*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
*Status : Postprint (Author's version)*

# Psychological Factors Involved in Sexual Desire, Sexual Activity, and Sexual Satisfaction: A Multi-factorial Perspective

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**KEYWORDS:** Sexual desire and satisfaction, Motivation, Attachment, Impulsivity, Mindfulness

**ABSTRACT**

This study explored the role of psychological trait factors in sexual desire and sexual activity. In particular, it investigated how these factors may contribute to maintaining a balance between motivational aspects and self-control abilities, as both have been considered important in relation to adaptive sexuality. Moreover, the study explored the relationship between sexual desire, activity, and satisfaction. Participants completed questionnaires assessing sexual desire (dyadic, solitary), sexual activity (with a partner, alone), sexual satisfaction, approach and avoidance motivation, attachment, self-control, sensation seeking, and mindfulness. Cluster analyses, based on participants' level of sexual desire and sexual activity, highlighted three distinct profiles for each gender related to different types of psychological functioning: (a) participants with high dyadic sexual desire and activity were the most sexually satisfied, showed optimal psychological functioning, and were characterized by a balance between motivational tendencies to seek positive rewards and self-control abilities (high approach motivation, secure attachment, high self-control, high mindfulness); (b) participants with high dyadic and solitary sexual desire and activity were moderately satisfied and showed a type of psychological functioning predominantly characterized by impulsivity (an overly high motivation to obtain rewards in women, and low self-control in men); (c) participants with low dyadic sexual desire and activity were the least sexually satisfied and were characterized by high motivation to avoid negative consequences and low self-control (high avoidance motivation, insecure attachment, and poor mindfulness). These results shed further light on how fundamental psychological factors contribute to explain the individual variability in sexual desire, activity, and satisfaction.

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# Introduction

Although sexual desire, sexual activity, and sexual satisfaction are very important aspects of human life, scientific interest in their functioning is relatively recent and many questions still remain unanswered. In particular, the links between these sexual aspects are yet unclear. Moreover, although psychological factors have shown to play an important role in sexuality (e.g., Carvalho & Nobre, 2011), few studies have actually attempted to understand the individual variability in sexual desire, sexual activity, and sexual satisfaction in relation to a more global psychological functioning. The present study aimed to explore individual variability in sexual desire and sexual activity in relation to some fundamental psychological factors that are stable traits and that have been shown to play an important role in many aspects of human functioning. Furthermore, it aimed to explore the relationship between sexual desire, activity, and satisfaction.

## SEXUAL DESIRE, SEXUAL ACTIVITY, AND SEXUAL SATISFACTION

It is generally assumed that sexual desire, defined as "the sum of the forces that lean us toward and push us away from sexual behavior" (Levine, 2003, p. 280), is multi-determined, as it depends on biological, psychological, relational, contextual, and sociological factors (see Carvalho & Nobre, 2010 for a review). Although the relative contributions of these factors have not been determined yet, recent research has suggested that psychological factors play a central role in sexual desire (e.g., Carvalho & Nobre, 2011). Besides, psychological research has shown links between emotional disorders, such as depression, anxiety, and obsessive-compulsive disorder, and sexual desire. In this context, while most men and women report a decrease in sexual desire associated with these psychopathological states (e.g., Kennedy, Dickens, Eisfeld, & Bagby, 1999; Van Minnen & Kampman, 2000), a minority report higher sexual interest (e.g., Bancroft et al., 2003; Michael & O'Keane, 2000). Moreover, some studies have shown that emotional disorders may be associated with an increase in "solitary sexual desire" (i.e., the desire to masturbate) and a decrease in "dyadic sexual desire" (i.e., the desire to engage in sexual activities with a partner; Frohlich & Meston, 2002; Spector, Carey, & Steinberg, 1996). Together, these findings suggest that different underlying psychological factors are involved in the individual variability in sexual desire (conceptualized, according to a dimensional approach, as a continuum from very low or absent to very high levels of sexual desire; Heaven et al., 2003; Miri, Ali Besharat, Asadi, & Shahyad, 2011).

Another important aspect of sexuality is the frequency of sexual activities (masturbation and sexual activity with a partner). While sexual activity with a partner has consistently been found to be related to greater sexual satisfaction, better health, and better sexual function (e.g., Brody & Costa, 2009; Costa, 2012), the results concerning masturbation have been more contradictory, suggesting that dyadic and solitary sexuality may be related to different sexual and psychological functioning patterns. Indeed, masturbation has been associated—mainly among men—with less sexual activity with a partner, less sexual and relationship satisfaction, higher sexual dysfunction, and lower satisfaction with mental health and life in general (Costa, 2012; Gerressu, Mercer, Graham, Wellings, & Johnson, 2008). On the other hand, masturbation has also been associated—particularly among women—with more frequent sexual activity, greater sexual satisfaction, higher self-esteem, and better sexual

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health (Carvalheira & Leal, 2012; Kaestle & Allen, 2011). Concerning the link between sexual activity and sexual desire, it has been shown that these two aspects are not necessarily correlated (Beck, Bozman, & Qualtrough, 1991). In fact, people can have sexual relationships without experiencing sexual desire. Conversely, one may desire sexual activity with a partner without having the possibility of satisfying it, because of the unavailability of the partner, a sexual dysfunction, or a discrepancy of desire between the two persons.

Sexual satisfaction, defined as the subjective evaluation of the aspects of one's sexual relationship and the affective response subsequent to this evaluation (Lawrance & Byers, 1992), has been associated with a number of variables, such as general life satisfaction and satisfaction with interpersonal relationships, psychological well-being, physical health, high education, sexual assertiveness, and openness to different sexual experiences, as well as considering sexuality important in life (e.g., Apt, Hurlbert, Pierce, & White, 1996; Haavio-Mannila & Kontula, 1997; Laumann et al., 2006). Moreover, studies have reported a negative association between sexual satisfaction and several emotional disorders, such as depression (Peleg-Sagy & Shahar, 2012), social anxiety (Kashdan et al., 2011) and alexithymia (Scimeca et al., 2013).

Sexual satisfaction has been conceptualized mainly in an inter-personal context (e.g., Lawrance & Byers, 1992), and there are still few theoretical frameworks for factors that contribute to explaining the variability of sexual satisfaction at the individual level. It is conceivable that both sexual desire and sexual activity may be related to the level of sexual satisfaction. For instance, Santtila et al. (2008) conceptualized sexual satisfaction as meaning that there is no discrepancy between sexual desire and sexual activity, suggesting that one may have low sexual desire and still be sexually satisfied, if one's sexual activity is in accordance with what one expects and desires. However, it is also possible that the relationship between sexual satisfaction, sexual desire and sexual activity depends on a particular kind of psychological functioning. Indeed, sexual satisfaction may well depend on the ability to feel sexual desire and to fulfill it (through sexual activity) in a way that is appropriate and that leads to positive long-term consequences. Psychologically, this may depend on a balance between, on the one hand, a propensity to abandon oneself to one's own arousal and impulses and, on the other hand, an ability to control sexual impulses, arousal and interfering thoughts in order to better adapt to the context and/or the partner, inhibit irrelevant stimuli, and avoid negative consequences.

## A DUAL-SYSTEM MODEL TO EXPLORE SEXUAL DESIRE, SEXUAL ACTIVITY, AND SEXUAL SATISFACTION

Several different dual-system models (e.g., Bancroft & Janssen, 2000; Gray, 1982; Strack & Deutsch, 2004) develop the idea that health behavior may be characterized by a certain balance between two separate though interacting systems that may, in some circumstances, be associated to opposite tendencies. For instance, according to the Dual Control Model (DCM; Bancroft & Janssen, 2000) individual variability in sexual responsiveness depends on the existence of two independent neurophysiological systems, the *sexual excitatory* and *sexual inhibitory* systems, which are both important for an adaptive, unproblematic sexuality. An overly high propensity for sexual excitation is more likely to lead to risky or problematic sexual behaviors, while an overly high propensity for sexual inhibition may lead to difficulties responding sexually (e.g., low sexual desire, sexual dysfunction).

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Based more specifically on psychological mechanisms, Friese, Hofmann, and Wiers (2011)—who applicate the Reflective-Impulsive Model of Strack and Deutsch (2004) to health behaviors—suggest that many of those behaviors are characterized by two separate, though interacting, systems. On the one hand, motivational (automatic) aspects generate impulses and urges that seek either instant gratification (e.g., the sight of a chocolate cake may lead a person to enter a bakery and buy a slice of cake) or immediate avoidance of negative cues (e.g., being continually jostled could cause one to become aggressive to the annoying person). On the other hand, self-control abilities allow people to regulate such automatic processes (e.g., avoid cakes if one wants to cut calories; stay calm if the annoying person is another passenger in a full subway car). According to this dual-system model, satisfying sexuality may depend on both motivational tendencies to seek sexual rewards and good self-control abilities. In contrast, poor self-control may lead one to behave in away that corresponds to one's own motivational tendencies, even if such behavior is risky, inappropriate, or could have negative consequences. Thus, a person with strong motivational tendencies to seek sexual rewards and poor self-control may desire and engage in sexual activity even if it is inappropriate (e.g., risky sexual activity). This inappropriate sexual behavior might result in negative emotions (e.g., worries or regrets) that would negatively influence sexual satisfaction. Conversely, a person with strong motivational tendencies to avoid negative consequences related to sexuality (e.g., feeling sexually incompetent) and poor self-control may be unable to disengage from negative thoughts and/or emotions and thus be incapable of feeling sexual desire or pleasure, which would eventually lead the person to feel sexually dissatisfied.

In the present study, we will explore some fundamental psychological factors that are stable traits and that are related to those two systems: (a) approach and avoidance motivations, attachment, and sensation seeking, which are related to motivational aspects; and (b) self-control and mindfulness, which are related to self-control abilities. The investigation of such fundamental psychological factors will enable us to better understand both the individual variability in sexual desire, sexual activity, and sexual satisfaction, as well as the relationship between sexual and psychological functioning.

## APPROACH AND AVOIDANCE MOTIVATIONS

According to Elliot (2006, 2008), approach and avoidance motivations reflect basic, rudimentary aspects of psychological functioning and play a fundamental role in personality. Approach motivation is defined as sensitivity to positive stimuli (real or imagined) and the activation of behavior to move toward those stimuli (e.g., reward cues, signals of safety). It is related to positive affect (Elliot & Thrash, 2002). Indeed, individuals with a higher approach motivation seem to experience more enthusiasm, interest, and relief. Avoidance motivation is defined as sensitivity to negative stimuli (e.g., threat cues, punishment) and the activation of behavior to move away or escape from those stimuli. It has been related to a variety of negative emotions (e.g., anxiety, anger, disgust). Approach and avoidance motivations have generally been considered to be independent of each other (e.g., Gray, 1982). However, more recently, some authors (e.g., Corr, 2001) suggested that these motivations might be interdependent, with reciprocal inhibitory influences. Approach motivation, for example, is assumed to both facilitate approach tendencies and have antagonist effects on avoidance tendencies. In contrast, avoidance motivation facilitates avoidance tendency and has

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antagonist effects on one's approach. The effects of such motivations on behaviors and emotions should thus be considered jointly.

Although specifically sexual motivations have been examined in relation to sexual desire and satisfaction (e.g., Impett, Strachman, Finkel, & Gable, 2008; Muise, Impett, & Desmarais, 2013), to the best of our knowledge, only one study (Aluja, 2004) has explored the links between sexuality and general motivational tendencies. In particular, it was found that, in 325 women from the general population, those who were more sensitive to reward (analogous to approach motivation) reported more frequent sexual experiences, excitability, and sexual satisfaction than women who were less sensitive to reward. In addition, women with higher sensitivity to punishment (analogous to avoidance motivation) were characterized by more sexual anxiety. Thus, it appears that the general propensity to approach and avoidance may play a role in sexual satisfaction, sexual desire, and sexual activity.

**ATTACHMENT**

Attachment is defined as an innate, adaptive motivational system that maintains proximity between infants and their caregivers under conditions of threat and progressively enables the infants to form mental representations (internal working models) of the self and others that tend to be stable and influence later relationships, such as romantic relationships (i.e., adult attachment; Ainsworth, 1989; Bowlby, 1977, 1983). Adult attachment is organized around two underlying dimensions (Brennan, Clark, &Shaver, 1998): (a) avoidance, which reflects a tendency to distrust others' goodwill, fear intimacy, and maintain emotional distance from significant others (e.g., the partner); and (b) anxiety, which reflects a tendency to fear that the significant other is not available or supportive in times of need and to fear rejection and abandonment. Persons who are low on both these dimensions exhibit secure attachment and are characterized by lower levels of distress and higher self-esteem, optimism, and self-efficacy (Mikulincer, Florian, Cowan, & Cowan, 2002). It is noteworthy that attachment is related to approach and avoidance motivations; secure attachment promotes exploration and reward seeking, whereas insecure attachment leads to protection and avoidance (Elliot, 2008).

It has been argued that attachment influences how sexual interactions are experienced. Individuals with high levels of anxiety and/or avoidance have less satisfying sexual experiences and more sexual dysfunctions than securely attached individuals. Moreover, avoidant attachment has been associated, with lower frequency of intercourse, with more uncommitted sexual relations, and with engaging in sexual activity to avoid negative consequences, such as conflicts with the partner (Beaulieu-Pelletier, Philippe, Lecours, & Couture, 2011; Impett, Gordon, & Strachman, 2008). Finally, anxious attachment has been related to higher rates of sexual intercourse, especially among women, probably in order to establish closeness and reduce insecurities (see Stefanou & McCabe, 2012 for a review).

**SELF-CONTROL**

Self-control can be defined as the ability to regulate one's thoughts, emotions, impulses, and behaviors (Baumeister, Heatherton, & Tice, 1994). Difficulties with self-control are manifested in cognitive distractibility, emotional instability, and behavior that is unduly risky or inappropriate to the situation and often results in undesirable outcomes (e.g., Evenden, 1999). Those difficulties are typical of individuals who show a high level of impulsivity. An

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influential conception of impulsivity is Whiteside and Lynam's (2001) model, which defines four different dimensions, each of which has been further related to specific psychological processes (Bechara & Van der Linden, 2005; Billieux, Gay, Rochat, & Van der Linden, 2010; Gay, Rochat, Billieux, d'Acremont, & Van der Linden, 2008): (a) urgency, defined as the tendency to experience strong reactions in response to strong negative or positive affects (Cyders et al., 2007); (b) lack of premeditation, defined as difficulty taking into account the consequences of an act before engaging in it; (c) lack of perseverance, defined as difficulty remaining focused on a task that may be boring and/or difficult; and (d) sensation seeking, defined as the tendency to enjoy and pursue activities that are exciting and to be open to new experiences. Because sensation seeking has been related to motivational processes, such as hypersensitivity to reward (Van der Linden, Rochat, & Billieux, 2006), whereas the other dimensions of impulsivity have been related to self-control (executive and decision-making processes; Gay et al., 2008), we will analyze them separately.

Impulsivity has been associated with more frequent sexual activity (e.g., Bancroft et al., 2004), sexual aggression (Carvalho & Nobre, 2013), and risky sexual practices such as having unprotected intercourse (e.g., Zapolski, Cyders, & Smith, 2009). Moreover, difficulties controlling sexual urges (low sexual self-control) have been related to higher rates of sexual infidelity (Gailliot & Baumeister, 2007). However, no study, to our knowledge, has investigated general impulsivity in relation to sexual desire and sexual satisfaction. Thus, a satisfying sexual life may be characterized by a certain capacity to control one's own sexual desire and impulses to suit the context and the partner's desire, as well as an ability to inhibit intrusive thoughts during sexual activity.

**MINDFULNESS**

Mindfulness has been defined as paying particular attention "on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1990, p. 4). The development of greater mindfulness has been found to be related to increased subjective well-being, reduced psychological symptoms and emotional reactivity, and improved behavioral regulation (Keng, Smoski, & Robins, 2011). In the area of sexuality, it has been noted that a brief mindfulness-based intervention can have a significant positive effect on sexual desire, subjective arousal, lubrication, orgasm, sexual satisfaction, and sexual distress among women with sexual problems (e.g., Brotto, Basson, & Luria, 2008; Brotto & Heiman, 2007). However, the practice of mindfulness was shown to depend on several different skills (e.g., observing, describing, acting with awareness, acceptance, non-judging of inner experience, non-reactivity to inner experience; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), and it seems essential to clarify which particular ones are beneficial for sexuality. Brown and Ryan (2003) considered "attention to and awareness of what is occurring in the present" (p. 824) as a central aspect of mindfulness, unlike non-reactivity, non-judgment, or acceptance, which might be outcomes of practicing mindfulness (see Jermann et al., 2009 for a review). Moreover, a recent study (Adam, Heeren, Day, & de Sutter, 2014) has shown significant negative links between a sexual mindfulness scale and sexual distress among women. In particular, the study revealed that the facets *describing* (e.g.,"I easily feel my emotions during sexual intercourse") and *acting with awareness* (e.g., "I usually feel quite available and present during sexual intercourse") were significantly more related to the absence of sexual distress than the other facets of the scale (observing, non-judging of inner experience and

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non-reactivity to inner experience). Therefore, in our study, we will focus more precisely on the effect of the tendency to be attentive and aware of present-moment experiences in daily life in relation to sexual desire, activity, and satisfaction among both men and women.

## GENDER DIFFERENCES IN SEXUAL DESIRE, SEXUAL ACTIVITY, AND SEXUAL SATISFACTION

In addition to the psychological factors described above, we will also investigate the role of *gender* in relation to sexual desire, sexual activity, and sexual satisfaction. Gender differences have been found in a wide array of studies of sexuality (Oliver & Hyde, 1993). It has been shown that men report experiencing sexual desire, sexual fantasies, and intrusive (unwanted) thoughts of sex more frequently than women. They also engage in masturbation and other sexual activities more frequently and are more prone to initiate sex than women (Baumeister, Catanese, & Vohs, 2001; Beck et al., 1991; Donahey & Carroll, 1993). Gender differences regarding sexuality have been supposed to be due to both biological (e.g., hormones) and sociocultural (e.g., socialization) influences (Baumeister et al., 2001; Oliver & Hyde, 1993). Nevertheless, it is noteworthy that considerable individual variability exists regarding the intensity and/or frequency of sexual desire, sexual activity, and sexual satisfaction among both men and women. Indeed, the sexual functioning of some women seems much closer to the level generally described in men (i.e., "highly sexual" women; Wentland, Herold, Desmarais, & Milhausen, 2009), while some men show very low levels of sexual desire (Brotto, 2010).

## OBJECTIVES OF THE STUDY

The present study has two main goals. First, it aims to understand how patterns of sexual desire and sexual activity relate to different levels of sexual satisfaction. Second, it seeks to understand the individual variability of sexual desire and sexual activity in men and women by exploring several fundamental psychological trait factors that are related to motivational tendencies and self-control abilities. Based on the assumption of the DCM, in which high sexual satisfaction is associated with a balance between the excitatory and inhibitory systems, as well as the model of Friese et al. (2011) that postulates the influence of both impulsive (motivational) processes and self-control abilities in health behavior, we assumed that (a) achieving and maintaining a satisfying sexual life may be related to moderate levels of both sexual desire and sexual activity resulting from a balance between the motivational tendency (moderately high approach motivation and moderately low avoidance motivation, secure attachment, moderate sensation seeking) and the ability to self-control those motivations when necessary (i.e., high self-control and high mindfulness). Conversely, (b) having poor self-control abilities (i.e., low self-control and low mindfulness) and high motivation toward positive rewards (i.e., high approach motivation and high sensation seeking) would be related to greater sexual desire and sexual activity but lower sexual satisfaction (as the desire to have sexual activity is strong, regardless of the context and/or the partner's desire). Finally, (c) having poor self-control abilities associated with high motivation to avoid threatening cues (i.e., high avoidance motivation, high avoidant attachment) would be related to lower sexual desire and activity, as well as lower sexual satisfaction (as sexual activity is related to negative emotions). In order to investigate these hypotheses, we examined different profiles in men and women according to their levels of sexual desire and sexual activity. Then, we explored how these profiles differed with respect

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to sexual satisfaction and the psychological factors presented above. Given that, to our knowledge, no previous study had focused on the combination of those particular psychological factors, the character of our research is, above all else, exploratory.

# Method

### PARTICIPANTS

Six hundred participants (300 men and 300 women), selected from the general population living in Geneva (Switzerland), were recruited by investigators from an economic and social research institute (M.I.S. TREND) as part of a large psycho-sociological survey of sexuality financed by the "Fonds Universitaire Maurice Chalumeau, "Geneva. To obtain this sample, 10,000 contacts were randomly selected from a list of addresses of households in Geneva. People were first contacted by mail. The subject and aim of the study were briefly introduced. Afterward, people were contacted by phone to determine whether they met the criteria for this study (i.e., being aged from 25 to 46 years and being native or fluent French speakers) and whether they were eligible according to predefined quotas (so that the final sample was composed of 50 % men, 50 % women with comparable ages). Among the people who were successfully contacted ($N$ = 7,344) and met the defined criteria ($N$ = 3,821), 1,893 refused to participate and 1,121 fell outside the quotas; 867 people agreed to participate in the study and 600 individuals actually did participate, which represented 22 % of the population that was contacted and met the criteria and quotas for the study. Participants received 20 Swiss francs in compensation for their participation.

For the current study, in order to have a more homogeneous sample, we selected a subsample made up of heterosexual participants who were in a couple and had been living with their partner for at least 1 year. We chose this lower limit of relationship duration because some data have suggested that sexual desire, particularly among women, declines with the length of a relationship (specifically, after 1 year of dating; Klusmann, 2002). From this subsample, seven subjects were excluded because of missing values. The final sample is composed of 359 individuals (178 men and 181 women) aged from 25 to 46 years ($M$ = 36.7, SD = 5.3). The mean duration of the couples'relationship was 11.28 years (SD = 6.11, range, 1-29 years), and the mean duration of cohabitation was 9.81 years (SD = 6.03, range 1-25 years). In addition, 78.8 % of participants were married and 76.6 % had one or more children.

### MEASURES

### SEXUAL DESIRE

The Sexual Desire Inventory (SDI; Spector et al., 1996) consists of 14 items assessing two separate, yet related, dimensions: (a) dyadic sexual desire (i.e., 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 [i.e., the desire to engage in sexual behavior by oneself; e.g., "During the last month, how often would you have liked to behave sexually by yourself (for example, masturbating, touching your genitals, etc.)?"]. Participants were asked to rate each item on Likert scales, depending 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:

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(a) dyadic sexual desire, corresponding to the sum of items 1-8 (total score ranging between 0 and 62) and (b) solitary sexual desire, corresponding to the sum of items 10-12 (total score ranging between 0 and 23). For each dimension, higher scores indicate a higher level of desire. The original questionnaire was translated into French using a back-translation procedure. In its original version, the SDI was shown to have strong internal consistency, in both the dyadic (Cronbach's alpha = .86) and solitary (Cronbach's alpha = .96) dimensions (Spector et al., 1996). 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 = .79).

**SEXUAL SATISFACTION**

The Multidimensional Sexuality Questionnaire (MSQ; Snell, Fisher, & Walters, 1993) consists of 60 items assessing 12 aspects of sexuality, each composed of five items (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, 5 = very characteristic of me*). For the purpose of our study, we selected the subscale related to sexual satisfaction (i.e., 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 for the SDI. In its original version, the MSQ showed 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).

**FREQUENCY OF SEXUAL ACTIVITIES**

Two items evaluating the frequency of sexual activities were created for the purpose of this study. Participants were asked to rate the frequency with which they had sexual activities (with a partner: "How often do you have intercourse or other sexual activity with a partner?" and on their own: "How often do you masturbate?"), using a 9-point rating scale (1 = *more than once a day* to 9 = never). For the analyses, scores were reversed so that a higher score indicates more frequent sexual activity. Two scores were examined separately: (a) frequency of sexual activity with a partner and (b) frequency of masturbation.

**ADULT ATTACHMENT**

The Revised Experiences in Close Relationships Questionnaire (ECR-R; Fraley, Waller, & Brennan, 2000; French version: Favez & Cairo, 2012) consists of 36 items that assess two dimensions of adult romantic attachment: (a) anxiety (i.e., fear of rejection and abandonment; e.g., "I'm afraid that I will lose my partner' s love") and (b) avoidance (i.e., discomfort with closeness and depending on others; e.g., "I find it difficult to allow myself to depend on romantic partners"). Participants were asked to rate each item using 7-point rating scales (1 = *disagree strongly* to 7 = *agree strongly*). Two total scores (anxiety and avoidance) were assessed by calculating the mean of scores for each item. A high score on the anxiety dimension indicates anxious attachment, while a high score on the avoidance dimension is

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related to avoidant attachment. Low scores on both dimensions indicate secure attachment. Validation studies highlighted the high internal reliability (Cronbach's alpha for anxiety and avoidance = .95 and .93, respectively) and test-retest stability (test-retest coefficients for a 3-week period for anxiety and avoidance *r* = .90 and .92, respectively) of the original English version (Sibley, Fischer, & Liu, 2005; Sibley & Liu, 2004). In the current study, the internal reliability of the ECR-R was good, in both the anxiety (Cronbach's alpha = .86) and avoidance dimensions (Cronbach's alpha = .89).

**APPROACH AND AVOIDANCE MOTIVATION**

The Approach-Avoidance Temperament Questionnaire (ATQ; Elliot & Thrash, 2010) consists of 12 items assessing two factors: (a) approach motivational tendencies, assessed by six items (e.g., "Thinking about the things I want really energizes me"), and (b) avoidance motivational tendencies, also assessed by six items (e.g., "I react very strongly to bad experiences"). Participants were asked to rate the extent to which they agreed with each statement, using 7-point rating scales (1 = *strongly disagree* to 7 = *strongly agree*). Two total scores were calculated: one related to approach motivation, the other to avoidance motivation. Both scores range from 6 to 42. Higher scores indicate a higher level of motivation. The questionnaire was translated into French, using the same procedure described above. In six studies, the original version of the ATQ showed acceptable to good internal consistency (Cronbach's alpha of the approach dimension = .74-.86; Cronbach's alpha of the avoidance dimension = .79-.87) and good test-retest stability over a 9-week period (approach dimension's test-retest *r* = .70; avoidance dimension's test-retest *r* = .85; Elliot & Thrash, 2010). In the current study, the internal reliability of the ATQ was acceptable, in both its approach (Cronbach's alpha = .70) and avoidance (Cronbach's alpha = .75) dimensions.

**MINDFULNESS**

The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003; French version: Jermann et al., 2009) consists of 15 items that assess a single factor representing the dispositional tendency to be attentive and aware of present-moment experiences in daily life as opposed to acting automatically (e.g., "I rush through activities without being really attentive to them"). Participants were asked to rate how frequently they experienced the situation described in each item, using 6-point rating scales (1 = *almost always* to 6 = *almost never*). A total score was calculated, ranging from 15 to 90. Higher scores indicate a greater ability to be mindful. A validation study demonstrated the high internal consistency of the French version of the MAAS (Cronbach's alpha = .84; Jermann et al., 2009). In the current study, the internal reliability of the MAAS was equally good (Cronbach's alpha = .84).

**IMPULSIVITY**

The Urgency-Premeditation-Perseverance-Sensation Seeking Positive Urgency Impulsive Behavior Scale (UPPS-P; Billieux et al., 2012) consists of 20 items assessing the propensity to impulsivity. The UPPS comprises five subscales of four items each corresponding to the separate, yet related, facets of impulsivity identified by Whiteside and Lynam (2001) and Cyders et al. (2007): (a) negative urgency (e.g., "When I feel rejected, I will often say things I later regret"), (b) positive urgency (e.g., "When I am really excited, I tend not to think of the consequences of my actions"), (c) (lack of) premeditation (e.g., "I usually make up my mind

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
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through careful reasoning"), (d) (lack of) perseverance (e.g., "Once I start a project, I almost always finish it"), and (e) sensation seeking (e.g., "I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional"). Participants were asked to rate each item, using 4-point rating scales (1 = *I agree strongly* to 4 = *I disagree strongly*). In the present study, we considered positive and negative urgency jointly, as some validation studies have revealed that those two facets of impulsivity represent a higher-order construct of general urgency (Billieux et al.,2012). Therefore, four total scores were calculated (i.e., urgency, lack of premeditation, lack of perseverance, sensation seeking). For each facet, scores range from 4 to 16, with higher scores indicating a higher level of impulsivity. In the present study, internal consistency was good for the four facets of impulsivity, namely urgency (Cronbach's alpha = .82), lack of premeditation (Cronbach's alpha = .83), lack of perseverance (Cronbach's alpha = .85), and sensation seeking (Cronbach's alpha = .84), as in the original French version, which also emphasized the strong test-retest stability of the UPPS-P (test-retest correlations over a 2-week period ranged from .84 to .92; Billieux et al., 2012).

## SOCIODEMOGRAPHIC DATA

The sociodemographic questionnaire included questions about gender, age, the duration of the couple's relationship, the duration of cohabitation with the partner, having children or not, the highest level of education achieved, profession, the importance of religion, and physical and psychological health. Participants were also asked about the age of first sexual intercourse and the number of sexual partners.

In addition, other questionnaires were administered to participants to assess the extent and characteristics of their social and interpersonal networks, satisfaction with their romantic relationship, self-esteem, sexual attitudes, and sexual practices. Data from these questionnaires are not relevant to this study and will be discussed in the context of one or more other studies.

## PROCEDURE

Participants were contacted first by mail and then by phone by investigators from M.I.S. TREND and were informed of the duration, content and compensation of the study. Participants were assessed individually at their homes. They signed an informed consent form before completing the battery of questionnaires described above. With the exception of the sociodemographic questionnaire, which was administered by the investigators, all other questionnaires were self-administered. Scales were presented in the same order on a laptop. Participants were debriefed at the end of the study. Answering all the questionnaires required approximately 1 h. This study was approved by the Ethics Committee of the Faculty of Psychology at the University of Geneva.

## STATISTICAL ANALYSES

Statistical analyses were performed using SPSS 19. In order to explore individual variability in sexuality, we computed cluster analyses (CA), which make it possible to identify specific profiles (clusters) based on sexual desire and sexual activity. Compared to more traditional linear models (such as regressions), cluster techniques emphasize the diversity among individuals (Rapkin & Luke, 1993) and enable one to take complex, nonlinear interactions into account, thereby providing more ecological validity. In fact, linear models may omit

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relationships that are significant for some (but not all) individuals (von Eye & Bogat, 2006). Given the gender differences found in previous studies, CA were run separately for men and women. Before computing the CA, all variables were standardized so that their impact on the distance between and within clusters was not influenced by the measurement scales. We first performed a hierarchical CA using Ward's method and applying squared Euclidean Distance, to explore the possible number of clusters in our data. Once this number was defined by the analysis of dendrogram and agglomeration coefficients, we computed an analysis using the k-means clustering method, which permits one to maximize the similarity of cases within each cluster and also the dissimilarity between the clusters that have been defined. Then, we compared the identified clusters in terms of motivations, attachment, and self-control, with mixed-design analyses of variance (ANO-VAs) (with clusters as between-subjects factors and motivation, attachment, self-control and mindfulness as within-subjects variables) in order to jointly take into account the different dimensions of a single construct. Univariate ANOVAs were computed for sexual satisfaction, mindfulness, and sensation seeking. When the homogeneity of variance assumption was not met, we reported Welch's *F* (Field, 2009). When an ANOVA revealed a significant effect, post hoc tests were computed and Bonferroni's correction was used to guarantee control over the Type I error rate (SPSS produces a new *p* value after the application of the Bonferroni's correction and the significance cutoff of .05 is considered after this correction).

# Results

### PRELIMINARY ANALYSES

Mean scores, SDs, minimum-maximum scores, skewness, and kurtosis values for the psychological and sexual scales 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.

### EXPLORATION OF DIFFERENT PROFILES BASED ON SEXUAL DESIRE AND SEXUAL ACTIVITY

CA were computed on dyadic sexual desire, solitary sexual desire, frequency of sexual activity with a partner, and frequency of masturbation separately for men and women (on 178 cases for men and 181 cases for women). The results of these analyses are presented in **Figs. 1** and **2**. Among men (see **Fig. 1**), the first cluster, composed of 37 participants, was predominantly characterized by high scores for dyadic sexual desire (*M* = 51.73, SD = 7.83) and sexual activity with a partner (*M* = 6.38, SD = 1.25), and low scores for solitary sexual desire (*M* = 6.62, SD = 3.33) and masturbation (*M* = 1.97, SD = 0.99). We called this group "dyadic men." The second cluster, composed of 79 men, was characterized by high scores for all four sexual measures and was therefore named "dyadic and solitary men" (dyadic sexual desire: *M* = 55.04, SD = 6.41; sexual activity with a partner: *M* = 5.85, SD = 1.03; solitary sexual desire: *M* = 17.92, SD = 3.21; masturbation: *M* = 6.00, SD = 1.15). Finally, the third cluster was made up of 62 men and was characterized by a rather low level of dyadic sexual desire (*M* = 46.15, SD = 6.40), low frequency of sexual activity with a partner (*M* = 3.66, SD = 1.13), by high levels of solitary sexual desire (*M* = 14.74, SD = 4.14), and masturbation (*M* = 5.24, SD = 1.50). We called these participants "solitary men."

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
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***Table 1.*** *Mean scores, standard deviations, observed range, skewness, kurtosis, and Cronbach's alphas of sexuality- and psychological factor-related measures*

| | *M* (SD) | Min-max | Skewness | Kurtosis | α |
|---|---|---|---|---|---|
| Sexuality-related measures | | | | | |
| Sexual desire (SDI) | | | | | |
| Dyadic sexual desire | 47.78 (9.44) | 3-62 | −.675 | 1.273 | .79 |
| Solitary sexual desire | 11.87 (6.23) | 0-23 | −.026 | −1.175 | .90 |
| Sexual satisfaction (MSQ) | 16.50(5.38) | 5-25 | −.484 | −.675 | .91 |
| Frequency of sexual activity | | | | | |
| Masturbation | 3.84 (2.21) | 1-8 | .120 | −1.290 | |
| Sexual activity with a partner | 5.33 (1.63) | 1-9 | −.354 | −.045 | |
| Psychological factors | | | | | |
| Approach and avoidance motivation (ATQ) | | | | | |
| Approach motivation | 32.49 (5.30) | 15-42 | −.511 | .374 | .70 |
| Avoidance motivation | 22.03 (6.83) | 6-40 | .209 | −.410 | .75 |
| Attachment in close relationship (ECR-R) | | | | | |
| Avoidant attachment | 2.38 (0.92) | 1-6.33 | .791 | .680 | .89 |
| Anxious attachment | 2.90 (0.97) | 1-5.56 | .120 | −.363 | .86 |
| Impulsivity (UPPS-P) | | | | | |
| Urgency | 9.60 (2.12) | 4.5-16 | .279 | .331 | .82 |
| Lack of premeditation | 7.48 (2.24) | 4-16 | .396 | .082 | .83 |
| Lack of perseverance | 6.70 (2.20) | 4-15 | .682 | .463 | .85 |
| Sensation seeking | 10.27 (2.59) | 4-16 | .067 | −.288 | .80 |
| Mindfulness (MAAS) | 64.4 (10.48) | 32-89 | −.256 | .024 | .84 |

*N = 359*

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*SDI Sexual Desire Inventory, MSQ Multidimensional Sexuality Questionnaire, ATQ Approach-Avoidance Temperament Questionnaire, ECR-R Revised Experiences in Close Relationships Questionnaire, UPPS-P Impulsive Behavior Scale, MAAS Mindful Attention Awareness Scale*

A multivariate analysis of variance (MANOVA) was computed to assess whether the three clusters of men differed with respect to age, the length of the couple's relationship, the length of cohabitation with the partner, and the number of children living at home. The results revealed no significant effects of the three profiles of men on those sociodemographic variables, $F(8, 252) = 1.54$, $p = .143$. A univariate ANOVA conducted on sexual satisfaction revealed a significant effect, Welch's $F(2, 104.61) = 34.83$, $p < .001$. Post hoc tests showed that "dyadic men" presented higher scores for sexual satisfaction ($M = 20.11$, SD = 3.17) than either "solitary men" ($M = 13.52$, SD = 4.65; $p < .001$) or "dyadic and solitary men" ($M = 17.06$, SD = 4.39; $p = .001$). Moreover, "dyadic and solitary men" exhibited a higher level of sexual satisfaction than "solitary men" ($p < .001$).

***Figure 1.*** *Men's profiles obtained with k-means clustering performed on the z-scores related to the two dimensions of sexual desire (dyadic and solitary), the frequency of sexual activity with a partner and the frequency of masturbation*

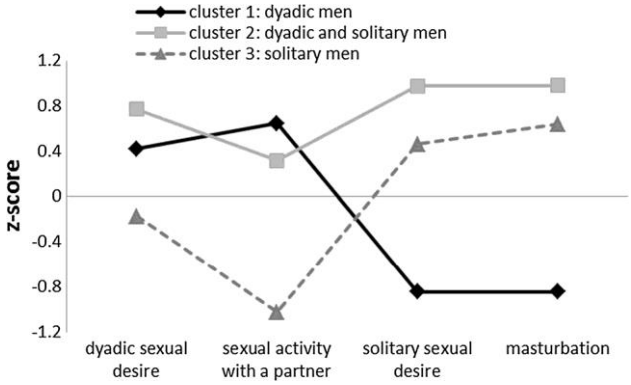
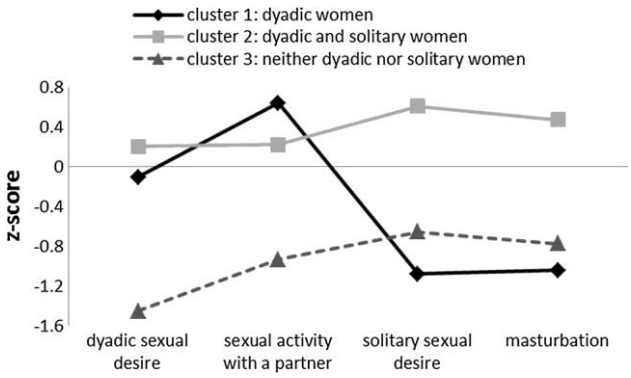



***Figure 2,*** *Women's profiles obtained with k-means clustering performed on the z-scores related to the two dimensions of sexual desire (dyadic and solitary), the frequency of sexual activity with a partner and the frequency of masturbation*



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Among women (see **Fig. 2**), the first cluster, made up of 73 participants, was characterized by moderate scores for dyadic sexual desire ($M$ = 46.75, SD = 7.39), high scores for sexual activity with a partner ($M$ = 6.37, SD = 1.09), and low scores for solitary sexual desire ($M$ = 5.15, SD = 2.77) and masturbation ($M$ = 1.53, SD = 0.97). We called this group "dyadic women." The second cluster, composed of 60 women, was characterized by moderate to high levels on all four sexual measures and was therefore named "dyadic and solitary women" (dyadic sexual desire: $M$ = 49.67, SD = 6.26; sexual activity with a partner: $M$ = 5.68, SD = 1.47; solitary sexual desire: $M$ = 15.62, SD = 3.66; masturbation: $M$ = 4.87, SD = 1.38). Finally, the third cluster was made up of 48 women and was characterized by low scores for all four sexual measures and was therefore named "neither dyadic nor solitary women" (dyadic sexual desire: $M$ = 34.08, SD = 8.64; sexual activity with a partner: $M$ = 3.81, SD = 1.38; solitary sexual desire: $M$ = 7.77, SD = 4.42; masturbation: $M$ = 2.13, SD = 1.26).

A MANOVA revealed no significant effect of women's profiles on sociodemographic variables (age, the length of the couple's relationship, the length of cohabitation with the partner, and the number of children living at home), $F(8, 276) = 0.83$, $p = .58$. A univariate ANOVA revealed a significant effect of the three groups on sexual satisfaction, $F(2, 178) = 23.60$, $p < .001$. Post hoc tests revealed that "dyadic women" presented higher scores for sexual satisfaction ($M$ = 19.42, SD = 4.69) than "neither dyadic nor solitary women" ($M$ = 12.83, SD = 5.37; $p < .001$) or "dyadic and solitary women" ($M$ = 16.20, SD = 5.68; $p = .001$). Moreover, "dyadic and solitary women" exhibited significantly higher sexual satisfaction than "neither dyadic nor solitary women" ($p = .003$).

## EXPLORATION OF THE IMPACT OF PSYCHOLOGICAL FACTORS ON THE DIFFERENT PROFILES

To assess the impact of the psychological factors that we selected, we computed mixed-design ANOVAs and one-way independent ANOVAs for men and women separately. Mean scores and standard deviations for the psychological factors of each cluster of men and women are presented in **Table 2**. Concerning men, a 3 (cluster: dyadic men, dyadic and solitary men, solitary men) × 2 (motivation: approach, avoidance) mixed ANOVA revealed a significant interaction between cluster and motivation, $F(2, 175) = 6.77$, $p = .001$ (see **Fig. 3a**). Univariate ANOVAs showed a significant effect of cluster on both approach motivation, $F(2, 175) = 3.34$, $p = .038$, and avoidance motivation, $F(2, 175) = 3.12$, $p = .046$. Post hoc tests using the Bonferroni correction revealed that "solitary men" exhibited higher scores for avoidance motivation than "dyadic men" ($p = .045$), while no differences were found between "dyadic and solitary men" and 'dyadic men" ($p = .618$) or "solitary men"($p = .390$). Concerning approach motivation, no significant difference was found among clusters after controlling for multiple tests.

A 3 (cluster: dyadic men, dyadic and solitary men, solitary men) × 2 (attachment: avoidant, anxious) mixed ANOVA revealed a significant interaction between cluster and attachment, $F(2, 175) = 3.10$, $p = .048$ (see **Fig. 3b**). Univariate ANOVAs showed a significant effect of cluster on avoidant attachment, $F(2, 175) = 7.51$, $p = .001$, and a nonsignificant effect on anxious attachment, $F(2, 175) = 0.36$, $p = .700$. Finally, post hoc tests revealed that "solitary men" scored significantly higher for avoidant attachment than either "dyadic men" ($p = .001$) or "dyadic and solitary men" ($p = .010$). No difference was found between "dyadic" and "dyadic and solitary" men ($p = .692$).

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
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Concerning self-control, we conducted a 3 (cluster: dyadic men, dyadic and solitary men, solitary men) × 3 (self-control: urgency, lack of premeditation, lack of perseverance) mixed ANOVA. The interaction was not significant, $F(4, 350) = 1.28$, $p = .279$. However, the results highlighted a main effect of cluster, $F(2, 175) = 4.44$, $p = .013$ (see **Fig. 3c**), showing that "dyadic men" had better self-control than either "dyadic and solitary men" or "solitary men". Univariate ANOVAs showed a significant effect of cluster on lack of premeditation, $F(2, 175) = 3.47$, $p = .033$ and lack of perseverance, $F(2, 175) = 3.95$, $p = .021$, and a nonsignificant effect on urgency, $F(2, 175) = 1.53$, $p = .220$. Finally, post hoc tests revealed that "solitary men" scored significantly higher for lack of premeditation and lack of perseverance than "dyadic men" ($p = .034$ and .018, respectively). No difference was found between "dyadic" and "dyadic and solitary" men regarding lack of premeditation and lack of perseverance ($p = .099$ and .393, respectively), nor between "dyadic and solitary" and "solitary" men ($p = 1.00$ and .318, respectively).

A univariate ANOVA showed no significant effect of cluster on sensation seeking, $F(2, 175) = 1.03$, $p = .358$ (see **Fig. 3d**). Finally, a univariate ANOVA revealed a significant effect of cluster on mindfulness, $F(2, 175) = 5.16$, $p = .007$ (see **Fig. 3e**). In particular, post hoc tests showed that "dyadic men" had a significantly higher score for mindfulness than "solitary men" ($p = .005$). Moreover, "dyadic men" were shown to be more mindful than "dyadic and solitary men," although the difference was only marginal ($p = .056$). Finally, no difference was found between "solitary" and "dyadic and solitary" men ($p = .796$).

Concerning women, a 3 (cluster: dyadic women, neither dyadic nor solitary women, dyadic and solitary women) × 2 (motivation: approach, avoidance) mixed ANOVA revealed a significant interaction between motivation and cluster, $F(2, 178) = 4.14$, $p = .018$ (see **Fig. 4a**). Univariate ANOVAs computed separately for the two types of motivation showed that the effect of cluster on avoidance motivations was not significant, $F(2, 178) = 1.87$, $p = .156$, while the effect on approach motivations was only marginally significant, $F(2, 178) = 2.42$, $p = .092$.

***Table 2.*** *Mean scores and standard deviations of psychological factors in clusters of men and women*

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | Dyadic ($N = 37$) | Dyadic and solitary ($N = 79$) | Solitary ($N = 62$) | Dyadic ($N = 73$) | Dyadic and solitary ($N = 60$) | Neither dyadic nor solitary ($N = 48$) |
| Approach motivation | 33.35 (4.70) | 32.82 (5.74) | 30.77 (5.74) | 32.82 (5.31) | 33.63(4.14) | 31.54 (5.23) |
| Avoidance motivation | 18.84 (5.38) | 20.44 (6.77) | 22.08 (6.32) | 22.53 (6.83) | 22.86 (7.01) | 24.98 (6.88) |
| Avoidant | 2.10 (0.68) | 2.31 (0.91) | 2.75 (0.93) | 2.27(1.01) | 2.24 (0.77) | 2.55 (0.99) |

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*DOI:10.1007/s10508-014-0467-z*
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| | | | | | | |
|---|---|---|---|---|---|---|
| attachment | | | | | | |
| Anxious attachment | 2.82 (1.00) | 2.82 (0.78) | 2.94 (0.86) | 2.96 (1.13) | 2.91 (0.96) | 2.89 (1.05) |
| Urgency | 8.95 (2.14) | 9.60 (2.10) | 9.27(1.57) | 9.57 (2.30) | 10.22 (2.39) | 9.73 (1.94) |
| Lack of premeditation | 6.59 (1.83) | 7.49 (2.14) | 7.71 (2.20) | 7.60 (2.53) | 7.83 (2.23) | 7.19 (2.16) |
| Lack of perseverance | 6.03 (1.89) | 6.67 (2.28) | 7.26 (2.06) | 6.55 (2.21) | 6.78 (2.24) | 6.63 (2.27) |
| Sensation seeking | 10.54 (2.80) | 11.11 (2.61) | 10.55 (2.52) | 9.48 (2.47) | 10.46 (2.21) | 9.29 (2.60) |
| Mindfulness | 68.81 (9.32) | 64.33 (9.22) | 62.53 (9.89) | 68.34 (8.62) | 62.14 (12.59) | 60.65 (11.10) |

Finally, post hoc tests revealed that "dyadic and solitary women" had higher approach motivation than "neither dyadic nor solitary women," although the difference was only marginally significant ($p$ = .088). No significant difference was found between "dyadic" and "neither dyadic nor solitary" or "dyadic and solitary" women ($p$ = .490 and 1.00, respectively).

***Figure 3.*** *Men's profiles on the z-scores related to psychological factors:* ***a*** *motivations,* ***b*** *attachment,* ***c*** *self-control,* ***d*** *sensation seeking, and* ***e*** *mindfulness*

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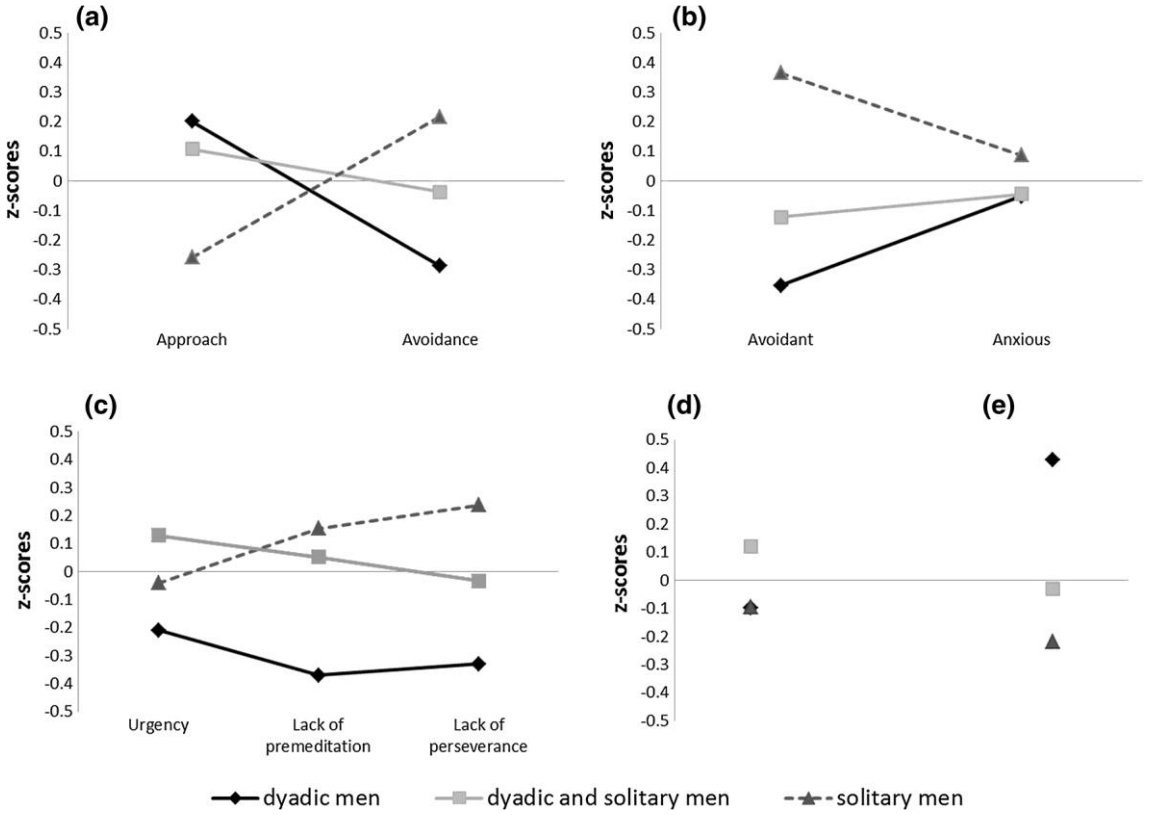


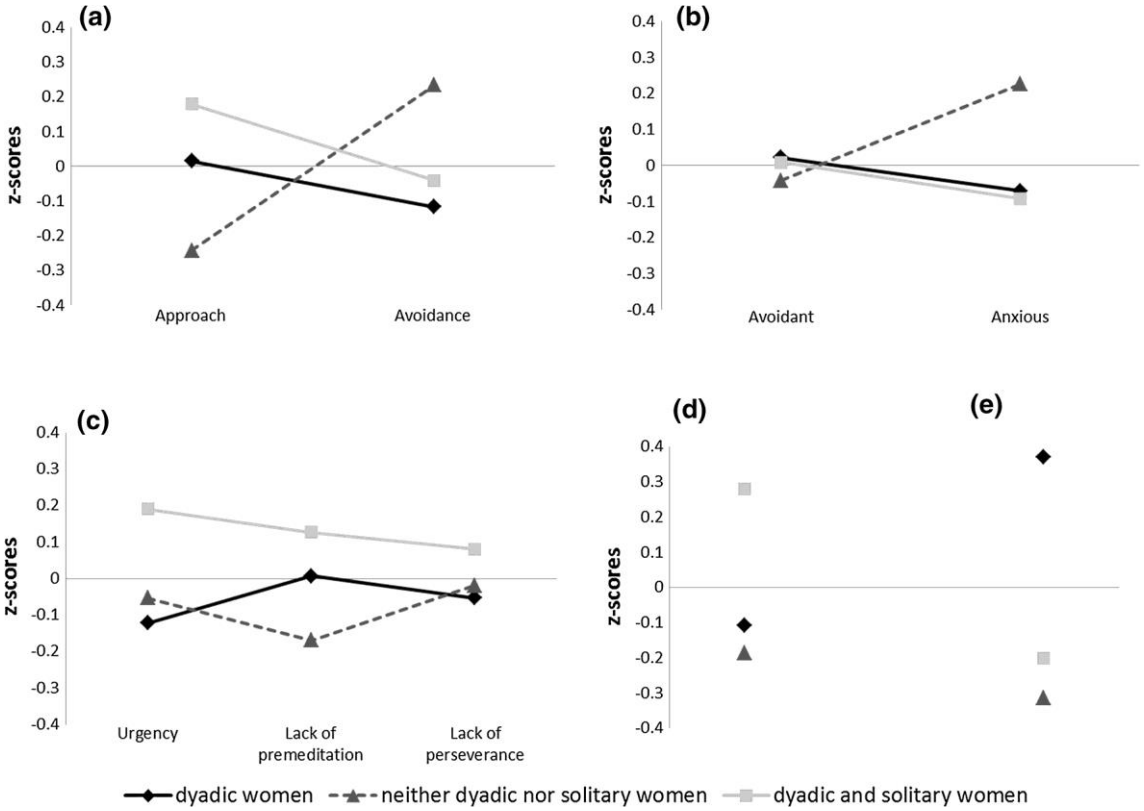

A 3 (cluster: dyadic women, neither dyadic nor solitary women, dyadic and solitary women) × 2 (attachment: avoidant, anxious) mixed ANOVA revealed neither a significant interaction between these variables, $F(2, 178) = 1.94$, $p = .146$, nor significant main effects of cluster or attachment, $F(2, 178) = 0.40$, $p = .672$ and $F(1, 178) = 0.09$, $p = .767$, respectively (see **Fig. 4b**).

As well, we computed a 3 (cluster: dyadic women, neither dyadic nor solitary women, dyadic and solitary women) × 3 (self-control: urgency, lack of premeditation, lack of perseverance) mixed ANOVA. Neither the interaction, $F(4, 356) = 0.60$, $p = .665$, nor the main effects were significant, $F(2, 178) = 1.61$, $p = .203$ for cluster, and $F(2, 177) = 0.26$, $p = .974$ for self-control (see **Fig. 4c**).

A univariate ANOVA showed a significant effect for sensation seeking, $F(2, 178) = 3.71$, $p = .026$ (see **Fig. 4d**). Post hoc tests revealed that "dyadic and solitary women" exhibited significantly higher scores for sensation seeking than "neither dyadic nor solitary women" ($p = .047$) and "dyadic women," although the latter comparison was only marginally significant ($p = .074$). No significant difference was found between "dyadic" and "neither dyadic nor solitary women" regarding sensation seeking ($p = 1.00$). Finally, a univariate ANOVA revealed a significant effect of cluster on mindfulness, $F(2, 178) = 9.42$, $p < .001$ (see **Fig. 4e**). In particular, post hoc tests showed that "dyadic women" scored significantly higher for mindfulness than "neither dyadic nor solitary women" ($p < .001$) or "dyadic and solitary women" ($p = .002$). No significant difference was found between "dyadic and solitary women" and "neither dyadic nor solitary women" regarding mindfulness ($p = 1.00$).

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
*Status : Postprint (Author's version)*

***Fig. 4.*** *Women's profiles on the z-scores related to psychological factors:* ***a*** *motivations,* ***b*** *attachment,* ***c*** *self-control,* ***d*** *sensation seeking, and* ***e*** *mindfulness*




# Discussion

The first objective of this study was to explore how patterns of sexual desire and sexual activity relate to different levels of sexual satisfaction. Secondly, the study sought to understand the individual variability of sexual desire and sexual activity in men and women by exploring several fundamental psychological trait factors that are related to motivational tendencies and self-control.

We hypothesized that sexual satisfaction would be related, on the one hand, to a moderate level of both sexual desire and sexual activity and, on the other hand, that this moderate level of desire and sexual activity would be related to a balance between motivational tendency and self-control. To this end, we conducted CA to identify different subgroups of men and women depending on their levels of sexual desire and activity (both dyadic and solitary), and compared how these profiles related to sexual satisfaction and different psychological factors (i.e., approach and avoidance motivation, attachment, sensation seeking, self-control, and mindfulness).

The CA revealed three different profiles among both men and women. First of all, "dyadic men" and "dyadic women" were characterized by high dyadic sexuality (both desire and activity) and low solitary sexuality. Participants in these clusters were the most sexually satisfied. Psychologically, they were characterized by high scores for approach motivation and relatively low scores for avoidance motivation, relatively secure attachment, high

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mindfulness and, among men, good self-control. All these psychological characteristics have been found to be related to psychological health, effective emotional regulation, well-being, and the tendency to experience positive affect and satisfactory relationships (Baumeister, Vohs, & Tice, 2007; Elliot, 2008; Mikulincer et al., 2002). Moreover, in agreement with our hypotheses, they were characterized by a certain balance between motivational tendencies to seek sexual rewards and self-control abilities.

"Dyadic and solitary men" and "dyadic and solitary women" (characterized by both high dyadic and high solitary sexual desire and sexual activity) showed a moderate level of sexual satisfaction (lower than for the "dyadic" profile, and higher than for the third profile described below). More specifically, these participants were defined by a relatively secure attachment and a moderate to low ability to be mindful. Furthermore, they were characterized by impulsivity. While the men showed relatively poor self-control abilities, the women exhibited strong motivational tendencies toward rewards (i.e., high sensation seeking and moderate to high approach motivation).

Finally, "solitary men" (defined by high solitary and low dyadic sexuality) and "neither dyadic nor solitary women" (low dyadic and solitary sexuality) showed the lowest level of sexual satisfaction. Their psychological functioning was characterized by high levels of avoidance motivation and low levels of approach motivation as well as a poor capacity to be mindful. Moreover, the men manifested high levels of avoidant attachment and low levels of self-control while the women showed low levels of sensation seeking. These psychological characteristics, which can be described by low self-control abilities, low motivational tendencies toward rewards and high motivational tendencies against threatening and negative cues have been found to be related to low well-being and the tendency to feel negative emotions such as fear or sadness (e.g., Elliot & Thrash, 2002; Keng et al., 2011).

First, our results suggest that sexual satisfaction does not necessarily depend on the accordance (or discordance) between sexual desire and sexual activity, as suggested by Santtila et al. (2008); rather, it seems to depend on the relation between *dyadic* and *solitary* sexuality. Indeed, high sexual satisfaction was related to high dyadic and low solitary sexuality. The differential link with sexual satisfaction suggests that dyadic and solitary sexuality may fulfill different functions for individuals. Dyadic sexuality may not only involve the expression of a sexual need but also broader motivations such as expressing love, enhancing self-esteem, or increasing intimacy with the partner, as suggested by some authors (e.g., Cooper, Shapiro, & Powers, 1998). On the other hand, solitary sexuality may also involve motivations other than sexual such as coping with negative emotions and/or sexual frustration, explaining its link with low sexual satisfaction (e.g., Bancroft et al., 2003).

Moreover, the profiles we found revealed some similarities between men and women. Indeed, regardless of gender, having both high dyadic and low solitary sexuality (i.e., "dyadic men" and "dyadic women") was related to high sexual satisfaction, optimal psychological functioning, and a balance between motivational tendencies toward rewards and self-control abilities. On the other hand, having both high dyadic and high solitary sexuality (i.e., "dyadic and solitary men" and "dyadic and solitary women") was associated, independently of gender, with a moderate level of sexual satisfaction and with higher impulsivity, resulting in an imbalance between motivational and self-control tendencies. However, the nature of the imbalance was different in men and women. While men showed a low propensity for self-

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*DOI:10.1007/s10508-014-0467-z*
*Status : Postprint (Author's version)*

control, women presented an overly high motivation toward rewards (i.e., high sensation seeking and high approach motivation). Finally, "solitary men" and "neither dyadic nor solitary women" differed according to gender, although both were characterized by the least optimal psychological functioning. Indeed, men and women seem to relate differently to sexuality when they face emotional difficulties. While men seem to avoid intimate contacts (i.e., high avoidant attachment) but still engage in solitary sexuality, women show a more general avoidance of sexuality, at both the solitary and dyadic levels. Differences in socialization among men and women may account for these contrasting results. Indeed, it has been shown that women are more inclined to seek social support and use emotion-focused coping strategies (e.g., expressing emotional distress) when they face difficulties (Ptacek, Smith, & Dodge, 1994), whereas men seem to be more inclined to use distraction as a coping strategy (Broderick, 1998).In this context, masturbation could be a way for men to distract themselves from negative emotions (Costa, 2012).

Concerning the psychological factors, the results revealed that both approach and avoidance motivations were relevant in understanding sexual desire and sexual activity. Among men and women, having both low approach and high avoidance motivation was associated with the lowest level of dyadic sexuality, consistent with an interdependent, rather than an independent, conceptualization of approach and avoidance motivations (e.g., Corr, 2001). According to Trew's (2011) model of the concurrent role of both approach deficit and avoidance motivation in the onset and maintenance of depression (partly based on Corr's conceptualization), a decreasing approach motivation may result in less positive emotions as well as limiting exposure to rewarding experiences (e.g., less sexual activities with the partner). This deficit in approach motivation may in turn heighten avoidance motivation, increasing negative affect and aversive experiences related to sexual activity, and therefore contributing to lower dyadic sexual desire. Finally, it is conceivable that such functioning may lead to a decrease in sexual satisfaction as well (as the profiles characterized by the lowest level of dyadic sexuality were associated to the lowest level of sexual satisfaction).

Consistent with previous findings (e.g., Butzer & Campbell, 2008), our results showed that avoidant attachment was associated with the tendency to avoid intimate contacts (cf. low dyadic sexual desire and low frequency of sexual activity with a partner) as well as the tendency to engage in more solitary sexual activity in men. Because people with an avoidant attachment pattern tend to have negative representations of others and to distrust others' goodwill (Brennan et al., 1998), they may avoid intimate contacts such as sexual relationships. As solitary sexual activity does not represent a threatening situation for such men, it may be used as a preferential way to fulfill their sexual needs and/or to cope with negative emotions related to insecure attachment. However, this sexual behavior is related to sexual dissatisfaction. It is likely that avoidant attachment may create tensions and conflicts within the couple and this may, as a consequence, negatively affect also sexual satisfaction.

In addition, the results showed the impact of impulsivity on general (and not just risky) sexuality. In both men and women, impulsivity differentiated those who had a higher solitary sexuality from those who did not. However, while high solitary sexuality was related to the pursuit of immediate rewards such as sexual pleasure (i.e., high sensation seeking) in women, it was related to a problem controlling one's own impulses (i.e., low self-control) in men. This result may partly explain why solitary sexuality is generally associated with

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
*Status : Postprint (Author's version)*

positive states among women (e.g., sexual satisfaction, sexual health, high self-esteem; Carvalheira & Leal, 2012) and negative states among men (e.g., sexual and life dissatisfaction, sexual dysfunctions, depressive symptoms; Costa, 2012). Indeed, in other domains, high levels of sensation seeking have been associated with a greater tendency to engage in reward-seeking behaviors (e.g., gambling or alcohol use) without necessarily leading to negative consequences, whereas the self-control-related dimensions of impulsivity have been linked to the negative consequences of such behaviors (e.g., debts and/or symptoms of dependence; Billieux & Van der Linden, 2008).

Finally, our results supported earlier findings regarding the positive effects of mindfulness on sexuality (e.g., Brotto et al., 2008). Moreover, they highlighted a particular psychological mechanism that may explain such a positive effect on sexuality: the ability to be highly attentive and aware of what is occurring in the present moment. This result could be interpreted as indicating that individuals who are highly mindful are more attentive and aware of both internal (e.g., arousing sensations, thoughts, emotions) and external cues (e.g., erotic cues such as seeing the partner's naked body), which may diminish the impact of interfering and/or irrelevant thoughts that may occur during sexual activities, and thus enhance sexual arousal and desire. This is consistent with what was suggested by Barlow (1986), who argued that dysfunctional sexuality was mainly associated with an inappropriate attentional focus on elements not related to erotic cues during sexual activities (e.g., thoughts about the consequences of not performing well). Finally, being highly mindful during sexual activity may eventually lead to higher sexual satisfaction as well.

## CONCLUSIONS AND CLINICAL PERSPECTIVES

To sum up, our study indicated that sexual satisfaction depends on both dyadic and solitary sexuality and highlighted the importance of taking different combinations of psychological factors into account in order to gain a more complete understanding of sexual desire and sexual activity. In particular, the results suggest that an imbalance between motivational tendency and self-control abilities is linked either to an overly low dyadic desire and sexual activity, or an overly high solitary desire and activity, which are both related to lower sexual satisfaction.

From a clinical perspective, exploring such fundamental psychological factors may lead to the development of treatments that specifically target the underlined psychological mechanisms involved in the person's sexual dysfunction. For instance, interventions intended to enhance self-control (e.g., implementation intentions; Burkard, Rochat, & Van der Linden, 2013) may help to increase dyadic sexuality, as well as sexual satisfaction, by reducing inappropriate behaviors (e.g., systematically skipping the preliminaries and behave only to satisfy one's own sexual needs) in individuals (especially men) with low self-control. Indeed, it is conceivable that a difficulty to control one's own impulses, emotions, and/or desires could lead to negative consequences, such as conflicts with the partner or negative emotions (e.g., regrets), that may reduce the frequency of sexual activity with the partner and, eventually, reduce sexual satisfaction. Thus, an improved ability to self-control could help impulsive persons to better adapt to their own *and* their partner's needs and desires, leading to more satisfactory dyadic sexuality. On the other hand, if sexual dissatisfaction or complaints related to desire are the consequences of a difficulty in inhibiting intrusive thoughts during sexual activity, it could be beneficial to incorporate an attentional training

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
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*Status : Postprint (Author's version)*

procedure (e.g., Attention Training Technique; Wells, 1990), or mindfulness into therapy. Finally, if sexual difficulties (e.g., low dyadic sexual desire) are related to motivational aspects (e.g., avoidance motivation, avoidant attachment), using a procedure that enables modifying automatic action tendencies may reduce avoidance behaviors (and negative emotions) in relation to sexual activities. Such changes may eventually enhance sexual desire. Indeed, it has been shown that using such a procedure (e.g., Approach-Avoidance Task) led individuals to approach more the feared objects than participants in a control condition (Amir, Kuckertz, & Najmi, 2013).

## LIMITATIONS AND PROSPECTS FOR FUTURE RESEARCH

Because this study is, to our knowledge, the first to explore the joint contribution of motivations, attachment, sensation seeking, self-control, mindfulness, and gender to sexual desire, sexual activity, and sexual satisfaction, further studies should be conducted to confirm our results. In addition, some limitations should also be addressed. First, all aspects of sexuality were assessed with self-report measures. Therefore, we cannot rule out potential biases (e.g., social desirability) of the kind some authors have previously documented (e.g., Alexander & Fisher, 2003; Schwarz, 1999). Moreover, we cannot exclude the possibility that the use of questionnaires (especially those without a precise time frame) may have led to inaccurate retrospective reporting of sexual experience. Second, the people who participated in this study may share some characteristics that those who declined to do so do not. In fact, some studies have demonstrated that volunteers for sex research hold more liberal sexual attitudes than non-volunteers (e.g., Wolchik, Braver, & Jensen, 1985). Third, all participants included in this study defined themselves as heterosexuals and were in stable cohabiting relationships. Therefore, generalizations to other groups should be avoided or made with great caution. Finally, this study is cross-sectional in nature and does not reveal causal relationships between psychological factors and sexuality. Thus, future research should apply a longitudinal design to clarify the direction of the relationships highlighted in this study. Another important issue that must be addressed in future concerns the development of more implicit sex-related measures in order to avoid biases due to social desirability. Moreover, future studies should also examine those factors in individuals who are not involved in long-term relationships or have other sexual preferences. Finally, future research should explore the relation between general trait psychological factors, such as those investigated in the present study, and more specifically sexuality-related factors that have been shown to influence sexual satisfaction, sexual desire and sexual activity, such as sexual motives and sexual self-control (Adam, Teva, & Wit, 2008; Cooper et al., 1998; Muise et al., 2013).

***ACKNOWLEDGMENTS***

*This research was part of the project "Sexual desire: An interdisciplinary approach" funded by the Maurice Chalumeau Fund from the University of Geneva, Switzerland. The authors would like to thank the colleagues of the project "Sexual Desire" who provided thoughtful comments and suggestions on the analyses. A special thanks to Nadia Ammar, for her valuable comments and proofreading on earlier drafts of this paper.*

*Published in : Archives of Sexual Behavior (2016), vol. 45, pp. 2029-2045*
*DOI:10.1007/s10508-014-0467-z*
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