportunity to override automatic processes are limited (e.g., due to fatigue or time constraints; Friese, Hofmann, & Schmitt, 2009). For example, an IAT assessing White participants' automatic appraisals of African-Americans predicted how far they sat from an African-American person, independent of self-reported appraisals of African Americans (Amodio & Devine, 2006). In another study, an IAT measuring appraisals of words associated with “death” predicted psychiatric patients' future suicide attempts beyond patients' own or their clinician's appraisals (Nock et al., 2010).

To the best of our knowledge, implicit measures have not previously been used to assess sexual desire for romantic partners, although they have proven valuable in assessing general appraisals of romantic partners. For example, Lee, Rogge, and Reis (2010) found that an implicit measure of positive and negative appraisals of relationship partners predicted breakups even after controlling for self-reported relationship satisfaction and hostile conflict. Similarly, McNulty, Olson, Meltzer, and Shaffer (2013) found that implicit appraisals of romantic partners predicted change in marital satisfaction over time.

1.6. Assessing implicit sexual desire in romantic relationships

As described above, sexual desire is triggered by automatic appraisals of a stimulus as a sexual incentive (Spiering & Everaerd, 2007), but people may over- or under-report their feelings on self-report measures. However, desire also motivates people to seek sexual contact with the incentive and triggers automatized behaviors that facilitate sex, such as genital arousal (Toates, 2009). These automatized behaviors may be more difficult to fake in daily life when people are often cognitively depleted or facing time pressures (e.g., due to stress, child care, etc.). Under conditions of reduced self-control, implicit sexual desire is most likely to influence automatic and spontaneous sexual

behaviors (Friese et al., 2009). Because implicit measures assess automatic appraisals before they can be modified, we theorized that implicit sexual desire would predict sexual behaviors over and above (i.e., while controlling for) explicit, self-reported desire.

1.7. The current research

This research assessed the predictive validity of a sexual desire implicit association test (SD-IAT). Study 1 examined the role of implicit sexual desire in couples' everyday sex lives. If implicit desire reflects automatic sexual appraisals of one's partner, then it should influence the automatized or spontaneous behaviors that facilitate sex, such as initiation of sex, being receptive to the partner's advances, or becoming genitally aroused (Both, Everaerd, Laan, & Janssen, 2007). Accordingly, higher implicit desire should be associated with more frequent sex and, during sex, more sexual arousal, pleasure, intimacy, and responsiveness to partners' sexual needs. Because we have theorized that the SD-IAT taps an aspect of sexual desire that people are unable or unwilling to self-report, all analyses controlled for participants' own and partners' explicit desire.

We also examined whether implicit desire was associated with perceptions of partners' sexual experiences. Person perception may be influenced by motivational states so that goal attainment is facilitated (Niedenthal & Halberstadt, 2003). For example, sexual motivation increases the likelihood of perceiving sexual arousal in attractive targets (Maner et al., 2005). Accordingly, we expected that higher implicit desire would be associated with perceiving partners as experiencing more arousal, intimacy, and less boredom during sex, and as being more responsive to one's own sexual needs. Because of the interdependence inherent in sex, we also examined partner effects of sexual desire. That is, how does the partner's sexual desire affect the individual? To the best of our knowledge, this is the first investigation of partner effects of either implicit or self-reported sexual desire.

Study 2 investigated the role of implicit sexual desire in attentional disengagement from attractive romantic alternatives. Attractive and available alternative partners threaten relationships and predict breakup, and various motivated relationship-maintenance strategies minimize these threats; for example, attentional disengagement from attractive alternatives (Maner et al., 2009). Several studies point to the motivational underpinnings of these strategies, particularly focusing on commitment (Lydon & Karremans, 2015).

We theorize that sexual desire is another key motivator of attentional disengagement from attractive alternatives. From an evolutionary perspective, sexual desire directs cognitive, socioemotional, and material resources towards romantic partners so that couples remain together long enough to rear offspring (Buss & Schmitt, 1993). Attentional engagement is the type of automatic, spontaneous behavior that should be particularly indicative of implicit sexual desire, as opposed to self-reported sexual desire, which could be over- or under-reported. Accordingly, we expected that higher implicit sexual desire should be associated with quicker attentional disengagement from attractive alternatives. Because men, compared to women, tend to be more interested in uncommitted sex and have higher sex drive (Baumeister, Catanese, & Vohs, 2001), we tested for gender differences, although we had no a priori hypotheses regarding this.

2. Pilot study

A pilot study compared internal reliability and effect size of two different lengths of the SD-IAT. The shorter version had 72 trials per critical block, and the longer version had 96 trials per critical block. Here we also describe development of this new measure.

2.1. Method

2.1.1. Participants

Participants (261 women, 164 men) were recruited from various online venues (e.g., psych.hanover.edu, Amazon.com's Mechanical Turk; the latter were paid $0.15) and were at least 18 years old, native English speakers, and in romantic relationships.

2.1.2. Procedure

The study was conducted online. Participants provided informed consent and reported the first name of their romantic partner, after which they were randomly assigned to complete one of the two versions of the SD-IAT.

2.1.3. The SD-IAT

The measure was based on the single-category Implicit Association Test (Karpinski & Steinman, 2006), a speeded word-sorting task that assesses the strength of mental associations between a single target concept and an evaluative dimension (e.g., good/bad). See Appendix A, Supplementary materials, for screenshots of the task and instructions.[1]

The evaluative dimension of the SD-IAT was sexually desirable/sexually undesirable. Exemplars for the category "sexually desirable" were those used in previous IAT research that assessed implicit sexual desire in heterosexual and gay individuals (Snowden & Gray, 2012): *appealing*, *attractive*, *exciting*, *hot*, and *sexy*. In Snowden and Gray's (2012) study, exemplars for "sexually undesirable" reflect strong aversion (e.g., repulsive, disgusting). However, in romantic relationships low sexual desire manifests as sexual boredom rather than repulsion (Klusmann, 2002). Accordingly, in the SD-IAT, "sexually undesirable" was represented by *bland*, *boring*, *dull*, *ordinary*, and *plain*.[2] The exemplars of "sexually desirable" and "sexually undesirable" did not differ in number of letters nor frequency of occurrence in English, $ps > .14$.

The task comprised three blocks of trials (see Table 1 for an overview). In the first block, participants practiced discriminating the sexually desirable words from the sexually undesirable words. The second and third blocks were the critical blocks. In the second block, the first name of the partner was sorted with the same key used for exemplars of "sexually desirable." In the third block, the first name of the partner was sorted with the same key used for exemplars of "sexually undesirable."

In all blocks, word order was randomized without replacement and fixed across participants. Target words, centered on the screen, were visible until a response was made or 5000 ms had elapsed. Following incorrect responses, a red "X" was displayed for 250 ms. In all of the

[1] In contrast to the traditional IAT, which relies on two contrasting target concepts (e.g., White-Black, liberal-conservative), the single-category IAT assesses evaluations of a single target, and is ideal for assessing appraisals of targets for which there is no obvious contrasting target, such as alcohol (Thush & Wiers, 2007) or national referendum proposals (Raccuia, 2016). The single-category IAT has been shown to have equivalent reliability to the two-category IAT (Gawronski & de Houwer, 2014).

[2] Choice of exemplars for "sexually undesirable" was constrained by the fact that most single-word synonyms for "sexually undesirable" include the prefix "un-" (e.g., unsexy, etc.), which risks unintended priming effects or confounds with reading speed. However, the IAT operates at the level of category label (e.g., "sexually desirable" and "sexually undesirable") rather than the specific exemplars representing those categories (De Houwer, 2001). For example, British participants exhibited in-group favoritism on an IAT regardless of whether the British stimuli were typically perceived positively (e.g., Princess Diana) or negatively (e.g., mass murderer Rosemary West) or whether the "foreigner" stimuli were positive (e.g., Albert Einstein) or negative (e.g., Adolf Hitler; De Houwer, 2001). This research indicates that the specific exemplars are processed in terms of their relevance to the category "sexually undesirable." That is, *bland* activates the representation "sexually bland," *boring* activates "sexually boring," etc.

Table 1
Task sequence of the SD-IAT.

Block	Number of trials	Function	Assignment of categories to response keys	
			Left key: "Q"	Right key: "P"
1	20	Practice	"Sexually undesirable"	"Sexually desirable"
2	96	Critical	"Sexually undesirable"	"Sexually desirable" or "my partner"
3	96	Critical	"Sexually undesirable" or "my partner"	"Sexually desirable"

Notes. The pilot study compared two versions of the task, one with 72 trials per critical block, and the other with 96 trials per critical block. Studies 1 and 2 used the 96-trial version of the task due to its superior psychometric properties.

current studies, the SD-IAT was run using open-source software ScriptingRT (Schubert, Murteira, Collins, & Lopes, 2013).

Scores were computed using the newer *D*-score algorithm for IAT data (Greenwald et al., 2003): practice trials were discarded, error responses were replaced with the block mean response time (RT) plus error penalty of 600 ms, mean RT of the second critical block was subtracted from the mean RT of the first critical block then divided by the standard deviation of RTs from both critical blocks. Higher *D*-scores reflected higher implicit sexual desire.

2.2. Results

Following Gawronski and De Houwer's (2014) recommendation, we computed two measures of internal reliability. Even-odd reliability was the correlation between *D*-scores from the even and odd trials of the two critical blocks. Split-half reliability was the correlation between *D*-scores from the first and second half of the trials of each critical block. Because reliability on subsections of a measure underestimates the full measure's internal reliability, the Spearman-Brown correction was used to obtain a more accurate estimate of the SD-IAT's reliability (corrected $r = 2r / (1 + r)$; Kaplan & Saccuzzo, 2001). This corrected reliability estimate is equivalent to Cronbach's alpha.

For the 96-trial SD-IAT, even-odd reliability was 0.86, split-half reliability was 0.67. For the 72-trial version, even-odd reliability was 0.86, split-half reliability was 0.62. Internal reliability of the single category IAT generally ranges from 0.70 to 0.90 (Gawronski & De Houwer, 2014). We were also interested in how sensitive the two versions of the task were to implicit sexual appraisals. The average *D*-score, or *D*-effect, is considered to be a measure of effect size of an IAT (Greenwald et al., 2003). The *D*-effect for the longer and shorter versions of the SD-IAT were 0.27 and 0.23, respectively, suggesting that the longer task was more sensitive to implicit sexual desire. Based on both criteria, we deemed the longer version of the task preferable for use in Studies 1 and 2.

3. Study 1

Study 1 used a dyadic weekly diary to examine the role of implicit desire in couples' naturally occurring sexual interactions. In an initial survey, both partners completed the SD-IAT and self-report measures. Next, partners provided four weekly reports of their most recent sexual interaction. All measures included in this study are reported here.

3.1. Method

3.1.1. Power analysis

We used Optimal Design Version 3.01 (Spybrook et al., 2013) to estimate the number of couples required to power the effect of implicit desire to predict weekly reports across four time points. Setting power at 0.80 and alpha at 0.05, we conservatively estimated the effect size of implicit desire to be 0.25 standard deviations and variability to be 0.10. The required number of couples was 100. To allow for attrition, 110 couples were recruited.

3.1.2. Participants

We recruited 110 romantic couples from researchmatch.org, email listservs, and psych.hanover.edu. Individuals were required to be 21–45 years old, in a monogamous, cohabiting, heterosexual relationship of 6 months to 4 years duration, and sexually active (having vaginal, anal, or mutual oral sex at least once a month). Couples were paid $60.

Mean relationship length was 2.48 years (SD = 1.02). Couples were dating (51.8%), engaged (23.6%), or married or common-law (22.7%), and had sex an average of 2.97 times/week (SD = 2.02, range 0–14). Mean age was 26.51 years (SD = 3.78), and participants identified as Asian (6.8%), American Indian or Alaskan Native (1.8%), Black or African-American (8.2%), White (85.5%), or other (4.5%). Participants indicated having earned a high school diploma (4.1%), trade school or an AA degree (20.9%), college degree (46.8%), or a higher degree (28.2%).

3.1.3. Procedure

Recruitment advertisements linked to a screening survey, and eligible couples were emailed a description of procedures and payment. If both partners provided informed consent, study personnel spoke to both partners by phone to clarify procedures. Next, both partners were emailed a link to the initial battery of measures, which included the SD-IAT. Links to the weekly diary were emailed to both partners on the same four consecutive Monday mornings and were required to be completed on that day. All measures (see Supplementary materials, Appendix B) were administered online.[3]

3.1.4. Person-level measures: initial battery

3.1.4.1. SD-IAT. Implicit sexual desire was assessed with the 96-trial version of the task. Even-odd reliability was r = 0.87, split-half reliability was r = 0.64, and the *D*-effect was 0.31, SD = 0.29.

3.1.4.2. Explicit sexual desire. Twelve items from existing measures were modified to target sexual desire for one's partner. For example, "How strong is your desire to have sex with a partner?" (Spector, Carey, & Steinberg, 1996) was modified to refer to "your partner." Responses were given on a 1 (*No desire*) to 7 (*Strong desire*) scale. Cronbach's α = 0.94.

3.1.4.3. Relationship satisfaction. Relationship satisfaction was assessed with the 16-item Couple Satisfaction Inventory (Funk & Rogge, 2007), e.g., "How rewarding is your relationship with your partner?" (1 = *Not at all* to 6 = *Completely*). Cronbach's α = 0.94.

3.1.4.4. Commitment. Relationship commitment was assessed with the 8-item Commitment Inventory (Owen, Rhoades, Stanley, & Markman, 2010), e.g., "My relationship with my partner is clearly a part of my future life plans." Responses were given on a scale from 1 (*Strongly disagree*) to 9 (*Strongly Agree*). Cronbach's α = 0.81.

3.1.4.5. Passionate love. Passionate love was assessed with the Passionate Love Scale (Hatfield & Sprecher, 1986), e.g., "Just seeing my partner excites me." Participants indicated their agreement on a 1

[3] Six months later, participants completed a second wave of the same four consecutive weekly diary reports. Within this second wave, associations of implicit desire with weekly reports did not meaningfully differ from those found in the first wave. For the sake of clarity and brevity, we report here only results for the first wave.

(*Not at all true*) to 9 (*Definitely true*) scale. Cronbach's α = 0.85.

3.1.4.6. Sexual satisfaction. Satisfaction with one's sex life was assessed with the 7-item version of the Quality of Sex Inventory (Shaw & Rogge, 2016), e.g., "My sex life is fulfilling" (1 = *Not at all true* to 6 = *Completely true*). Cronbach's α = 0.95.

3.1.5. Weekly measures

In each weekly diary, participants reported on sexual interactions with their partner over the previous 7 days.

3.1.5.1. Sexual frequency. Frequency of sex was assessed as follows:

In the past 7 days, how many times did you have a sexual interaction with your partner? Think of a "sexual interaction" as a period of time spent with your partner having vaginal sex, anal sex, or giving each other oral sex. For example, having sex once or more times during the same encounter counts as one sexual interaction. As another example, having both oral and vaginal sex during the same encounter counts as one sexual interaction. Do not count phone or cybersex or interactions during which you only kissed, made out, engaged in manual stimulation of the genitals, or times when only one of you received oral sex as having had sex.

Participants who had sex with their partner in the previous 7 days were asked to describe their most recent sex. For all weekly items except one orgasm item, response options ranged from 1 (*Not at all true*) to 6 (*Completely true*). Items were averaged to create the following composite variables. The orgasm items were standardized prior to aggregation.

3.1.5.2. Arousal. Arousal and desire were assessed with three items, e.g., "During this sex, I was extremely sexually aroused (turned-on)." Cronbach's α, calculated separately for each weekly report, ranged from 0.85 to 0.89 (M = 0.87).

3.1.5.3. Pleasure. Pleasure and satisfaction were assessed with three items, e.g., "During this sex, I experienced a great deal of physical pleasure." Cronbach's α ranged from 0.79 to 0.84 (M = 0.82).

3.1.5.4. Intimacy. Intimacy felt during sex was assessed with two items, e.g., "During this sex, I was somewhat emotionally detached from my partner" (reverse scored). Correlation between items ranged from 0.45 to 0.61 (M = 0.46).

3.1.5.5. Sexual responsiveness. Participants indicated their own responsiveness to their partner during sex using five items adapted from Birnbaum and Reis's (2012) measure of perceived partner responsiveness, e.g., "During this sex, I focused on the 'best side' of my partner." Cronbach's α ranged from 0.67 to 0.82 (M = 0.76).

3.1.5.6. Boredom. Boredom and distraction were assessed with three items, e.g., "During this sex, I was somewhat bored." Cronbach's α ranged from 0.49 to 0.70 (M = 0.63).

3.1.5.7. Orgasm. Orgasm during sex was assessed with two items. The first read, "Please select the response that is most accurate for you, with response options ranging from "*I did not have an orgasm*" (coded 1) to "*I had more than one orgasm*" (coded 4)". The second item read, "During this sex, it was somewhat difficult for me to reach orgasm" (reverse scored). Correlation between items ranged from −0.58 to −0.68 (M = −0.62).

3.1.5.8. Perception of partner's arousal. All partner perception items were modified from the items used to assess individuals' own experiences, e.g., "During this sex, my partner seemed to be extremely sexually aroused (turned-on)." Cronbach's α ranged from 0.85 to 0.89 (M = 0.88).

3.1.5.9. Perception of partner's intimacy. Perceived partner intimacy was assessed with two items, e.g., "During this sex, my partner seemed to feel an intense intimate connection with me". Correlations between items ranged from 0.42 to 0.53 (M = 0.49).

3.1.5.10. Perceived partner sexual responsiveness. Perceived partner sexual responsiveness was assessed with five items (e.g., "During this sex, my partner seemed to accept me for who I am"). Cronbach's α ranged from 0.76 to 0.86 (M = 0.83).

3.1.5.11. Perception of partner's boredom. Perceived partner boredom was assessed with three items, e.g., "During this sex, my partner seemed somewhat bored." Correlations between items ranged from 0.31 to 0.65 (M = 0.48).

3.2. Results

3.2.1. Data cleaning

Data were cleaned prior to hypothesis tests. All exclusions are reported here. Participants provided 862 weekly reports, and within these reports, 738 reports described sex with the partner. Within the weekly reports there were 32 reports for which partners provided no corresponding report. Because unmatched reports did not differ significantly from matched reports, they were omitted from subsequent analyses. The final dataset comprised 830 weekly reports (711 with sex occurring; M = 3.23 sex reports per couple).

Mahalanobis distance scores were used to identify multivariate outliers on the weekly variables (Tabachnick & Fidell, 2001). A chi-square distribution with four degrees of freedom (omitting pleasure, intimacy, sexual responsiveness, perceived partner intimacy, and perceived partner sexual responsiveness from the number of variables used to determine degrees of freedom due to high intercorrelations) and a significance level of $p < .001$ produced a cutoff of $\chi^2(5) = 20.52$. Fourteen cases had Mahalanobis distances greater than this criterion, and these outliers were Winsorized to 3 standard deviations from the mean (Osborne & Overbay, 2004).

There were no missing data in the initial survey. Weekly reports had 0.003% missing data, which were not imputed. See Supplementary materials Tables S1–S3 for descriptive information with tests of within-couple gender differences, exploratory analyses among relationship measures, and correlations among implicit desire, explicit desire, and the weekly measures. Implicit desire was positively and significantly associated with explicit desire among men (r = 0.21, p = .03), but not among women (r = 0.10, p = .30).

3.2.2. Analytic approach for hypothesis testing

Two-level models were used to account for dependence due to multiple weekly reports and nesting of partners within couples. Level 1 contained weekly reports and level 2 contained person-level variables, including individuals' and their partner's scores on implicit desire. Following the Actor-Partner Interdependence Model (Kenny, Kashy, & Cook, 2006), we examined the effects of individuals' own implicit desire (actor effects) and partners' implicit desire (partner effects) on weekly sex reports (see Supplementary materials for additional details on our analytic approach).

To assess the predictive value of implicit sexual desire over and above self-reported desire, all models included individuals' own and partners' explicit desire at level 2. Models predicting perceptions of partners' experiences controlled for partners' reports (e.g., models predicting perception of partner's intimacy controlled for partners' reports of intimacy) because we wished these variables to reflect motivational bias, rather than accurate perception of partners' experience. Because relationship duration is typically negatively associated with sexual

Table 2
Predicting weekly reports of one's own experience of sex from implicit and explicit sexual desire.

	B	*SE*	*t*	*df*	*p*	95% CI		Effect size *r*
						Lower	Upper	
Sexual frequency								
Own implicit desire	0.01	0.33	0.03	109.71	.977	−0.65	0.67	0.00
Own explicit desire	0.48	0.12	4.19	108.17	< .001	0.25	0.71	0.37
Partner's implicit desire	0.12	0.34	0.35	108.97	.729	−0.55	0.79	0.03
Partner's explicit desire	0.44	0.12	3.68	107.37	< .001	0.20	0.67	0.33
Arousal								
Own implicit desire	0.31	0.17	1.82	199.50	.065	−0.02	0.66	0.13
Own explicit desire	0.51	0.06	8.62	185.20	< .001	0.39	0.63	0.54
Partner's implicit desire	0.28	0.17	1.61	183.48	.109	−0.06	0.63	0.12
Partner's explicit desire	0.09	0.06	1.43	163.47	.154	−0.03	−0.21	0.11
Pleasure								
Own implicit desire	0.23	0.15	1.52	187.04	.132	−0.07	0.52	0.11
Own explicit desire	0.35	0.05	6.72	170.47	< .001	0.25	0.45	0.46
Partner's implicit desire	0.31	0.15	2.05	170.30	.042	0.01	0.62	0.15
Partner's explicit desire	0.05	0.05	1.02	147.58	.309	−0.05	0.16	0.08
Intimacy								
Own implicit desire	0.31	0.14	2.23	194.55	.027	0.04	0.59	0.16
Own explicit desire	0.34	0.05	6.88	174.05	< .001	0.24	0.43	0.46
Partner's implicit desire	0.23	0.14	1.62	189.23	.107	−0.05	0.50	0.12
Partner's explicit desire	0.12	0.05	2.52	167.62	.012	0.03	0.22	0.19
Sexual responsiveness								
Own implicit desire	0.37	0.15	2.49	187.40	.014	0.08	0.67	0.18
Own explicit desire	0.29	0.05	5.52	171.32	< .001	0.19	0.39	0.39
Partner's implicit desire	0.24	0.15	1.65	199.03	.100	−0.05	0.53	0.12
Partner's explicit desire	0.12	0.05	2.29	183.47	.023	0.02	0.21	0.16
Boredom								
Own implicit desire	−0.14	0.10	−1.52	188.42	.131	−0.33	0.04	0.11
Own explicit desire	−0.20	0.03	−5.95	167.35	< .001	−0.26	−0.13	0.42
Partner's implicit desire	−0.09	0.10	−0.90	182.49	.369	−0.27	0.10	0.07
Partner's explicit desire	0.00	0.03	0.06	155.40	.956	−0.06	0.07	0.00
Orgasm								
Own implicit desire	−0.16	0.15	−1.04	141.14	.302	−0.47	0.15	0.09
Own explicit desire	0.19	0.05	−3.76	146.89	< .001	0.09	0.30	0.30
Partner's implicit desire	0.17	0.18	0.95	120.68	.342	−0.18	0.52	0.09
Partner's explicit desire	0.05	0.06	0.74	111.57	.460	−0.07	0.17	0.07

Note: CI = confidence interval.

frequency and sexual satisfaction (Carvalheira et al., 2014; Klusmann, 2002), models controlled for relationship length. Additionally, models controlled for the linear effect of time across weekly reports.[4]

3.2.3. Does implicit sexual desire predict weekly reports of sex?

Tables 2 and 3 summarize results focusing on key predictors central to our hypotheses and discussion below. For more detailed documentation of results for all predictors, control variables, and interaction terms, see Tables S4–S14 in the Supplementary materials.

3.2.3.1. Individuals' experience of sex. Individuals with greater implicit desire reported significantly more intimacy during sex and sexual responsiveness towards one's partner, and marginally greater arousal (for parameter estimates, see Table 2). Actor effects of implicit desire were not significant for sexual frequency, pleasure, boredom, or orgasm. For partner effects, individuals with partners high on implicit desire reported significantly more pleasure. Partner effects of implicit desire were not significant for sexual frequency, arousal, intimacy, responsiveness, boredom, or orgasm.

Own and partner's explicit sexual desire, the central control variables in the model, also had significant effects. Sexual frequency, intimacy, and sexual responsiveness were positively and significantly predicted by own and partner's explicit desire. Greater explicit desire was significantly associated with greater arousal, pleasure, orgasm and with less boredom, but partner's explicit desire was not significantly associated with these variables.

3.2.3.2. Individuals' perceptions of their partners' experience of sex. Individuals exhibited accuracy in perceiving their partners' experiences of sex for all four partner perception indices (for parameter estimates, see Table 3). That is, partners' reports of arousal significantly predicted individuals' perceptions of partners' reports of arousal, and a similar level of accuracy was found for individuals' perceptions of partners' intimacy, responsiveness, and boredom. Controlling for partners' reports, people with higher implicit desire were significantly more likely to perceive that their partners felt higher arousal and more intimate connection during sex. The actor effect of implicit desire was not significant for perceptions of partners' responsiveness or boredom.

Own and partners' explicit sexual desire also had significant effects. Individuals with higher explicit desire were significantly more likely to perceive that their partners felt more desire/arousal, more intimacy, more responsiveness, and less boredom. Individuals with partners high on explicit desire reported significantly less boredom.

3.3. Brief discussion

Study 1 assessed whether implicit sexual desire predicted indices of couples' sex lives over four subsequent weeks. Controlling for explicit sexual desire, people with higher implicit desire experienced

[4] No interactions between gender and either implicit or explicit desire were significant. There was only one significant implicit x explicit interaction, for sexual frequency, indicating that people with high explicit desire but low implicit desire had less frequent sex (see Supplementary materials for these results).

Table 3
Predicting weekly reports of perceptions of partner's experience of sex from implicit and explicit sexual desire.

	B	*SE*	*t*	*df*	*p*	95% CI		Effect size *r*
						Lower	Upper	
Perceived partner desire/arousal								
Own implicit desire	0.38	0.17	2.26	192.65	.025	0.05	0.72	0.18
Own explicit desire	0.18	0.06	3.24	172.18	.001	0.07	0.30	0.25
Partner's implicit desire	0.05	0.17	0.31	201.47	.755	−0.28	0.39	0.02
Partner's explicit desire	0.04	0.06	0.74	185.54	.460	−0.07	0.16	0.05
Partner's desire/arousal	0.39	0.04	10.22	491.70	< .001	0.31	0.46	0.42
Perceived partner intimacy								
Own implicit desire	0.36	0.14	2.61	200.50	.010	0.09	0.64	0.20
Own explicit desire	0.15	0.05	3.21	184.78	.002	0.06	0.24	0.24
Partner's implicit desire	0.17	0.14	1.21	186.94	.230	−0.11	0.45	0.09
Partner's explicit desire	0.09	0.05	1.88	169.42	.062	0.00	0.19	0.14
Partner's intimacy	0.26	0.04	7.39	502.96	< .001	0.19	0.33	0.31
Perceived partner sexual responsiveness								
Own implicit desire	0.24	0.18	1.33	200.50	.187	−0.12	0.59	0.11
Own explicit desire	0.20	0.06	3.33	184.78	< .001	0.08	0.32	0.27
Partner's implicit desire	0.08	0.18	0.47	186.94	.643	−0.27	0.43	0.04
Partner's explicit desire	0.03	0.06	0.52	169.42	.602	−0.09	0.15	0.04
Partner's sexual responsiveness	0.49	0.04	12.44	402.68	< .001	0.41	0.56	0.53
Perceived partner boredom								
Own implicit desire	−0.12	0.09	−1.33	200.50	.186	−0.31	0.06	0.10
Own explicit desire	−0.07	0.03	−2.35	184.78	.020	−0.14	−0.01	0.18
Partner's implicit desire	−0.02	0.09	−0.18	186.94	.860	−0.20	0.16	0.01
Partner's explicit desire	−0.07	0.03	−2.19	169.42	.030	−0.13	−0.01	0.15
Partner's boredom	0.09	0.04	2.44	639.48	.015	0.02	0.15	0.10

Note: CI = confidence interval.

significantly greater intimacy during sex, felt they were more responsive to their partner during sex, and perceived that their partners felt more arousal and intimacy during sex. People with higher implicit sexual desire also reported feeling more arousal during sex, but this effect was only marginally significant. These results were not moderated by gender.

We theorized that the SD-IAT taps into automatic, gut-level implicit sexual desire and that implicit desire influences spontaneous, automatized behaviors and responses that lead to or facilitate sexual interactions. Findings from Study 1 largely supported the latter part of this theorizing, particularly for feelings of intimacy, responsiveness, and sexual arousal. Of particular interest are the findings that implicit sexual desire predicted perceptions of a partner's responses during sex, a judgment that to some extent requires subjective inferences and that is likely influenced by motivational factors (e.g., sexual desire). Our findings suggest that these inferences may be particularly sensitive to implicit thinking.

Although not central to our hypotheses, we believe that Study 1 is the first investigation of partner effects of self-reported sexual desire. Individuals with partners high on explicit desire reported more intimacy and responsiveness during sex and perceived less boredom in their partner.

4. Study 2

Study 2 investigated whether implicit desire was associated with motivated relationship maintenance mechanisms, in particular attentional disengagement from alternatives. Attentional disengagement represents a spontaneous, automatized behavior that in our theorizing should be indicative of implicit, as opposed to explicit, desire. Thus, we expected that higher implicit desire would lead to quicker disengagement from attractive non-partner faces. Participants were told the targets they would view were potential dating partners whom they might encounter in their everyday lives. Attentional disengagement was assessed using the dot-probe task, in which latency in responding to stimuli varies as a function of attentional fixation (Frewen, Dozois, Joanisse, & Neufeld, 2008). All measures included in this study are reported here.

4.1. Method

4.1.1. Power analysis

Piface (Lenth, 2011) was used to calculate minimum sample size required. We conservatively estimated a small effect size β of 0.20. We set the *SD* of the predictor to 1, VIF to 2, alpha to 0.05, and error *SD* to 0.5. The necessary sample size to achieve acceptable levels of power (0.80) for a two-tailed test was 101.

4.1.2. Participants

We recruited 111 individuals (29 men, 82 women) from the psychology department participant pool who were Caucasian, native English speakers, and in sexually active, committed romantic relationships. Participants were dating (98%) or engaged or married (2%). Mean relationship length was 2.49 years (*SD* = 1.49). The majority of individuals (95%) were in heterosexual relationships. Mean age was 20.10 years (*SD* = 1.67; range, 18–32 years).

4.1.3. Procedure

The study was described as an investigation of how interpersonal processes relate to face perception, and that the attractive targets seen during the dot-probe task (see below) were single people who might be encountered in their everyday lives and thus potential dating partners. All tasks were completed in the lab. Participants provided informed consent, completed a demographics measure, the SD-IAT, all self-report measures, and the dot-probe task, in that order.

4.1.4. Measures

4.1.4.1. SD-IAT. Implicit sexual desire for one's romantic partner was assessed with the longer version of the SD-IAT used in Study 1. Even-odd reliability was $r = 0.90$, split-half reliability was $r = 0.65$, and the *D*-effect was 0.31, *SD* = 0.26.

Table 4
Regression analysis predicting attentional disengagement from attractive faces from implicit and explicit sexual desire.

	B	*SE*	*t*	*p*	95% CI for *B*		Effect size *r*
					Lower	Upper	
Step 1							
Implicit desire	0.00	0.02	0.00	1.000	−0.04	0.04	0.00
Explicit desire	−0.02	0.03	−0.74	.463	−0.08	0.04	0.07
Gender	0.02	0.01	2.45	.016	0.00	0.03	0.24
Practice latency	0.38	0.06	6.35	< .001	0.26	0.50	0.53
Step 2							
Implicit desire*gender	0.11	0.02	4.93	< .001	0.07	0.15	0.45
Explicit desire*gender	−0.01	0.03	−0.21	.833	−0.07	0.06	0.02
Practice latency*gender	0.12	0.07	1.73	.087	−0.17	0.25	0.17
Implicit*explicit	0.16	0.12	1.33	.188	−0.08	0.39	0.13

Note: CI = confidence interval. Gender was contrast coded women = −1, men = 1.

4.1.4.2. Explicit measures. Explicit sexual desire (α = 0.93), relationship satisfaction with one's relationship (α = 0.97), commitment, (α = 0.86), sexual satisfaction (α = 0.97), and passionate love (α = 0.89) were assessed with the same measures used in Study 1.

4.1.4.3. Dot-probe task. The dot-probe task assesses attentional capture by simultaneously presenting two stimuli varying in emotional significance (e.g., neutral vs. positive), and assessing response latency in identifying the neutral stimulus. The current task, closely following DeWall, Maner, Deckman, and Rouby (2011), began with a block of 20 practice trials, in which a neutral object (e.g., spoon, lamp) was presented in one quadrant of the computer screen (e.g., top left), immediately followed by a categorization object, either a circle or square. Participants' task was to respond to circles and squares by pressing the “e” or “i” key, respectively, as quickly and accurately as possible. The location of the categorization object varied: In “filler” trials the categorization object appeared in the same location as the neutral object, and in “attentional shift” trials it appeared in a different quadrant.

In the critical trials, participants were presented with an image of a face of an attractive person of the same gender as their romantic partner. As in the practice trials, the attractive face appeared in one quadrant of the screen, immediately followed by either a circle or square which participants sorted as before. The critical block comprised 22 attentional shift trials and 22 filler trials. Attentional adhesion was indicated by mean latency on attentional shift trials.

Each trial unfolded as follows: A fixation cross appeared for 1000 ms, followed by an attractive face (or neutral object, for practice trials) for 500 ms. Next, a categorization object appeared in either the same quadrant as the face or a different quadrant until the participant's response. A 2000-ms break occurred between trials, which were randomized within participant.

Participants were shown the following instructions prior to the critical block of trials:

In this next part of the task, continue to sort the circles and squares as before. Before the shapes you'll briefly see faces. These are pictures submitted by single people in the greater Rochester area. This research, conducted in collaboration with researchers at colleges and universities in the Rochester area, is investigating the facial expressiveness of single people who were hoping to make new friends.

Target faces were selected from various websites and met certain criteria. First, they were required to plausibly have been involved in the study described by the cover story. Second, because people tend to find own-race faces more attractive than other-race faces (Rhodes et al., 2005), and because most of our participant pool was Caucasian, we used only Caucasian faces. Third, to equate the sets of male and female faces for attractiveness, we selected an initial pool of 44 images of men and 44 images of women. The male faces were rated by 92 heterosexual women and four gay men, and the female faces were rated by 40 heterosexual men and four lesbian women. Attractiveness was rated on a 1 (*not at all attractive*) to 6 (*extremely attractive*) scale and smile intensity was rated on a 1 (*no smile at all*) to 6 (*extreme smile*) scale. We selected the 11 male and 11 female faces that were most attractive and did not differ in attractiveness, male faces $M = 4.02$, $SD = 0.62$, female faces $M = 4.24$, $SD = 0.62$, $t(20) = 1.06$, $p = .30$, or smile, male faces $M = 2.89$, $SD = 1.59$, female faces $M = 3.46$, $SD = 1.20$, $t(20) = 0.95$, $p = .36$.

4.2. Results

4.2.1. Data cleaning

Data were cleaned prior to hypothesis tests. All exclusions are reported here. Three participants with error rates over 50% on the dot-probe task were dropped. Error responses on the dot-probe task were deleted, in keeping with established practices (DeWall et al., 2011). One participant with many errors and RTs quicker than 300 ms on the SD-IAT was dropped, in line with established practices (Greenwald et al., 2003), leaving 107 participants in the final sample.

Mean latencies on critical attentional shift trials and practice attentional shift trials were log transformed. Two outliers on the practice attentional shift trials were Winsorized to three standard deviations from the mean (Osborne & Overbay, 2004).

4.2.2. Preliminary analyses

Table S14 in Supplementary materials presents descriptive information for the sample, along with tests of gender differences. There were no gender differences on implicit or explicit sexual desire, commitment, or passionate love. Women were significantly higher than men on relationship and sexual satisfaction.

We assessed correlations between implicit and explicit desire and other variables unrelated to our hypothesis (see Table S15 in Supplementary materials). Implicit desire was not significantly associated with explicit desire among either men or women (respectively, $r = -0.06$, $p = .77$ and 0.13, $p = .25$).

4.2.3. Hypothesis tests

We tested whether higher implicit sexual desire was associated with quicker attentional disengagement from attractive non-partner targets with linear regression (see Table 4). To assess the predictive value of implicit sexual desire over and above self-reported sexual desire, all models included both implicit and explicit desire. Attentional shift from attractive targets was first regressed onto implicit and explicit sexual desire, gender (contrast-coded women = −1, men = 1), and mean latency on practice trials (to control for baseline levels of attentional shift from neutral objects). At this step, neither implicit nor explicit desire significantly predicted attentional shift from attractive faces, but men had significantly longer latency in shifting their attention. We then

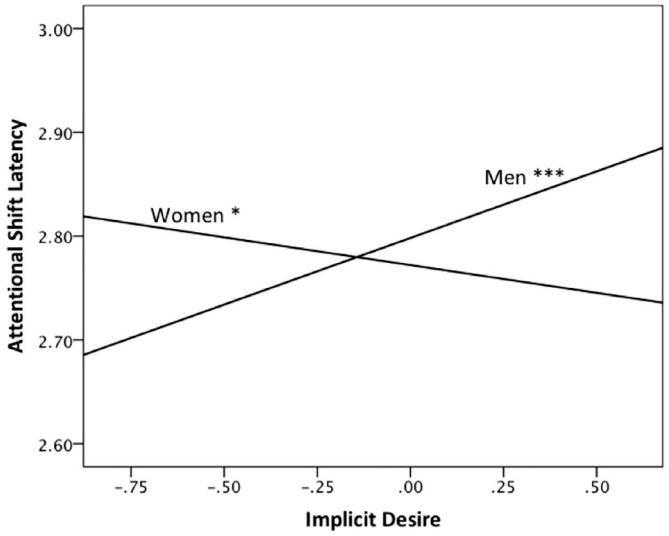

Fig. 1. Simple slopes for the 2-way interaction between implicit desire and gender predicting latency in attentional shift from attractive faces. $^{*}p < .05$, $^{***}p < .001$.

entered two-way interactions between gender and the three predictors, plus the interaction between implicit and explicit desire. This step yielded a significant interaction between implicit desire and gender.

Simple slopes (see Fig. 1) showed that among women, higher implicit desire was associated with significantly quicker attentional shift away from attractive faces, $B = -0.06$, $SE = 0.02$, $t(101) = 2.51$, $p = .014$, 95% CI for B (-0.11, -0.01), $r = 0.24$. However, for men, higher implicit desire was associated with significantly slower attentional shift away from attractive faces, $B = 0.15$, $SE = 0.04$, $t(101) = 3.90$, $p < .001$, 95% CI for B (0.07, -0.22), $r = 0.36$.[5]

4.3. Brief discussion

Study 2 assessed the hypothesis that implicit sexual desire for one's romantic partner would be associated with quicker attentional disengagement from attractive faces in a dot-probe task, while controlling for explicit sexual desire. The rationale for this hypothesis was that sexual desire helps direct attention towards one's partner and away from threatening alternatives (Birnbaum, 2017). This hypothesis was supported for women but the opposite was found for men: Men who were higher in implicit desire were slower to disengage attention from attractive faces, perhaps because, for men, sexual desire for one's partner reflects desire for sex in general. We expand on this possibility below.

5. General discussion

Most theoretical models posit that sexual activity is a potent reward for establishing and maintaining committed and satisfying relationships (Birnbaum, 2017). Indeed, partners commonly describe sexual activity as an important factor in their relationship, and that activity tends to be impelled when partners feel strong sexual desire for each other. Nevertheless, many studies indicate that the strong desire typical of early romantic relationships diminishes over time (Carvalheira et al., 2014). Many people feel threatened by this downturn and may be reluctant to acknowledge it, even to themselves. For this reason, we set out to assess sexual desire for one's partner using implicit methods.

In Study 1, a weekly diary conducted over four weeks, we found that, controlling for explicit sexual desire, partners with higher levels of implicit sexual desire reported greater intimacy and sexual responsiveness, and marginally greater desire and arousal, during sex. Implicit desire for one's partner also predicted perceiving higher levels of intimacy, desire, and arousal in one's partner. In Study 2, higher levels of implicit sexual desire, again controlling for explicit desire, predicted faster attentional disengagement from pictures of attractive alternative partners, but only among women. For men, the pattern was reversed: Higher levels of implicit sexual desire predicted slower attentional disengagement.

To our knowledge, these are the first studies to identify implications of implicit sexual desire in romantic relationships. As discussed earlier, for several reasons, explicit reports might not capture fully people's sexual desire for their partners. Acknowledging that one's desire has waned can threaten people's sense of relationship security, or, alternatively, they may be reluctant to admit it on a questionnaire, given social norms that good sex is characteristic of healthy relationships. It is also possible that explicit reports may underestimate some people's sexual desire, such as when these feelings elicit embarrassment or shame. To be sure, explicit reports did significantly predict the measures used in Study 1, as would be expected, given that the dependent variables were also explicit. Showing that implicit sexual desire helps explain people's experience of sex over and above their explicit reports contributes novel insights to our understanding of this important relationship maintenance mechanism. More specifically, these findings demonstrate that sexual feelings that people may not be able or willing to report may influence their experiences of feeling excited and intimately connected during sex.

Notably, we found that implicit sexual desire influenced perceptions of a partner's desire and intimacy. Sexual activity is an intrinsically and highly interdependent activity and people may wonder, if not worry, about whether their partners are enjoying the experience (Birnbaum et al., 2014). Because objective feedback about a partner's sexual experience can be elusive, these perceptions may be particularly influenced by implicit feelings, perhaps in the manner of projection (e.g., Lemay & Clark, 2008). That is, given the absence or ambiguity of explicit feedback, people may infer a partner's experience by drawing on associations that exist in their own mind, but outside of awareness. If so, this suggests an exciting new direction for research on implicit processes in close relationships—individuals' implicit feelings towards others may influence their perceptions of the other's internal states.

Although Study 1 found no gender differences in how implicit desire was associated with sexual outcomes, in Study 2, higher implicit desire was associated with the predicted pattern of quicker attentional disengagement from attractive non-partner faces only among women. Previous research has found that more time spent looking at pictures of attractive people in a laboratory setting was associated with greater likelihood of breakup two months later (Miller, 1997), suggesting that for women, implicit desire may protect against the allure of attractive alternatives, and in turn, foster relationship longevity. Among men, for whom implicit desire predicted slower attentional disengagement, it is possible that sexual desire for one's partner reflects broader sexual interest; that is, desire for one's partner goes hand in hand with desire for sex in general. This idea is consistent with parental investment theory, which argues that men can maximize their reproductive success by mating more indiscriminately than women (Buss & Schmitt, 1993). If so, the higher a man's implicit desire for his partner, the more he also would desire the alternative faces in the dot-probe task. Among women, who are more relationally attuned, particularly with regard to sex (Diamond, 2004), sexual desire is more likely to be focused on her partner. This speculative explanation warrants further research.

One important limitation of this research stems from the novelty of the SD-IAT. Further research is needed to examine its validity, particularly our use of boredom-related words as exemplars for the concept of "sexually undesirable." Although this decision was based on literature showing that the typical trajectory of sexual desire in romantic relationships is an early peak and gradual dissipation as novelty fades

[5] Excluding participants in same-sex relationships did not meaningfully change these results, nor did including relationship satisfaction, sexual satisfaction, or commitment as covariates.

and habituation sets in (Carvalheira et al., 2010), it is also possible that other terms (e.g., disgust) may be more effective. Another possible threat to validity arises from our use of the romantic partner's first name to represent the target concept. We chose to use names because they are likely to be strongly associated with the partner while also being easily entered into the online task, thereby allowing for efficient implementation with a large sample. Future research might assess whether more vivid representations (e.g., photos) or multiple stimuli (e.g., photos, first name and nickname, physical traits, etc.) would improve the predictive ability of the SD-IAT.

Another caveat entails the online administration of the SD-IAT, which relies on precise and consistent measurement of response latencies. To achieve this, we used the open-source software ScriptingRT (Schubert et al., 2013), which allows response time tasks to run online on any computer with Flash installed.[6] In six studies, Schubert et al. (2013) found that response time tasks run online with ScriptingRT vs. in the lab incurred small lags and increased variance in latencies, but this loss in precision did not influence measured effects (e.g., the Stroop effect replicated across all studies). Researchers interested in studying implicit desire in online studies should be cautious about the platform with which they implement the task.

Another limitation involves the relative homogeneity of our samples. To enable efficient processing of the word stimuli of the SD-IAT, participants were required to be native English speakers. Further contributing to sample homogeneity, because Study 1 was administered over the Internet and Study 2 used college students, participants were relatively well-educated. Additionally, both samples were mostly heterosexual, monogamous, and relatively sexually active and healthy (e.g., sex at least once/month, no sexual dysfunction). It is an open question as to whether the current findings would generalize to more diverse populations. For example, it would be valuable to investigate the role of implicit sexual desire in couples who are older, considering divorce, or dealing with sexual dysfunction.

Two of the key dependent variables in Study 1 exhibited less-than-optimal internal reliability (e.g., intimacy during sex, perceived partner intimacy). Future investigations of the role of implicit desire in sexual intimacy should consider assessing this construct with more than two items, which would contribute to improved internal reliability of the measure.

A final limitation is that this research was cross-sectional, examining sexual desire within a narrow snapshot of couples' lives. Future research should examine longitudinal trends in implicit desire, especially as they may reflect and contribute to temporal trends in sexual activity and relationship satisfaction.

Future research into implicit desire in romantic relationships might benefit from an individual differences perspective. For example, are there individual differences that account for strength of implicit desire? While relationship-specific factors may contribute to implicit desire, such as integration of novelty into one's sex life (Rosa et al., 2019), the dual control model of sexual inhibition and excitation (Janssen & Bancroft, 2007) describes how suppression and excitation of the sexual response system is governed by two independent neurophysiological processes. This trait-level variability in the propensity for activation of the sexual response may also influence the degree of implicit desire triggered by romantic partners.

Investigations into associations between implicit and explicit desire may also benefit from an individual differences approach. Correlations between implicit and explicit measures vary greatly, and are generally higher for mundane topics (e.g., preference for Coke vs. Pepsi) than for topics that are sensitive or subject to self-presentation concerns (e.g., preference for Asians vs. Whites; Nosek, 2007). We suggest that the low implicit-explicit correlations observed in our studies reflect the sensitive nature of partner desire—for reasons mentioned earlier, people may be highly motivated to under- or over-report how much they sexually desire their romantic partners. Accordingly, a trait-focused perspective suggests certain moderators of the association between implicit and explicit desire—for example, discomfort with sexual feelings (Woo et al., 2012), tendencies towards positive relationship illusions (de Jong & Reis, 2014), or lay theories about sexuality in romantic relationships (Maxwell et al., 2017).

Another possible trait-level moderator may be interoceptive awareness of sexual responses. Study 1 found a significant implicit-explicit association for men, but not for women. This accords with research indicating that women, compared to men, exhibit low concordance between genital and subjective sexual arousal (Chivers et al., 2010), and that among women, greater concordance is predicted by interoceptive awareness (Handy & Meston, 2016), and can be increased by mindfulness training aimed at enhancing non-judgmental awareness of inner states, including genital responses and sexual desire (Brotto & Basson, 2014).

This research attempted to gain a better understanding of couples' sex lives by exploring the predictive validity of an implicit measure of sexual desire. Overall, our findings demonstrate that people may be unwilling or unable to accurately report the desire they feel for their romantic partners, and that this unreported component of desire predicts theoretically relevant aspects of couples' sex lives. Even though implicit measures have been used to investigate a wide variety of socially sensitive constructs, and some relationship constructs, this is the first research to use implicit methods to assess a particularly sensitive construct has important consequences for couple well-being. We hope that the SD-IAT will be useful for other researchers who study the dynamics of sexuality in romantic relationships.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2019.05.042.

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[6] Flash is no longer supported by developer Adobe, nor by Chrome, Mozilla, or Safari.

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