Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Implicit and Explicit Sexual Attitudes: How Are They Related to Sexual Desire and Sexual Satisfaction in Men and Women?

Alessandra Dosch[a], **Sanaâ Belayachi**[a b], **Martial Van der Linden**[b]

[a]*Cognitive Psychopathology and Neuropsychology Unit, University of Geneva*

[b] *Department of Psychology, Cognition, and Behavior, University of Liege*

ABSTRACT

This article examines individual variability in sexual desire and sexual satisfaction by exploring the relation between these sexual aspects and sexual attitudes (implicit and explicit) and by taking gender into account, as this has been shown to be an influential factor. A total of 28 men and 33 women living in heterosexual relationships completed questionnaires assessing sexual desire (dyadic, solitary), sexual satisfaction, and explicit sexual attitudes. An adapted version of the Affect Misattribution Procedure was used to assess implicit sexual attitudes. Results showed higher levels of dyadic and solitary sexual desire in men than in women. No gender differences were found regarding sexual satisfaction or sexual attitudes. High dyadic sexual desire was associated with positive implicit and explicit sexual attitudes, regardless of gender. However, solitary sexual desire was significantly higher in men than women and was associated, in women only, with positive implicit sexual attitudes, suggesting that solitary sexual desire may fulfill different functions in men and women. Finally, sexual satisfaction depended on the combination of explicit and implicit sexual attitudes in both men and women. This study highlights the importance of considering both implicit and explicit sexual attitudes to better understand the mechanisms underlying individual variability in sexual desire and satisfaction.

Despite the proliferation of studies on sexual functioning during recent decades, our understanding of individual variability in sexual desire and sexual satisfaction remains limited. Research suggests, however, that sexual attitudes may play an important role in the understanding of sexual behavior, in particular regarding sexual desire and sexual satisfaction (e.g., DeLamater & Sill, 2005; Stephenson & Meston, 2010).

Attitudes are relatively stable sets of representations regarding an object (e.g., sexuality) that are stored in memory and are influenced by past experiences, education, relational aspects, and social norms (Belgrave, Van Oss Marin, & Chambers, 2000; Feeney, Peterson, Gallois, & Terry, 2000; Rudman, 2004). Such representations reflect the valence (positive versus negative) as well as other features of the attitude object, such as its importance in one's own life (Bergman, 1998; Cunningham, Zelazo, Packer, & Van Bavel, 2007). Attitudes are suggested to play a central role in human functioning because they shape cognitions, intentions, and behaviors (for a review, see Kraus, 1995). For instance, attitudes serve as tendencies to approach objects that are evaluated positively and to avoid objects that are evaluated

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

negatively (Chen & Bargh, 1999). Because sexual desire represents the tendency to seek out sexual experiences (Kaplan, 1979), and sexual satisfaction represents the positive affective response arising from the subjective evaluation of one's own sexual life (Lawrance & Byers, 1995), both should be intrinsically related to a positive evaluation toward sexuality.

Recent research, however, has pointed out that attitudes influence human behaviors in a complex manner. Indeed, attitudes can be both automatic (implicit) and complemented by additional controlled (explicit) processes (e.g., Strack & Deutsch, 2004). For instance, a young mother may automatically (implicitly) associate sexuality with a positive experience (e.g., related to excitement, feeling desired) but at the same time think that it is inappropriate to have sexual activities while her baby is sleeping in the next room. Such a negative explicit attitude, in conflict with the positive implicit attitude, may reduce her sexual desire, thus persuading the woman to refuse her partner's sexual advances, or may lead to sexual dissatisfaction (e.g., because of regrets) if intercourse occurs.

Surprisingly, however, existing research has been largely confined to the study of the relation between explicit sexual attitudes and sexual functioning. Therefore, it seems important to explore both explicit and implicit sexual attitudes, and the interaction between them, as they might provide a useful perspective for better understanding individual variability in sexual desire and satisfaction.

Implicit and Explicit Attitudes

It is currently assumed that attitudes influence cognitions, intentions, and behaviors through two distinct interacting mechanisms: (a) rapid associative processing, which is regulated by lower-order processes and activated automatically without awareness or the possibility of controlling it when one encounters a social object, forming *implicit* attitudes; and (b) reflective and effortful processing, based on symbolic representations, which operates slowly and sequentially and is supported by higher-order processes, thus forming *explicit* attitudes that can be assessed with questionnaires (e.g., Strack & Deutsch, 2004; Wilson, Lindsey, & Schooler, 2000). While implicit attitudes are supposed to influence spontaneous behaviors that are not under conscious control (e.g., automatic approach and avoidance behaviors; Chen & Bargh, 1999), explicit attitudes influence more controlled behaviors (e.g., deliberative judgments expressed in public contexts; Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997).

Implicit and explicit attitudes are generally thought to interact. Indeed, reflective attitudes are partially based on automatic associations, whereas automatic associations can be influenced by explicit attitudes (for a review, see Deutsch & Strack, 2006). In some circumstances, however, the two processes can differ. This discordance has been explained, from a dual-model perspective, by the fact that reflective attitudes sometimes supplant automatic attitudes, particularly when individuals want to hide certain attitudes or stereotypes to be more accepted socially, or when the stimulus evaluated is ambivalent in terms of valence (e.g., the stimulus is associated with immediate positive but long-term negative outcomes; Deutsch & Strack, 2006; Devine, 1989; Jones & McMahon, 1996). Such divergences between implicit and explicit attitudes are psychologically uncomfortable and can lead to negative consequences (e.g., Brifiol, Petty, & Wheeler, 2006). For example, studies based on attitudes toward the self highlighted the fact that people who exhibited divergent implicit and explicit self-esteem behaved more defensively and had more personal and interpersonal difficulties than did individuals whose explicit and implicit self-esteem were both high (e.g., Bosson, Brown, Zeigler-Hill, & Swann, 2003;

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Schroder-Abe, Rudolph, Wiesner, & Schütz, 2007).

Attitudes Toward Sexuality

In the field of sexuality, attitudes have almost always been explored explicitly. In this context, it has been shown that men hold more permissive explicit attitudes toward sexuality (in particular casual sex) than women do (e.g., Petersen & Hyde, 2010) and that explicit sexual attitudes are closely interconnected with sexual desire (e.g., DeLamater & Sill, 2005; Fisher, White, Byrne, & Kelley, 1988). Moreover, it has been shown that there is a link between explicit sexual attitudes and sexual satisfaction. Indeed, people who believe that sexual activities are important in life have been found to experience greater sexual satisfaction (Haavio-Mannila & Kontula, 1997; Laumann et al., 2006; Stephenson & Meston, 2010).

Implicit attitudes toward sexuality have mainly been studied in relation to the concept of sexual preference and prejudices against homosexuality (e.g., Banse, Seise, & Zerbes, 2001; Imhoff, Schmidt, Bernhardt, Dierksmeier, & Banse, 2011). Surprisingly, only a few studies have examined both explicit and implicit attitudes toward sexuality as a general concept. Geer and Robertson (2005) explored gender differences in implicit and explicit sexual attitudes. Implicit sexual attitudes were assessed by using a modified procedure from the Implicit Association Test (IAT), which consists of categorizing sexual words (e.g., *masturbate, nipples)* and nonsexual words (e.g., *orange, spoon)* according to their content (sexual versus nonsexual) and valence (positive versus negative). The response key for the sexual and positive categories is identical in some trials, whereas in other trials the response key for the sexual category is the same as that used for the negative category. It is assumed that faster responses when assigning a sexual word to the sexual/positive category (as compared with the sexual/negative category) reflect positive implicit attitudes, whereas the opposite suggests negative implicit attitudes toward sexuality. Explicit attitudes were examined by using a questionnaire (i.e., Sexual Opinion Survey [SOS]) in which various statements about sexuality concepts are assessed (e.g., masturbation, pornography, group sex) along a negative-positive dimension. The results of this study showed that women had stronger negative attitudes toward sexuality than men did, both explicitly and implicitly, although the two measures were not correlated. The authors interpreted these findings as indicating that gender differences in socialization (e.g., the fact that, from an early age, women are allowed less permissiveness concerning sexuality than men are) had been deeply integrated. However, it is conceivable that these results may be related not only to differences in socialization but also to individual variability concerning aspects of sexual functioning, such as sexual desire and sexual satisfaction. Indeed, gender differences have been found regarding both sexual desire and sexual satisfaction, suggesting that men experience them more frequently and strongly than women do (e.g., Baumeister, Catanese, & Vohs, 2001; Haavio-Mannila & Kontula, 1997).

In this regard, Brauer and colleagues (2012) explored implicit and explicit sexual attitudes in women diagnosed with hypoactive sexual desire disorder (HSDD), as compared with sexually functional women. Implicit sexual attitudes were assessed by using two implicit tasks. First, a modified version of the IAT (i.e., the Single Target Implicit Association Task) required classifying sexual and nonsexual stimuli into the appropriate category according to sexuality and valence. In the second task, the Picture Association Task, positive and negative words (e.g., *wonderful* and *dirty,* respectively) were

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

superimposed on sexual (e.g., *kissing, fellatio)* or neutral (created by scrambling the sexual images) pictures, and participants were asked to categorize the words as either positive or negative by pressing one of two keys as quickly as possible. The time needed to correctly categorize the word as positive or negative is assumed to be influenced by the valence of the background image (a correspondence between the valence of the image and the word leads to faster responses). Finally, explicit attitudes were assessed by asking the participants to rate the erotic stimuli used in the implicit tasks on three dimensions (valence, desire, and disgust). Brauer and colleagues (2012) found that women with HSDD displayed less positive implicit attitudes (regardless of the task) and explicit attitudes than sexually functional women did. However, this study was limited to the study of clinical versus nonclinical groups and did not include men. Moreover, the relation between implicit and explicit attitudes was not considered.

Objectives of the Study

Given the relative lack of studies exploring implicit attitudes in the field of sexuality, we aimed to investigate sexual attitudes both on an explicit and an implicit level for a more complete view of the individual variability in sexual desire and sexual satisfaction. Indeed, using implicit measures may provide a greater understanding of the mechanisms underlying sexual functioning. Unlike explicit measures, implicit measures do not require verbal self-reporting; therefore, they are less biased by self-presentation strategies (such as social desirability) and may tap into mental states that are outside individuals' self-awareness (LeBel & Paunonen, 2011). Moreover, considering both implicit and explicit sexual attitudes allows us to explore not only the independent effect but also the combined effect of these two types of attitudes, as previous studies have revealed that a discrepancy (or convergence) between these attitudes may play an important role in cognitions, intentions, and behaviors.

In our study, we used an adapted version of the Affect Misattribution Procedure (AMP; Payne, Cheng, Govorun, & Stewart, 2005) to assess implicit attitudes toward sexuality. The AMP is an implicit test that ''relies on people's tendency to misattribute their affective reactions from one source to another when conditions are ambiguous'' (Payne, Govorun, & Arbuckle, 2008, p. 242). In this paradigm, participants are shown affect-laden prime photos and are asked to judge the pleasantness of ambiguous pictographs (i.e., Chinese characters) that are presented a few milliseconds afterward. Studies using this task have generally demonstrated that positive primes (e.g., a picture of a smiling baby) elicit more positive evaluations of the Chinese pictographs, whereas negative primes (e.g., a picture of an angry face) lead to more negative attitudes (Payne et al., 2005). Thus, responses are considered to be automatic because they are generated without conscious intention and without awareness that the measurement outcome reflects the attitude toward the prime that preceded the Chinese character (De Houwer, 2006). We decided to use this task because it is considered less demanding in terms of processing than other implicit tasks (e.g., IAT) and thus leads to more automatic responses (Witthoft, Basfeld, Steinhoff, & Gerlach, 2011). Moreover, the AMP may be less contaminated by attitude-irrelevant associations than the IAT (Olson & Fazio, 2004; Payne et al., 2008). Indeed, when participants are asked to perform the task correctly and as quickly as possible (e.g., in the IAT, participants are asked to classify a word into the appropriate category), they may rely on any information that is relevant for the task, even if it is unrelated to personal attitudes. In contrast, because the AMP has no correct answers, it forces participants to rely on internally generated reactions to evaluate the Chinese signs. Finally, the

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

AMP has proven to be a highly sensitive method for detecting different aspects of cognitions, intentions, and behaviors (Payne et al., 2008). As for explicit attitudes, we evaluated general attitudes toward sexuality by using a short questionnaire that was developed for the purpose of this study. We suspected that the questionnaire used by Geer and Robertson (2005), the SOS, was more related to particular aspects of sexuality (e.g., the use of pornography) than to sexuality in general. In the same vein, we suspected that the ratings of sexual pictures, such as those used by Brauer and colleagues (2012), were too narrowly related to specific cues in the pictures (e.g., attractiveness of the actors, a specific aspect of sexual activity) and thus did not necessarily provide an evaluation of sexuality in general.

In the present study, we aimed to explore the association between, on one hand, explicit and implicit attitudes toward sexuality and, on the other hand, sexual satisfaction and sexual desire (we distinguished between the desire to engage in sexual activities with a partner and the desire to masturbate, as they have been shown to have different relationships to psychological and sexual functioning; for a review, see Costa, 2012; Spector, Carey, & Steinberg, 1996) in men and women from the general population. Because past studies had suggested that men and women differed according to sexual attitudes, sexual desire, and sexual satisfaction, we also aimed to explore whether the relation between attitudes and sexual desire and satisfaction varies according to gender. To that end, we first explored gender differences in sexual desire and sexual satisfaction, as well as sexual attitudes (both implicit and explicit). We hypothesized that men would show higher levels of sexual desire (both dyadic and solitary) and sexual satisfaction than women would, as well as more positive explicit and implicit sexual attitudes. Second, we explored the relation of implicit and explicit attitudes toward sexuality with sexual desire and sexual satisfaction. In this context, we also explored the effect of congruence or divergence between implicit and explicit sexual attitudes on sexual desire and satisfaction. We hypothesized that, in general, positive attitudes toward sexuality would be associated with higher levels of sexual desire and sexual satisfaction. Moreover, we expected sexual desire and sexual satisfaction to be higher in convergent situations (i.e., when both implicit and explicit attitudes were positive) than in divergent situations (i.e., positive explicit and negative implicit attitudes, or negative explicit and positive implicit attitudes). Finally, we explored whether gender influenced the relation between sexual attitudes and sexual desire and satisfaction.

Because most of the existing studies on sexual desire and satisfaction are based on heterosexual samples, this study focused on heterosexual men and women only. Moreover, to control for access to a potential sexual partner, the sample contained only those individuals who were in a relationship.

Method

PARTICIPANTS

A total of 61 volunteers (28 men and 33 women) took part in this study. Participants were recruited from the general population living in the region of Geneva, Switzerland, by means of advertisements (placed at different university campuses) and social media, and they received no compensation for their participation. All were native or fluent French speakers and were in a heterosexual relationship. Their mean age was 26.54 years *(SD* = 5.49, range = 18-40) and mean years of education was 15.23 (*SD* = 2.84, range = 6-21). For 82% of the participants, French represented their only mother tongue. Moreover, although participants said they belonged to different religions, a large proportion of them (85.2%)

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

considered religion as *Not really important* or *Not important at all* in their lives. The mean duration of relationships was 3.60 years (*SD* = 4.06, range = 0-20 years). For those who lived with their partner (55.7% of the participants), the mean duration of cohabitation was 3.24 years (*SD* = 4.27, range = 020 years). In addition, 13.1% had one or more children. We also made sure that none of the participants spoke or understood Chinese (so that the Chinese characters would be perceived as ambiguous in the AMP task).

MATERIAL

Sexual desire. The Sexual Desire Inventory (SDI; Spector et al., 1996) consists of 14 items assessing two dimensions: (a) *dyadic* sexual desire (the desire to have sexual activity with another person; e.g., ''How strong is your desire to engage in sexual activity with a partner?'') and (b) *solitary* sexual desire (the desire to engage in sexual behavior by oneself; e.g., ''During the past month, how often would you have liked to behave sexually by yourself [for example, masturbating, touching your genitals, etc.]?''). Participants rated each item on 8- or 9-point scales on the frequency (0 = *Not at all* to 7 = *More than once a day),* the intensity (0 = *No desire* to 8 = *Strong desire),* and the importance (0 = *Not at all important* to 8 = *Extremely important*) of sexual desire. Two scores were calculated: (a) dyadic sexual desire, corresponding to the sum of items 1 to 8 (total score ranging between 8 and 70), and (b) solitary sexual desire, corresponding to the sum of items 10 to 12 (total score ranging between 3 and 26). For each dimension, higher scores indicate a higher level of desire. The original questionnaire was translated into French by a bilingual person and then back-translated into English by another bilingual person. The back-translation was then compared with the original version. Discrepancies emerging from the two versions were discussed, and adjustments were made to the translation. In its original version, the SDI has shown strong internal consistency in both the dyadic (Cronbach's alpha = .86) and the solitary (Cronbach's alpha = .96) dimensions. In the present study, internal consistency was excellent for the solitary dimension (Cronbach's alpha = .90) and acceptable for the dyadic dimension (Cronbach's alpha = .73).

Sexual satisfaction. The Multidimensional Sexuality Questionnaire (MSQ; Snell, Fisher, & Walters, 1993) consists of 60 items assessing 12 aspects of sexuality (sexual esteem, sexual preoccupation, internal sexual control, sexual consciousness, sexual motivation, sexual anxiety, sexual assertiveness, sexual depression, external sexual control, sexual monitoring, fear of sex, and sexual satisfaction) on 5-point scales (1 = *Not at all characteristic of me* to 5 = *Very characteristic of me).* For the purpose of our study, we selected the subscale related to sexual satisfaction (the tendency to be satisfied with the sexual aspects of one's life; e.g., ''I am very satisfied with my sexual relationship''). The total score ranges between 5 and 25. A higher score indicates a higher level of sexual satisfaction. This subscale was translated into French and then back-translated into English, using the same procedure as described for the SDI. In its original version, the MSQ has shown good psychometric properties. In particular, the sexual satisfaction dimension revealed good internal consistency (Cronbach's alpha = .90) and high stability over time (test-retest *r* = .76 over 3 weeks). The internal reliability of the sexual satisfaction dimension in the current study was excellent (Cronbach's alpha = .91).

Explicit attitudes toward sexuality. Two items were created for the present study to evaluate general attitudes toward sexuality. Participants were asked to rate their own perception of sexuality in terms of valence (''In general, I perceive sexuality as something: [Circle the answer that best describes your perception on a scale from 1 = *Extremely negative* to 10 = *Extremely positive]''),* as well as the importance

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

granted to sexuality in their own life (''What importance do you give to sexuality in your life? [Circle the answer that best describes your experience on a scale from 1 = *Not at all important* to 10 = *Extremely important]").* The total score is obtained by calculating the mean of the scores for the two items. A higher score indicates a more positive general attitude toward sexuality. The internal reliability of this measure was acceptable (Cronbach's alpha = .63).

Implicit sexual attitudes. The AMP used in the present study was adapted from the AMP described by Payne and colleagues (2005). The task was programmed in E-Prime (version 2.0). There were 24 color pictures depicting heterosexual couples serving as primes; 12 pictures depicted heterosexual couples during sexual activity (erotic prime), whereas the other 12 photographs depicted heterosexual couples in nonsexual contexts (nonerotic prime; e.g., walking or smiling). The pictures were selected from the International Affective Picture System (Lang, Bradley, & Cuthbert, 2008) and the Internet and had previously been rated in terms of arousal and eroticism by 12 judges, confirming that the erotic primes were more erotic and arousing than the nonerotic primes. We also used a gray square as a control prime (neutral prime). In each trial, the prime was presented in the middle of the screen for 75 ms and was followed by a blank screen for 125 ms. A Chinese character then appeared for 100 ms and was followed by a pattern mask (a white and black pattern of ''noise''), which stayed on the screen until the participant responded. The next trial began immediately after the participant's response. Participants were asked to evaluate the pleasantness of the Chinese characters by pressing a key labeled ''pleasant'' if they judged the pictograph to be more pleasant than average, or a key labeled ''unpleasant'' if the pictograph was judged to be less pleasant than average. They were also instructed to do their best not to let the preceding images influence their judgment of the pictographs. Indeed, it has been demonstrated that the affect misattribution effect can apply even when participants receive a strong warning to avoid any influence of the primes, providing evidence that the AMP reveals evaluations that are independent of participants' intent (Payne et al., 2005). The task consisted of 72 randomly ordered trials, in which each of the 12 erotic and 12 nonerotic primes was presented twice, whereas the neutral prime was presented 24 times; in addition, 72 different Chinese characters were used as targets and were randomly paired with the primes. The task lasted approximately six minutes. The outcome variable of the AMP was the number of pictographs that the participants judged to be pleasant in each prime condition *(erotic, nonerotic, neutral).* Reliability was calculated by using the same method as described in Payne and colleagues (2005). First, each trial was scored as+1 for a pleasant and 0 for an unpleasant judgment. A randomly selected nonerotic trial was then chosen and subtracted from a randomly selected erotic trial. Therefore, a set of 24 difference scores was created and treated as individual items (each item could range between —1 and +1). For each score, higher numbers reflect a greater probability of responding ''pleasant'' to erotic than to nonerotic trials. This analysis revealed acceptable to high reliability (Cronbach's alpha = .77).

To make sure that the pictures used as primes in the AMP (i.e., erotic versus nonerotic primes) measured sexual versus nonsexual attitudes appropriately, participants evaluated each picture explicitly at the end of the experiment. For the explicit assessment, each picture was presented, 1 at a time, for 6 seconds on a computer screen and participants had 14 seconds to rate it on four dimensions presented in random order: valence, arousal, dominance, and eroticism. Ratings were performed on the dimensions of valence (ranging from 1 = *Pleasant* to 9 = *Unpleasant*), arousal (ranging from 1 = *Calm* to 9 = *Excited*), and dominance (i.e., the feeling of being controlled versus in control while watching the

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

picture, ranging from 1 = *Dominated* to 9 = *Dominating*) with the 9-point scales of the Self-Assessment Manikin (Lang et al., 2008). The degree of eroticism of each picture was assessed with a 9-point scale (1 = *Not erotic at all* to 9 = *Extremely erotic*).

A repeated measures analysis of variance (ANOVA) revealed a significant effect of prime type on the different dimensions of evaluation, F (1, 60) = 75.42, $p < .001$. As expected, paired t tests showed that nonerotic pictures were evaluated as less erotic *(*M = 2.08, SD = 1.11) and less arousing (M = 3.04, SD = 1.55) than erotic pictures (eroticism: M = 6.82, SD = 1.22; $p < .001$; arousal: M = 5.70, SD = 1.68; $p < .001$). Moreover, nonerotic pictures were assessed as more positive (M = 2.79, SD = 1.01) than erotic pictures (M = 3.34, SD = 1.15; $p < .001$). Finally, no differences were found on the dominance dimension between erotic (M = 5.60, SD = 1.35) and nonerotic pictures (M = 5.65, SD = 1.54; $p > .05$).

Social desirability. The Social Desirability Scale (DS-36; Tournois, Mesnil, & Kop, 2000) is a 36-item French questionnaire designed to assess two facets of the construct: (a) autodeception, that is, the tendency to give favorable self-descriptions without being aware of it, and (b) heterodeception, that is, the tendency to knowingly give an excessively favorable self-description to other people. All items are scored on a 7-point rating scale (0 = *Totally false* to 6 = *Totally true).* A higher score indicates higher social desirability. In its original version, the DS-36 has shown good psychometric properties (autodeception: Cronbach's alpha = .86; heterodeception: Cronbach's alpha = .82). In the current study, internal reliability was excellent for the autodeception dimension (Cronbach's alpha = .91) and acceptable for the heterodeception dimension (Cronbach's alpha = .71). Only the heterodeception subscale was used in this study.

Sociodemographic data. The sociodemographic questionnaire included questions about gender, age, native language, duration of the couple's relationship, duration of cohabitation with the partner, whether the respondent had children or not, highest level of education the respondent had achieved, professional activity, importance of religion, and physical and psychological health.

PROCEDURE

Participants were tested individually in a laboratory at the University of Geneva. All participants gave their informed consent prior to participation. They were informed that the experiment would involve measures related to sexuality, including erotic photographs; that they could withdraw from participation at any time without difficulty; and that all data would be collected anonymously. They were then given an envelope in which to place the completed questionnaires.

After completing the first sociodemographic questionnaire, participants were asked to complete a battery of self-assessed questionnaires and to perform the AMP task. To match the answers from the questionnaires to AMP performance, each participant was given a code number. Participants were randomly assigned to one of four fixed orders, in which the order of the presentation of the questionnaires and the AMP was counterbalanced. All participants ended the testing session by explicitly evaluating the images seen during the AMP task. At the end of the experiment, participants were asked to put the envelope containing all the completed questionnaires into a large box through a small slot and to shake the box to mix the contents. The anonymity of the participants was guaranteed, as informed consent forms were kept separate from the completed (and anonymous) questionnaires. The entire experiment lasted about one hour and ended in a debriefing.

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Results

PRELIMINARY ANALYSES

Mean scores, standard deviations, minimum-maximum scores, skewness, and kurtosis values for the sexual and attitude-related measures are presented in Table 1. The observed values for skewness and kurtosis show that the distributions of all the variables do not deviate strongly from a normal distribution (West, Finch, & Curran, 1995).

Table 1. *Descriptives*

	Total Sample (*N* = 61)	**Men (N = 28)**	**Women (N = 33)**			
Measures	***M (SD)***	***M* (*SD*)**	***M* (*SD*)**	**Range**	**Skewness**	**Kurtosis**
Sexual desire (SDI)						
Dyadic sexual desire	42.19 (8.35)	45.20 (6.99)	39.56 (8.65)	22-60	-0.199	-0.140
Solitary sexual desire	9.52 (6.55)	12.18 (5.78)	7.19 (6.37)	0-22	-0.091	-1.168
Sexual satisfaction (MSQ)	17.70 (5.86)	18.50 (5.16)	17.03 (6.40)	5-25	-0.414	-1.005
Explicit attitudes toward sexuality	8.46 (1.21)	8.68 (1.00)	8.27 (1.36)	4-10	-1.154	2.022
Implicit attitudes (AMP)						
Erotic primes	15.10 (6.42)	15.00 (6.64)	15.18 (6.32)	2-24	-0.183	-1.012
Nonerotic primes	14.87 (5.83)	12.93 (5.68)	16.52 (5.51)	1-24	-0.152	-0.846
Neutral primes	12.54 (5.76)	10.07 (5.16)	14.64 (5.46)	0-24	0.174	-0.405
Social desirability (DS-36)	59.63 (14.62)	59.77 (13.15)	59.50 (15.93)	22-90	-0.050	-0.139

Note. SDI = Sexual Desire Inventory; MSQ = Multidimensional Sexuality Questionnaire; AMP = Affect Misattribution Procedure; DS-36 = Social Desirability Scale: heterodeception scale.

MEAN AMP PERFORMANCE

The outcome variable of the AMP was the number of pictographs that participants judged to be pleasant in each prime condition *(erotic, nonerotic, neutral).* To investigate automatic evaluative reactions according to prime type, we computed a repeated-measures ANOVA on AMP performance for each prime condition. Because the assumption of sphericity was violated (i.e., estimates of sphericity <0.75), the Greenhouse-Geisser correction was used as recommended by Girden (1992). The analysis revealed a main effect of prime type, F (1.72, 103.19) = 4.73, $p < .05$. This effect was further explored by means of pairwise comparisons. The results showed that participants made more pleasant judgments after seeing nonerotic pictures of heterosexual couples than after seeing the gray square *(*$p < .01$). Erotic pictures were also evaluated as more pleasant than neutral pictures ($p < .05$). Finally, no difference was found between the evaluations of the erotic and nonerotic pictures *(*$p > .05$).

In subsequent analyses, the score resulting from the pleasant responses in erotic prime conditions was

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

used as a measure of implicit sexual attitudes. In contrast, scoring for nonerotic pictures may be considered a measure of implicit attitudes toward couples; computing the analyses by using this score enabled us to control whether the expected effects were specific to the implicit attitudes toward sexuality (i.e., erotic pictures) rather than to more general implicit attitudes toward couples. Finally, scoring for neutral trials (the gray square) was used as a control variable in subsequent analyses to correct for a general tendency to evaluate pictographs as ''pleasant.''

GENDER DIFFERENCES IN SEXUAL DESIRE, SEXUAL SATISFACTION, AND SEXUAL ATTITUDES

To explore gender differences in sexuality-related measures (dyadic and solitary sexual desire, sexual satisfaction), sexual attitudes (implicit and explicit), and implicit attitudes toward nonerotic pictures, we performed a multivariate analysis of variance (MANOVA), controlling for the effect of the AMP index toward neutral pictures. Mean scores and standard deviations for each measure according to gender are presented in Table 1. The MANOVA revealed a marginal difference between men and women, F (6, 52) = 1.98, $p < .10$. This difference was further explored by means of univariate analyses (ANOVAs), which showed that men and women differed regarding sexual desire. Indeed, compared with women, men showed marginally higher levels of dyadic sexual desire, F (1, 57) = 3.82, $p < .10$, and significantly higher levels of solitary sexual desire, F (1, 57) = 7.65, $p < .01$. However, no gender differences were found regarding sexual satisfaction, F (1, 57) = 0.85, $p > .05$. Likewise, men and women did not differ on explicit sexual attitudes, F (1, 57) = 0.38, $p > .05$, implicit sexual attitudes, F (1, 57) = 0.00, $p > .05$, and implicit evaluation of nonerotic pictures, F (1, 57) = 0.63, $p > .05$.

RELATIONS BETWEEN SEXUAL ATTITUDES, SEXUAL DESIRE, AND SEXUAL SATISFACTION

First, Pearson's correlations were performed to explore the associations between implicit and explicit sexual attitudes, sexual desire (dyadic and solitary), sexual satisfaction, implicit attitudes toward nonerotic pictures, gender, social desirability, and some sociodemographic variables (age, years of education, duration of relationship, and importance of religion) that may influence attitudes and sexuality. Because this study was exploratory, we did not use any adjustment for multiple tests (see Bender & Lange, 1999). The results are shown in Table 2.

These analyses revealed a significant positive correlation between dyadic and solitary sexual desire, whereas there was no correlation between the two kinds of sexual desire and sexual satisfaction. Concerning attitudes, positive explicit sexual attitudes were associated with both higher dyadic sexual desire and higher sexual satisfaction, while positive implicit sexual attitudes were correlated with higher dyadic sexual desire and, marginally, with higher solitary sexual desire. It should be noted that implicit and explicit sexual attitudes were correlated, although the relation was moderate. Moreover, though implicit attitudes toward nonerotic primes were significantly correlated with implicit attitudes toward erotic primes, the former showed no relation with the other sexual variables. As for sociodemographic variables, only duration of relationship revealed significant correlations with some aspects of sexuality. Indeed, longer duration of relationship was related to lower dyadic sexual desire and satisfaction. Finally, none of the measures was related to social desirability.

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

PREDICTION OF SEXUAL DESIRE AND SATISFACTION BY EXPLICIT AND IMPLICIT SEXUAL ATTITUDES

Three separate hierarchical multiple regression analyses were then conducted, with dyadic sexual desire, solitary sexual desire, and sexual satisfaction defined as the dependent variables, and gender and sexual attitudes (both implicit and explicit) defined as the predictors. For each analysis, gender, the AMP index for erotic primes, and explicit sexual attitudes were introduced in the first step. We also entered the AMP index for neutral primes as a control variable. In the second step, we entered the interaction between implicit and explicit sexual attitudes. Moreover, to explore the moderating effect of gender, we entered the interaction between gender and explicit sexual attitudes, as well as the interaction between gender and implicit sexual attitudes. There were no extreme observations (standardized residual errors >3) or influential cases. Multicollinearity problems were checked by means of tolerance values (ranging from .62 to .88) and variance inflation factor (VIF) values (ranging from 1.13 to 1.60). These values revealed no sign of multicollinearity, insofar as VIF values greater than 2.5 and tolerance below .40 are considered problematic (e.g., Allison, 1999). Results are illustrated in Table 3.

Table 2. *Correlations Between Sexual Desire, Sexual Satisfaction, Sexual Attitudes, Social Desirability, Gender, and Sociodemographic Variables*

								Sociodemographic Variables			
	1	2	3	4	5	6	7	Age	Years of Education	Duration of Relationship	Importance of Religion
1. Dyadic sexual desire	—							.024	−.022	−.276*	.076
2. Solitary sexual desire	.298*	—						.042	.073	−.033	.104
3. Sexual satisfaction	.128	−.035	—					.057	−.042	−.270*	.183
4. Explicit sexual attitudes	.468***	.053	.454***	—				.164	−.178	−.080	.083
5. Implicit attitudes: Erotic primes[a]	.335*	.253†	.086	.320*	—			.040	−.033	.001	.139
6. Implicit attitudes: Nonerotic primes[a]	−.208	−.193	.043	−.181	.454***	—		.115	−.113	.179	−.080
7. Social desirability	−.177	−.209	.111	.020	−.133	.084	—	.223	.161	.067	−.049
8. Gender[b]	−.340**	−.383**	−.126	−.168	.003	.172	−.009	−.204	−.007	.156	−.074

Note. N = 61.
[a]Partial correlations were used to calculate relationships between the Affect Misattribution Procedure (AMP) scores for erotic and nonerotic primes and the other sets of variables, while controlling for the effect of the AMP index for neutral primes.
[b]Point-biserial correlation was used with gender. Men were set at 0 and women at 1. Thus, a positive correlation corresponds to a higher score for women.
****p<.001; **p<.01; *p<.05; p<.10.*

Dyadic sexual desire. The results showed that dyadic sexual desire was predicted, in the first step, by gender, indicating that men expressed higher dyadic desire than women do. Moreover, both implicit and explicit sexual attitudes were significant predictors, suggesting that positive implicit and explicit attitudes toward sexuality were independently associated with higher dyadic sexual desire. The introduction, in the second step, of the interaction between gender and sexual attitudes, and between implicit and explicit sexual attitudes, did not improve the overall prediction, nor did it substantially change the previous results (though gender became only marginally significant).

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Solitary sexual desire. The results showed that being a man and having positive implicit sexual attitudes were both related to higher solitary sexual desire. No effect was found concerning explicit sexual attitudes. The introduction of the interaction effects in the second step significantly improved the overall prediction, underscoring a significant interaction between gender and implicit sexual attitudes. As Figure 1 shows, the slope of the relationship between implicit sexual attitudes and solitary sexual desire was significant for women (simple slope = 3.79, t = 3.39, p < .01), showing that higher solitary sexual desire was related to positive implicit sexual attitude (i.e., high AMP). In contrast, there was no difference in accordance with implicit sexual attitudes among men (simple slope = — 0.10, t =-0.08, p > .05).

Table 3. *Standardized (β) Regression Coefficients Predicting Dyadic Sexual Desire, Solitary Sexual Desire, and Sexual Satisfaction*

	Dyadic Sexual Desire		**Solitary Sexual Desire**		**Sexual Satisfaction**	
Predictors	**Step 1**	**Step 2**	**Step 1**	**Step 2**	**Step 1**	**Step 2**
Gender	-.25*	-.24'	-.38**	-.38**	-.07	-.03
AMP for erotic primes	.25*	.24*	.27*	.28*	-.01	-.01
AMP for neutral primes	-.11	-.11	-.06	-.10	.06	-.02
Explicit sexual attitudes	.32*	.32*	-.11	-.14	.46**	.57***
Gender x AMP for erotic primes		.02		.30*		.02
Gender x Explicit attitudes		-.08		.19		.10
Explicit attitudes x AMP for erotic primes		-.08		.16		.41**
R^2 (R^2 adjusted)	.35 (.30)	.36 (.27)	.21 (.16)	.34 (.25)	.21 (.15)	.34 (.25)
$\triangle R^2$		.01		.13*		.13*

Note. Dyadic sexual desire: N = 61; solitary sexual desire: N = 61; sexual satisfaction: N = 61. All variables were standardized prior to analysis.

*AMP = Affect Misattribution Procedure. AR^2 = change in R^2 between Step 1 and Step 2 models. Men were set at 0 and women at 1. ***p < .001; **p < .01; *p < .05; 'p < .10.*

Figure 1. *Interaction between gender and implicit sexual attitudes (AMP index for erotic primes; higher scores correspond to a more positive attitude, whereas lower scores correspond to a less positive attitude) and their impact on solitary sexual desire.*

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

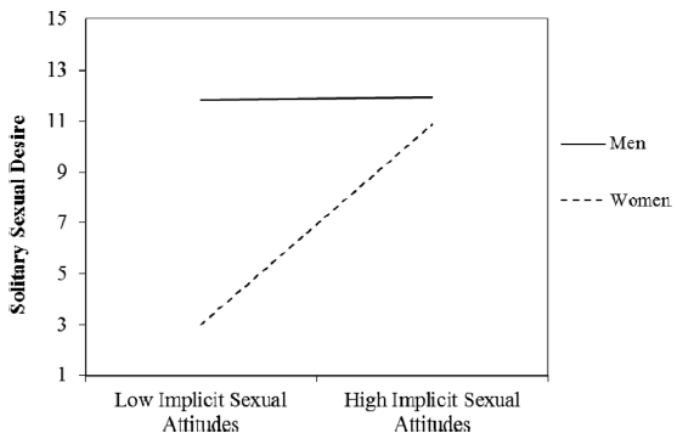
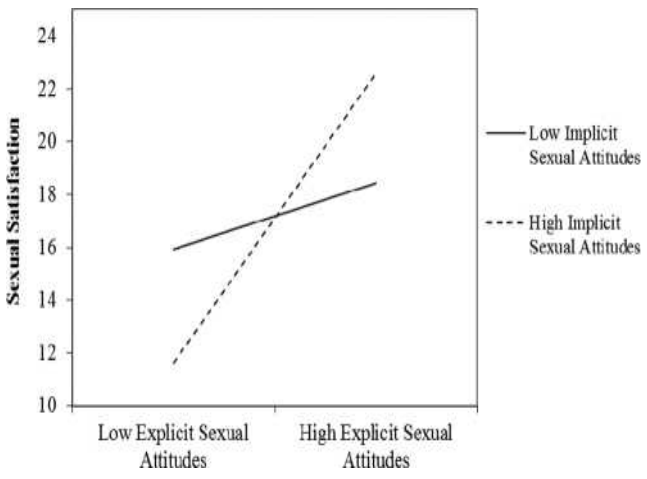


Figure 2. *Interaction between implicit sexual attitudes (AMP index for erotic primes) and explicit sexual attitudes and their impact on sexual satisfaction. Higher scores correspond to a more positive attitude (+1 SD from the mean), whereas lower scores correspond to a less positive attitude (—1 SD from the mean).*



Sexual satisfaction. The results showed, in the first step, that positive explicit attitudes were associated with higher sexual satisfaction. The introduction of the interaction effects in the second step significantly improved the overall prediction. Indeed, the interaction between explicit and implicit attitudes appeared to be a significant predictor of sexual satisfaction as well. As Figure 2 shows, the slope of the relationship between explicit sexual attitudes and sexual satisfaction was stronger when implicit sexual attitudes were highly positive (i.e., high implicit sexual attitudes; simple slope = 5.48, t = 4.38, $p < .001$) than for less positive implicit sexual attitudes (i.e., low implicit sexual attitudes; simple slope = 1.26, t = 1.46, p = .15). The interaction between implicit and explicit sexual attitudes suggests

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

that having high sexual satisfaction was associated with positive explicit sexual attitudes, especially when the implicit evaluation was positive as well. Conversely, when both explicit and implicit sexual attitudes were negative, sexual satisfaction was relatively low but not at the lowest level. In fact, the lowest level of sexual satisfaction was associated with the combination of negative explicit and positive implicit sexual attitudes.[1]

To ensure that the effects we found were specific to the implicit evaluation of erotic primes, we computed the same regression analyses but replaced the AMP index for erotic primes with the AMP index for nonerotic primes (see Table 4). Results showed that dyadic sexual desire was positively related to explicit sexual attitudes and marginally to gender (men showed marginally higher dyadic sexual desire than women did). Moreover, there was a marginal interaction between gender and implicit attitudes, indicating that higher dyadic sexual desire was related, among women, to less positive implicit attitudes toward nonerotic pictures and, among men, to higher positive implicit attitudes toward such pictures. However, a deeper exploration of the interaction revealed that both slopes were nonsignificant (men: simple slope = 1.49, t = 0.89, p > .05; women: simple slope = — 2.54, t =—1.52, p > .05). Regarding solitary sexual desire, gender was a significant predictor, indicating that men reported higher solitary sexual desire than women did. Moreover, there was a significant interaction between explicit sexual attitudes and gender, showing that solitary sexual desire was higher among men with negative explicit sexual attitudes, while it was higher among women with positive explicit sexual attitudes. Both slopes, however, were only marginally significant (men: simple slope =—3.02, t =—1.94, p < .10; women: simple slope = 2.38, t = 1.78, p < .10). Finally, sexual satisfaction was significantly, and positively, related to explicit sexual attitudes. Moreover, there was a marginal relation between the AMP index for nonerotic primes and satisfaction, suggesting that having a positive implicit attitude toward nonerotic pictures of couples was associated with higher sexual satisfaction.

Comparing these results with previous ones (based on the AMP index for erotic primes) revealed that implicit attitudes toward sexuality and toward nonerotic pictures were differently related to sexual desire (dyadic and solitary) and sexual satisfaction. Thus, these different links suggested that the relations found in previous analyses were specific to the AMP index for erotic pictures.

Table 4. *Standardized (ß) Regression Coefficients Predicting Dyadic Sexual Desire, Solitary Sexual Desire, and Sexual Satisfaction*

	Dyadic Sexual Desire		**Solitary Sexual Desire**		**Sexual Satisfaction**	
Predictors	**Step 1**	**Step 2**	**Step 1**	**Step 2**	**Step 1**	**Step 2**
Gender	-.23’	— .26*	-.36*	-.48**	-.10	-.21
AMP for nonerotic primes	-.03	-.06	-.08	.12	.16	.27*

[1]*It should be noted that we also performed all the analyses by using separately, as the measure of explicit sexual attitudes, valence and the importance of sexuality. Separate testing did not provide additional (or different) information compared with the analyses computed by using the total score. Moreover, valence and importance showed comparable patterns of associations with sexual desire and sexual satisfaction, although valence was less strongly related to sexual variables compared with importance. The low variance found in the valence scale (most participants assessed sexuality as very positive) could be a reasonable explanation for these weaker relations.*

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

AMP for neutral primes	-.08	-.02	-.01	-.04	.00	.04
Explicit sexual attitudes	.40**	.38**	-.02	-.05	.47***	.42**
Gender x AMP for nonerotic primes		— .23*		.07		-.16
Gender x Explicit attitudes		-.08		.41*		.21
Explicit attitudes x AMP for nonerotic primes		-.02		-.26		-.21
R^2 (R^2 adjusted)	.30 (.24)	.35 (.26)	.15 (.09)	.24 (.14)	.23 (.18)	.28 (.18)
ΔR^2		.05		.09		.04

Note. Dyadic sexual desire: N = 61; solitary sexual desire: N = 61; sexual satisfaction: N = 61. All variables were standardized prior to analysis. Tolerance values range from .470 to .928 and variance inflation factor values from 1.078 to 2.126. AMP = Affect Misattribution Procedure. AR^2 = change in R^2 between Step 1 and Step 2 models. Men were set at 0 and women at 1.

***p < .001; **p < .01; *p < .05; 'p < .10.

Discussion

The main objective of this study was to explore the relationship between explicit and implicit attitudes toward sexuality, on one hand, and sexual desire and sexual satisfaction, on the other. Because previous studies had highlighted gender differences in sexual desire and sexual satisfaction, we also aimed to explore the moderating effect of gender in the link between attitudes and sexual desire and satisfaction. For this purpose, we first explored gender differences regarding sexual desire and sexual satisfaction, as well as sexual attitudes (both implicit and explicit). We then explored the relation of sexual desire and sexual satisfaction with implicit and explicit attitudes toward sexuality (and the divergence or convergence between the two), as well as the moderating effect of gender.

GENDER DIFFERENCES IN SEXUAL DESIRE, SEXUAL SATISFACTION, AND SEXUAL ATTITUDES

Our results revealed gender differences in sexual desire, suggesting that men experience higher dyadic and solitary desire than women do, consistent with previous findings (Baumeister et al., 2001). No difference was found, however, between men and women concerning sexual satisfaction, which is consistent with some previous findings (e.g., Castellanos-Torres, Alvarez- Dardet, Ruiz-Munoz, & Perez, 2013).

It is worth noting that there were no differences between men's and women's explicit and implicit attitudes toward sexuality, contrary to our hypothesis and contrary to Geer and Robertson's (2005) study, which found that women expressed more negative implicit and explicit attitudes toward sexuality than men did. The lack of gender differences in sexual attitudes observed in our study, which suggests that women consider sexuality as positively as men do, could lead one to believe, at first glance, that gender differences in sexuality have faded (at least in Western societies). However, such a conclusion cannot be formulated from our data. Indeed, it is possible that such similarity may be true only in the context of a committed and long-term relationship (as is the case for the participants in our study), in which women are socially expected to have sexual activities with their partner because of ''love, romance and commitment'' (Borges & Nakamura, 2009, p. 97). In contrast, compared with men,

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

women may still have more negative attitudes regarding sexual activities outside of a committed and long-term relationship, as they still seem to be subjected to more restrictiveness and punishment for having had sex with many partners in the past, or for having engaged in sexual activities outside of heterosexual marriage (e.g., Crawford & Popp, 2003).

Moreover, the difference between our results and Geer and Robertson's (2005) may be related to methodological aspects. Indeed, both the questionnaire used to assess explicit sexual attitudes (SOS) and the sexual words used to assess implicit sexual attitudes in Geer and Robertson's (2005) study concerned specific and contextual aspects of sexuality, rather than general aspects (e.g., engaging in group sex, watching pornographic material, masturbation) that have been shown to be evaluated differently by men and women. Previous studies, in fact, noted that men have more positive and permissive attitudes regarding these sexual activities than women do (e.g., Baumeister et al., 2001; Hald, 2006). In contrast, the questionnaire and the primes used in our study (i.e., pictures of heterosexual couples in erotic, but not pornographic, situations) measured sexuality as a more general construct, independently of specific sexual practices. In this context, participants may have referred to aspects related to sexuality other than those described in the questionnaire, or elicited by the stimuli, used in Geer and Robertson's (2005) study (such as intimacy, well-being), thus reducing gender differences.

DYADIC SEXUAL DESIRE AND SEXUAL ATTITUDES

The regression analysis showed that gender was marginally related to dyadic sexual desire, suggesting that men reported higher dyadic sexual desire than women did, though the difference was only marginal. Moreover, results showed that positive implicit and explicit sexual attitudes were related to higher levels of desire, thus supporting, with a nonclinical sample, a previous study that had found more positive attitudes (both implicit and explicit) in sexually functional women than in women with HSDD (Brauer et al., 2012). It is worth noting that the relation between implicit attitudes and dyadic sexual desire was specific to sexual attitudes. Furthermore, gender did not moderate the relation between attitudes toward sexuality (implicit and explicit) and dyadic sexual desire, suggesting that the influence of attitudes on dyadic sexual desire is comparable across genders.

Contrary to our hypothesis, there was no correlation between the level of dyadic sexual desire and the concordance (or discrepancy) between implicit and explicit sexual attitudes. Indeed, both explicit and implicit positive sexual attitudes were related, independently, to higher levels of dyadic sexual desire. This means that having automatic positive associations toward sexuality was associated with a greater desire to engage in sexual activities with a partner, independently of the level of explicit sexual attitudes, and vice versa. This result highlights the importance of assessing both implicit and explicit sexual attitudes when considering dyadic sexual desire. Moreover, regarding implicit attitudes being underlain by automatic, uncontrolled mechanisms, and explicit attitudes being related to more controlled processing (e.g., Strack & Deutsch, 2004), this result suggests that (a) dyadic sexual desire may be experienced because of positive associations elicited automatically in response to sexual stimuli (e.g., related to satisfying past sexual experiences); and (b) dyadic sexual desire may be experienced because of more reflective processing related to the explicit representation of sexuality in the context of a committed relationship (e.g., wishing to regain the partner's love).

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

SOLITARY SEXUAL DESIRE AND SEXUAL ATTITUDES

The regression analysis showed that gender explained a significant proportion of variance in solitary sexual desire. Indeed, consistent with the literature (for a review, see Petersen & Hyde, 2010), men reported higher levels of solitary sexual desire than women did.

Interestingly, the relationships between sexual attitudes and solitary desire were different than those observed for dyadic desire, underscoring the importance of considering these two aspects of sexual desire separately. Indeed, only implicit attitudes were significantly associated with solitary sexual desire. Such a link was found only among women, however, suggesting that solitary sexual desire was related to positive implicit attitudes toward sexuality. In contrast, no significant relation was found between implicit sexual attitudes and solitary sexual desire in men. This gender difference may be explained in light of previous findings showing that solitary sexuality in women is related to satisfying sexual and individual functioning (e.g., higher sexual satisfaction, self-esteem, and well-being; Carvalheira & Leal, 2013; Kaestle & Allen, 2011), thus explaining the positive implicit association toward sexuality. In contrast, solitary sexual desire in men may fulfill different functions. On one hand, men may desire masturbation to satisfy a sexual need and to feel pleasure. On the other hand, solitary sexuality in men may be related to dissatisfying sexual and individual functioning, as suggested by different authors (e.g., Costa, 2012; Gerressu, Mercer, Graham, Wellings, & Johnson, 2008), and may be used as a coping strategy. It should also be noted that no links were found between solitary sexual desire and implicit attitudes not specifically related to sexuality.

In addition, the lack of correlation between explicit sexual attitudes and solitary desire may be explained by the specific characteristics of the explicit measure. Indeed, participants may have not thought of solitary sexuality (i.e., masturbation) when asked to evaluate ‘‘sexuality’’ as a general construct. However, it is also conceivable that solitary sexual desire may be experienced more spontaneously rather than in a controlled way, which would explain why only implicit sexual attitudes were significantly related to it.

SEXUAL SATISFACTION AND SEXUAL ATTITUDES

Explicit positive attitudes toward sexuality were associated with high sexual satisfaction, consistent with previous research (Haavio-Mannila & Kontula, 1997; Laumann et al., 2006). However, this relationship appeared to depend on the valence of implicit attitudes as well. Indeed, results showed that, although the highest level of sexual satisfaction was related to positive implicit and explicit attitudes, the lowest level of sexual satisfaction was associated with the combination of positive implicit and negative explicit sexual attitudes. Interestingly, expressing negative sexual attitudes both implicitly and explicitly was not associated with the lowest level of sexual satisfaction. This result is partially consistent with our predictions and with the literature on the discrepancy between implicit and explicit evaluations, suggesting that divergences between implicit and explicit attitudes can be psychologically uncomfortable and lead to negative personal and interpersonal consequences (e.g., Brihol et al., 2006). Indeed, our results showed that expressing explicit attitudes that reflect one's automatic associations, even if they are not positive, is associated with greater well-being and satisfaction than having positive implicit and negative explicit sexual attitudes. Although it is merely speculative at this point, this finding could explain why some people do not suffer from sexual dissatisfaction and/or sexual distress even

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

though they have low or absent sexual desire (e.g., Brotto, Knudson, Inskip, Rhodes, & Erskine, 2010). On the other hand, individuals with positive implicit and negative explicit sexual attitudes may be people who experience an intrinsically spontaneous and uncontrolled high level of sexual desire that is perceived as problematic and/or leads to adverse consequences and dissatisfaction (e.g., risky sexual activities, conflicts with the partner; Kafka, 2010).

Finally, sexual satisfaction was associated with implicit attitudes toward nonerotic pictures of couples, suggesting that both sexual and nonsexual aspects of couple relationships are important in relation to sexual satisfaction.

CONCLUSIONS

Our study underscored the importance of considering both implicit and explicit sexual attitudes to better understand human sexual desire and sexual satisfaction. Indeed, the results showed that these aspects of sexuality were associated with both implicit and explicit sexual attitudes, though in a distinct way. Dyadic sexual desire was related independently to both implicit and explicit sexual attitudes, suggesting that such a desire may have different underlying reasons. In contrast, sexual satisfaction seemed to result from a particular and complex combination of both implicit and explicit attitudes. In this context, our results suggested that a discrepancy between these attitudes (at least when implicit sexual attitude is positive and explicit sexual attitude is negative) may be psychologically uncomfortable and connected with sexual dissatisfaction. Interestingly, gender did not influence these relations, suggesting that dyadic sexual desire and sexual satisfaction may be underlain by similar mechanisms in men and women. These results challenge the popular vision of men and women functioning in a fundamentally different way, in particular when it comes to sexuality (as well illustrated by John Gray's best sellers *Men Are From Mars, Women Are From Venus,* published in 1993, and *Mars and Venus in the Bedroom: A Guide to Lasting Romance and Passion,* published in 1995). In contrast, solitary sexual desire was related only to implicit sexual attitudes, at least among women. The lack of relation between sexual attitudes and solitary sexual desire in men suggested that this kind of sexual desire may fulfill different functions, depending on gender.

From a clinical perspective, acting on attitudes— either explicitly or implicitly depending on which process needs to modified—could constitute an interesting strategy for sexual therapy. Indeed, research has suggested it is possible to modify both explicit and implicit sexual attitudes. For example, the cognitive restructuring of dysfunctional sexual beliefs, which are thought to represent vulnerability factors of sexual dysfunction (e.g., believing that ''the quality of the erection is what most satisfies women'' or believing that ''women who are not physically attractive can't be sexually satisfied''; Nobre & Pinto-Gouveia, 2006, p. 68), may enable one to develop more positive explicit attitudes toward sexuality. Moreover, implicit attitudes may be changed by evaluative conditioning procedures, in which a conditioned stimulus related to the attitude object (e.g., a picture depicting a sexual relationship) is repeatedly paired with an unconditioned stimulus of positive (e.g., a smiling face) or negative (e.g., an angry face) valence. Across numerous studies, it has been shown that attitude regarding the unconditioned stimulus becomes more positive when it has been paired with a positive unconditioned stimulus and more negative when it has been paired with a negative unconditioned stimulus (for a review, see Gawronski & Bodenhausen, 2006; Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). Therefore, further studies should examine how attitude modification toward sexuality may

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

improve sexual desire and sexual satisfaction.

Because only a few studies have explored the relationships between sexual attitudes (implicit and explicit) and sexual desire and satisfaction, further research should be conducted to better understand the impact of these attitudes on sexuality. In addition, some limitations of the present study should be addressed. First, our results were based on a relatively small and homogeneous sample in terms of cultural characteristics, sexual orientation, and relationship status, limiting the generalizability of the findings. Therefore, future studies should be conducted to replicate these findings in a larger and more heterogeneous sample. Second, our sample may present some bias regarding sexual attitudes, as some studies have demonstrated that volunteers for sex research hold more liberal sexual attitudes than do people who do not volunteer (e.g., Wolchik, Braver, & Jensen, 1985). Third, although sexual attitudes were measured both implicitly and explicitly, sexual desire and sexual satisfaction were assessed only by self-report questionnaires. To the best of our knowledge, there are no reliable implicit instruments designed to assess sexual desire and satisfaction. Thus, future research should develop such implicit tools. This would provide a better way of testing the predictive value of implicit versus explicit sexual attitudes related to sexual desire and sexual satisfaction. Fourth, explicit sexual attitudes were assessed by using a short questionnaire that was created for this study, as there were no validated questionnaires assessing explicit attitudes toward sexuality in general (i.e., not focused on specific sexual practices). Therefore, it seems important to develop new validated questionnaires that explicitly assess general sexual attitudes in the near future. Finally, this study was cross-sectional in nature, which prevents us from drawing any conclusions regarding causal relationships between attitudes and sexuality. Thus, future research should apply a longitudinal design to clarify the direction of the relationships noted in this study.

Funding

This research was part of the project ''Sexual Desire: An Interdisciplinary Approach,'' funded by the Maurice Chalumeau Fund from the University of Geneva, Switzerland. We thank Emilie Alexiou and Virginie Roche for their help with the data collection.

References

*Allison, P. D. (1999). Logistic regression using the SAS system: Theory and application**.** Cary, NC: SAS Institute.*

Banse, R., Seise, J., & Zerbes, N. (2001). Implicit attitudes towards homosexuality: Reliability, validity, and controllability of the IAT. Zeitschrift fur Experimentelle Psychologie, 48, 145-160. doi:10.1026//0949-3946.48.2.145

Baumeister, R. F., Catanese, K. R., & Vohs, K. D. (2001). Is there a gender difference in strength of sex drive? Theoretical views, conceptual distinctions, and a review of relevant evidence. Personality and Social Psychology Review, 5, 242-273. doi:10.1207/ S15327957PSPR0503_5

Belgrave, F. Z., Van Oss Marin, B., & Chambers, D. B. (2000). Culture, contextual, and intrapersonal predictors of risky sexual attitudes among urban African American girls in early adolescence. Cultural Diversity and Ethnic Minority Psychology, 6, 309-322. doi:10.1037/1099-9809.6.3.309

Bender, R., & Lange, S. (1999). Multiple test procedures other than Bonferroni's deserve wider use. British Medical Journal, 318, 600-604.

Bergman, M. M. (1998). A theoretical note on the differences between attitudes, opinions, and values. Swiss

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Political Science Review, 4, 81-93. doi:10.1002/j.1662-6370.1998.tb00239.x

Borges, A. L. V., & Nakamura, E. (2009). Social norms of sexual initiation among adolescents and gender relations. Revista Latino-Americana de Enfermagem, 17, 94-100. doi:10.1590/ S0104-11692009000100015

Bosson, J. K., Brown, R. P., Zeigler-Hill, V., & Swann, W. B. (2003). Self-enhancement tendencies among people with high explicit self-esteem: The moderating role of implicit self-esteem. Self and Identity, 2, 169-187. doi:10.1080/15298860309029

Brauer, M., van Leeuwen, M., Janssen, E., Newhouse, S. K., Heiman, J. R., & Laan, E. (2012). Attentional and affective processing of sexual stimuli in women with hypoactive sexual desire disorder. Archives of Sexual Behavior, 41, 891-905. doi:10.1007/ s10508-011-9820-7

Brifiol, P., Petty, R. E., & Wheeler, S. C. (2006). Discrepancies between explicit and implicit self-concepts: Consequences for information processing. Journal of Personality and Social Psychology, 91, 154. doi:10.1037/0022-3514.91.1.154

Brotto, L. A., Knudson, G., Inskip, J., Rhodes, K., & Erskine, Y. (2010). Asexuality: A mixed-methods approach. Archives of Sexual Behavior, 39, 599-618. doi:10.1007/s10508-008-9434-x

Carvalheira, A., & Leal, I. (2013). Masturbation among women: Associated factors and sexual response in a Portuguese community sample. Journal of Sex and Marital Therapy, 39, 347-367. doi:10.1080/0092623X.2011.628440

Castellanos-Torres, E., Alvarez-Dardet, C., Ruiz-Munoz, D., & Perez, G. (2013). Social determinants of sexual satisfaction in Spain considered from the gender perspective. Annals of Epidemiology, 23, 150-156. doi:10.1016/j.annepidem.2012.12.010

Chen, M., & Bargh, J. A. (1999). Consequences of automatic evaluation: Immediate behavioral predispositions to approach or avoid the stimulus. Personality and Social Psychology Bulletin, 25, 215-224. doi:10.1177/0146167299025002007

Costa, R. M. (2012). Masturbation is related to psychopathology and prostate dysfunction: Comment on Quinsey (2012). Archives of Sexual Behavior, 41, 539-540. doi:10.1007/s10508-012-9956-0

Crawford, M., & Popp, D. (2003). Sexual double standards: A review and methodological critique of two decades of research. Journal of Sex Research, 40, 13-26. doi:10.1080/ 00224490309552163

Cunningham, W. A., Zelazo, P. D., Packer, D. J., & Van Bavel, J. J. (2007). The iterative reprocessing model: A multilevel framework for attitudes and evaluation. Social Cognition, 25, 736-760. doi:10.1521/soco.2007.25.5.736

De Houwer, J. (2006). What are implicit measures and why are we using them?. In R. W. Wiers & A. W. Stacy (Eds.), The handbook of implicit cognition and addiction (pp. 11-28). Thousand Oaks, CA: SAGE.

DeLamater, J. D., & Sill, M. (2005). Sexual desire in later life. Journal of Sex Research, 42, 138-149. doi:10.1080/00224490509552267

Deutsch, R., & Strack, F. (2006). Reflective and impulsive determinants of addictive behavior. In R. W. Wiers & A. W. Stacy (Eds.), Handbook of implicit cognition and addiction (pp. 45-57). Thousand Oaks, CA: SAGE.

Devine, P. G. (1989). Stereotypes and prejudice: Their automatic and controlled components. Journal of Personality and Social Psychology, 56, 5-18. doi:10.1037/0022-3514.56.1.5

Dovidio, J. F., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). On the nature of prejudice: Automatic and controlled processes. Journal of Experimental Social Psychology, 33, 510-540. doi:10.1006/jesp.1997.1331

Feeney, J. A., Peterson, C., Gallois, C., & Terry, D. J. (2000). Attachment style as a predictor of sexual attitudes and behavior in late adolescence. Psychology and Health, 14, 1105-1122. doi:10.1080/08870440008407370

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Fisher, W. A., White, L. A., Byrne, D., & Kelley, K. (1988). Erotophobia-erotophilia as a dimension of personality. Journal of Sex Research, 25, 123-151. doi:10.1080/00224498809551448

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. Psychological Bulletin, 132, 692-731. doi:10.1037/0033-2909.132.5.692

Geer, J. H., & Robertson, G. G. (2005). Implicit attitudes in sexuality: Gender differences. Archives of Sexual Behavior, 34, 671-677. doi:10.1007/s10508-005-7923-8

Gerressu, M., Mercer, C. H., Graham, C. A., Wellings, K., & Johnson, A. M. (2008). Prevalence of masturbation and associated factors in a British national probability survey. Archives of Sexual Behavior, 37, 266-278. doi:10.1007/s10508-006-9123-6

*Girden, E. R. (1992). ANOVA: Repeated measures**.** Newbury Park, CA: SAGE.*

*Gray, J. (1993). Men Are From Mars, Women Are From Venus**.** New York, NY: HarperCollins.*

Gray, J. (1995). Mars and Venus in the Bedroom: A Guide to Lasting Romance and Passion. New York, NY: HarperCollins.

Haavio-Mannila, E., & Kontula, O. (1997). Correlates of increased sexual satisfaction. Archives of Sexual Behavior, 26, 399-419. doi:10.1023/A:1024591318836

Hald, G. M. (2006). Gender differences in pornography consumption among young heterosexual Danish adults. Archives of Sexual Behavior, 35, 577-585. doi:10.1007/s10508-006-9064-0

Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: A meta-analysis. Psychological Bulletin, 136, 390-421. doi:10.1037/a0018916

Imhoff, R., Schmidt, A. F., Bernhardt, J., Dierksmeier, A., & Banse, R. (2011). An inkblot for sexual preference: A semantic variant of the affect misattribution procedure. Cognition and Emotion, 25, 676-690. doi:10.1080/02699931.2010.508260

Jones, B. T., & McMahon, J. (1996). A comparison of positive and negative alcohol expectancy and value and their multiplicative composite as predictors of post-treatment abstinence survivorship. Addiction, 91, 89-99. doi:10.1046/j.1360-0443.1996.9118911.x

Kaestle, C. E., & Allen, K. R. (2011). The role of masturbation in healthy sexual development: Perceptions of young adults. Archives of Sexual Behavior, 40, 983-994. doi:10.1007/s10508-010-9722-0

*Kafka, M. P. (2010). Hypersexual disorder: A proposed diagnosis for DSM-**V.** Archives of Sexual Behavior, 39, 377-400. doi:10.1007/ s10508-009-9574-7*

Kaplan, H. S. (1979). Disorders of sexual desire and other new concepts and techniques in sex therapy. New York, NY: Brunner/Mazel.

Kraus, S. J. (1995). Attitudes and the prediction of behavior: A meta-analysis of the empirical literature. Personality and Social Psychology Bulletin, 21, 58-75. doi:10.1177/0146167295211007

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2008). International affective picture system (IAPS): Affective ratings of pictures and instruction manual (Technical report A-8). Gainesville: University of Florida.

Laumann, E. O., Paik, A., Glasser, D. B., Kang, J. H., Wang, T., Levinson, B., Gingell, C. (2006). A cross-national study of subjective sexual well-being among older women and men: Findings from the Global Study of Sexual Attitudes and Behaviors. Archives of Sexual Behavior, 35, 143-159. doi:10.1007/s10508- 005-9005-3

Lawrance, K.-A., & Byers, E. S. (1995). Sexual satisfaction in long-term heterosexual relationships: The

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

interpersonal exchange model of sexual satisfaction. Personal Relationships, 2, 267-285. doi:10.1111/j.1475-6811.1995.tb00092.x

LeBel, E. P., & Paunonen, S. V. (2011). Sexy but often unreliable: The impact of unreliability on the replicability of experimental findings with implicit measures. Personality and Social Psychology Bulletin, 37, 570-583. doi:10.1177/0146167211400619

Nobre, P. J., & Pinto-Gouveia, J. (2006). Dysfunctional sexual beliefs as vulnerability factors for sexual dysfunction. Journal of Sex Research, 43, 68-75. doi:10.1080/00224490609552300

Olson, M. A., & Fazio, R. H. (2004). Reducing the influence of extrapersonal associations on the Implicit Association Test: Personalizing the IAT. Journal of Personality and Social Psychology, 86, 653-667. doi:10.1037/0022-3514.86.5.653

Payne, B. K., Cheng, C. M., Govorun, O., & Stewart, B. D. (2005). An inkblot for attitudes: Affect misattribution as implicit measurement. Journal of Personality and Social Psychology, 89, 277-293. doi:10.1037/0022-3514.89.3.277

Payne, B. K., Govorun, O., & Arbuckle, N. L. (2008). Automatic attitudes and alcohol: Does implicit liking predict drinking? Cognition and Emotion, 22, 238-271. doi:10.1080/0269993070 1357394

Petersen, J. L., & Hyde, J. S. (2010). A meta-analytic review of research on gender differences in sexuality, 1993-2007. Psychological Bulletin, 136, 21-38. doi:10.1037/a0017504

Rudman, L. A. (2004). Sources of implicit attitudes. Current Directions in Psychological Science, 13, 79-82. doi:10.1111/j.0963-7214. 2004.00279.x

Schroder-Abe, M., Rudolph, A., Wiesner, A., & Schütz, A. (2007). Self-esteem discrepancies and defensive reactions to social feedback. International Journal of Psychology, 42, 174-183. doi:10.1080/00207590601068134

Snell, W. E., Fisher, T. D., & Walters, A. S. (1993). The Multidimensional Sexuality Questionnaire: An objective self-report measure of psychological tendencies associated with human sexuality. Annals of Sex Research, 6, 27-55. doi:10.1007/ BF00849744

Spector, I. P., Carey, M. P., & Steinberg, L. (1996). The Sexual Desire Inventory: Development, factor structure, and evidence of reliability. Journal of Sex and Marital Therapy, 22, 175-190. doi:10.1080/00926239608414655

Stephenson, K. R., & Meston, C. M. (2010). Differentiating components of sexual well-being in women: Are sexual satisfaction and sexual distress independent constructs? Journal of Sexual Medicine, 7, 2458-2468. doi:10.1111/j.1743-6109.2010. 01836.x

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. Personality and Social Psychology Review, 8, 220-247. doi:10.1207/s15327957pspr0803_1

Tournois, J., Mesnil, F., & Kop, J.-L. (2000). Autoduperie et heteroduperie: Un instrument de mesure de la désirabilité sociale [Auto-deception and hetero-deception: A social desirability questionnaire]. European Review of Applied Psychology, 50, 219-233.

West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.), Structural equation modeling: Concepts, issues, and applications (pp. 56-75). Thousand Oaks, CA: SAGE.

Wilson, T. D., Lindsey, S., & Schooler, T. Y. (2000). A model of dual attitudes. Psychological Review, 107, 101-126. doi:10.1037/ 0033-295X.107.1.101

Witthoft, M., Basfeld, C., Steinhoff, M., & Gerlach, A. L. (2012). Can't suppress this feeling: Automatic negative evaluations of somatosensory stimuli are related to the experience of somatic symptom distress. Emotion, 12, 640-649. doi:10.1037/ a0024924

Published in : Journal of Sex Research (2016)), vol. 53, n°2, pp. 251-264
DOI: 10.1080/00224499.2014.1003361
Status : Postprint (Author's version)

Wolchik, S. A., Braver, S. L., & Jensen, K. (1985). Volunteer bias in erotica research: Effects of intrusiveness of measure and sexual background. Archives of Sexual Behavior, 14, 93-107. doi:10.1007/ BF0154165