



PhD-FLSHASE-2019-07
The Faculty of Language and Literature, Humanities, Arts and Education

DISSERTATION

Presented on 08/07/2019 in Esch-sur-Alzette

to obtain the degree of

DOCTEUR DE L'UNIVERSITÉ DU LUXEMBOURG EN PSYCHOLOGIE

by

Agnieszka CZELUSCINSKA-PECZKOWSKA

Born on 15 July 1986 in Siedlce (Poland)

ATTENTIONAL BIAS TO BODY- AND SEXUALLY- RELEVANT STIMULI

Dissertation defence committee:

Dr. Claus Vögele, dissertation supervisor

Professor, University of Luxembourg

Dr. Christine Schiltz, Chairman

Professor, University of Luxembourg

Dr. André Schulz

Research scientist, University of Luxembourg

Dr. Jens Blechert

Professor, University of Salzburg

Dr. Dimitri van Ryckeghem

A-Professor, University of Maastricht

The present project was supported by the Fonds National de la Recherche Luxembourg.



We do not believe in ourselves until someone reveals that deep inside us something is valuable, worth listening to, worthy of our trust, sacred to our touch. Once we believe in ourselves we can risk curiosity, wonder, spontaneous delight or any experience that reveals the human spirit.

— Edwin M. McMahon and Peter A. Campbell, *Please Touch*

Acknowledgments

I would like to gratefully acknowledge the AFR funding received from the Luxembourg National Research Fund. Undertaking this PhD has been a truly life-changing and challenging experience for me and it would not have been possible to do without the support and guidance that I received from many people.

I would like to thank my supervisor, Claus Vögele, for all the support and encouragement throughout the last years. Thank you for your concern, useful advices and indispensable proof reading. I would also like to acknowledge the support and advice offered by Jens Blechert. I do appreciate your valuable feedback and great cooperation. I am very grateful to Dimitri Van Ryckeghem for his invaluable scientific support. My appreciation also goes to Christine Schiltz, who agreed to be the part of the dissertation defence committee. I am particularly indebted to André Schulz for the scientific guidance and advice throughout the project. In addition to your moral encouragement, you provided me with the tools that I needed to choose the right direction and to complete the project.

I would like to thank my colleagues from INSIDE Research Unit for their wonderful collaboration. You supported me greatly and were always willing to help me. I would particularly like to thanks to Annika, who helped me to elaborate the idea about PhD project, and Zoé for her scientific advice. I am also especially grateful for the support of my colleagues, Lilly, Mila, Sonja and Alessandro, who spent countless hours with me in the laboratory and helped me with data collection.

I would also like to extend thanks to all research participants who opened up and shared their experiences on this delicate and intimate subject. Without your life stories this project could not be elaborated.

I am deeply grateful to my mother who always believed in me and encouraged me to pursue my education. Special thanks is reserved to my friends, who were of great support and who provided happy distraction to rest my mind outside of my research. My dear children, Oliwia and Jan, thank you for giving me unconditional love and happiness. Thank you for your patience and reminding me that joy comes from the simplest things. I am immensely grateful to my husband for his wise counsel and for always being there for me. You have motivated me to overcome my fears and face the challenges. Without you, I would not have had the courage to begin this journey in the first place.

Abstract

Sexual dysfunctions and body image dissatisfaction in women have reached significant levels, with prevalence rates being currently estimated at 50% and 38%, respectively. The potential societal and health costs are considerable, as a negative body image is considered a high risk factor for the development and maintenance of eating disorders, and sexual dysfunctions can negatively impact overall well-being. Previous research has separately examined body image dissatisfaction and sexual functioning but research linking these two areas is missing. Study 1 demonstrated the significance of contextual body image in evaluating visual sexual images. Valence ratings of sexually explicit stimuli were found to be associated with sexual functioning level mediated by contextual body image: women, who rated sexually explicit pictures less positively scored lower on sexual functioning if they reported a more self-conscious focus and avoidance of the body in the context of sexual experiences. In Study 2 we were able to prove the relevance of new sexually-explicit images in evoking sexual arousal, which was reflected by evaluative judgements and psychophysiological indicators of arousal. Study 3 aimed to compare responses to sexual stimuli and stimuli related to body image dissatisfaction (images of own body) in participants with sexual dysfunctions (SD) and a healthy control (HC) group. Contrary to our expectations, women in the SD group looked significantly longer and more frequently at self-defined most satisfying than dissatisfying body parts when compared to HC participants. There were no significant group differences in gaze duration and frequency of sexually explicit images, but the women with SDs rated these stimuli as less positive, less arousing and expressed less motivation to keep looking at them. Furthermore, by inducing a positive or negative attention bias (AB) to own body parts we aimed at changing state body image satisfaction and state sexual arousal in response to sexually explicit video-clip. The

proposed AB induction was not sufficient and did not affect body image and sexual experiences. Altogether, the findings from current study suggests that it visual attention and general arousal in response to sexual stimuli in women with SD is not disturbed but rather the process of evaluation.

Table of Contents

Acknowledgments.....	6
Abstract.....	8
1. Introduction.....	12
1.1. Sexual functioning.....	14
1.1.1. Models of sexual response.....	14
1.1.2. Sexual arousal – the emotion perspective.....	16
1.1.3. Female sexual dysfunctions.....	20
1.2. Body image	22
1.3. Relationship between sexual functioning and body image	25
1.4. Attentional bias to body-relevant stimuli.....	29
1.5. Attentional bias to sexually-relevant stimuli.....	31
2. Research questions – study aims.....	35
3. Empirical studies.....	36
3.1. Evaluative judgements of sexual visual stimuli and level of sexual functioning: the mediating role of contextual body image.....	36
3.2. Psychophysiological responses to sexually explicit visual stimuli	65
3.3. Attentional bias to body- and sexually-relevant stimuli	86
4. General discussion	132
4.1. Summary of findings.....	132

4.1.1. Evaluative judgements of sexual visual stimuli and level of sexual functioning: the mediating role of contextual body image	132
4.1.2. Psychophysiological responses to sexually explicit visual stimuli	133
4.1.3. Attentional bias to body- and sexually-relevant stimuli	133
4.2. Implications	134
4.3. Limitations	135
4.4. Final conclusions	136
5. References	137
6. Appendices	155

1. Introduction

“To lose confidence in one’s body is to lose confidence in one’s self.”

Simone de Beauvoir, *The Second Sex*

Sexuality is an innate part of human existence, and the individuality of its experience makes it unrepeatable (Masters, Johnson, Kolodny, & Masters, 1986). Through pleasurable and positive sexual experiences, the need for emotional attachment and self-gratification is fulfilled. The adequate conditions to freely communicate and appreciate one’s own sexuality should be ensured and respected (World Health Organization, 2017). Nevertheless, despite the constantly expanding knowledge on sexuality, its problems and possible treatments, the proportion of people experiencing sexual difficulties has reached high levels, especially in women. Sexual dysfunctions (SDs) are defined as a decrease in a person’s ability to respond sexually, or to achieve sexual gratification (American Psychiatric Association, 2013). Various biological and psychosocial factors can affect the development or maintenance of SDs. One of the social aspects emphasizes the role of physical attractiveness in defining interpersonal and sexual attraction (Lippa, 2012), with the preference for a slim and slender female body (Glasser, Robnett, & Feliciano, 2009). Although body image has been shown to be closely related to sexual functioning, the causality of the effect has not yet been established.

In order to respond adequately during a sexual encounter a combination of physiological and cognitive changes needs to occur. An understanding of these processes may shed light on the role of body image in sexual responding and further contribute to treatments of SDs. The current research project aimed at investigating the psychological mechanisms underlying the relationship

between body image and sexual functioning, by examining visual perception and the evaluation of body- and sexually-relevant stimuli in individuals with SDs.

1.1. Sexual functioning

Human sexuality is a complex phenomenon representing an interaction of drive for sexual activity, physiological reactions, and behaviours that results in satisfactory excitation (Bancroft, 2009). Sexual functioning is understood as an ability to generate and experience sexual arousal and excitation, which fulfil individuals' needs and give pleasure (Wiederman, 2011).

The Global Better Sex Survey (GBSS) provides comprehensive data on the sexual life of men and women from around the world, including France, Germany, the United Kingdom, Switzerland, Italy, and Spain, among others (Mulhall, King, Glina, & Hvidsten, 2008). The results of the GBSS show that positive sexual experiences, including having sex, reaching orgasm, considering oneself as being sexually attractive, and the ability to sexually satisfy a partner, play a significant role in women's life (Mulhall et al., 2008). Women who are satisfied with their sexual life more frequently think about sex, express more interest in sex, engage in more sexual activities, and more often strive for sexual activity compared to women dissatisfied with their sexual life (Davison, Bell, LaChina, Holden, & Davis, 2008). Moreover, positive sexual experiences may enhance female's overall health and well-being (Brody, 2010; Davison, Bell, LaChina, Holden, & Davis, 2009; Levin, 2007).

1.1.1. Models of sexual response

The cycle of sexual responses consists of emotional and physiological changes that occur when an individual experiences sexual arousal and is engaged in sexual activity (Tripodi & Silvaggi, 2013). There are two general approaches, which aim at defining the cycle of sexual response, i.e. linear and circular models. Linear models posit that sexual responses occurs in a strict sequence, with the first model proposed in 1960s by Masters and Johnsons (1966). This model emphasises the physiological aspects of sexual experiences and distinguishes four stages

of responding: excitation, plateau, orgasm, and resolution. A subsequent model was proposed by Kaplan (1974), which in addition to the physiological changes incorporates also a “desire phase”. Nevertheless, the described linear models were criticized for being biased towards men, and for their rigid order of phases (Basson, 2000; Giles & McCabe, 2009; Hayes, 2011).

In order to overcome these weaknesses, an alternative circular model of female’s sexual function was proposed, which highlights the dynamic nature of the processes occurring during sexual responses and the role of sexual desire (Basson, 2000; Figure 1). In this model, experiencing spontaneous sexual desire is not regarded as a necessary phase for initiating the process of sexual experience. Increased sexual arousal (subjective or genital) by itself can trigger a desire for sexual activity, which is defined as a responsive desire (Giles & McCabe, 2009). Furthermore, the next important stage of this cycle is the expressed readiness to engage in sexual activity and the perception of the experienced state and of sexual stimuli as pleasurable (Basson, 2000). The inclusion of biological and psychological factors that can influence these processes, e.g. past negative sexual experiences or poor body image (Anderson & Cyranowski, 1995), and the acknowledgement of nonlinear aspects of women’s sexual responses has significantly expanded the current knowledge on sexual function (and dysfunction) in women (Tripodi & Silvaggi, 2013).

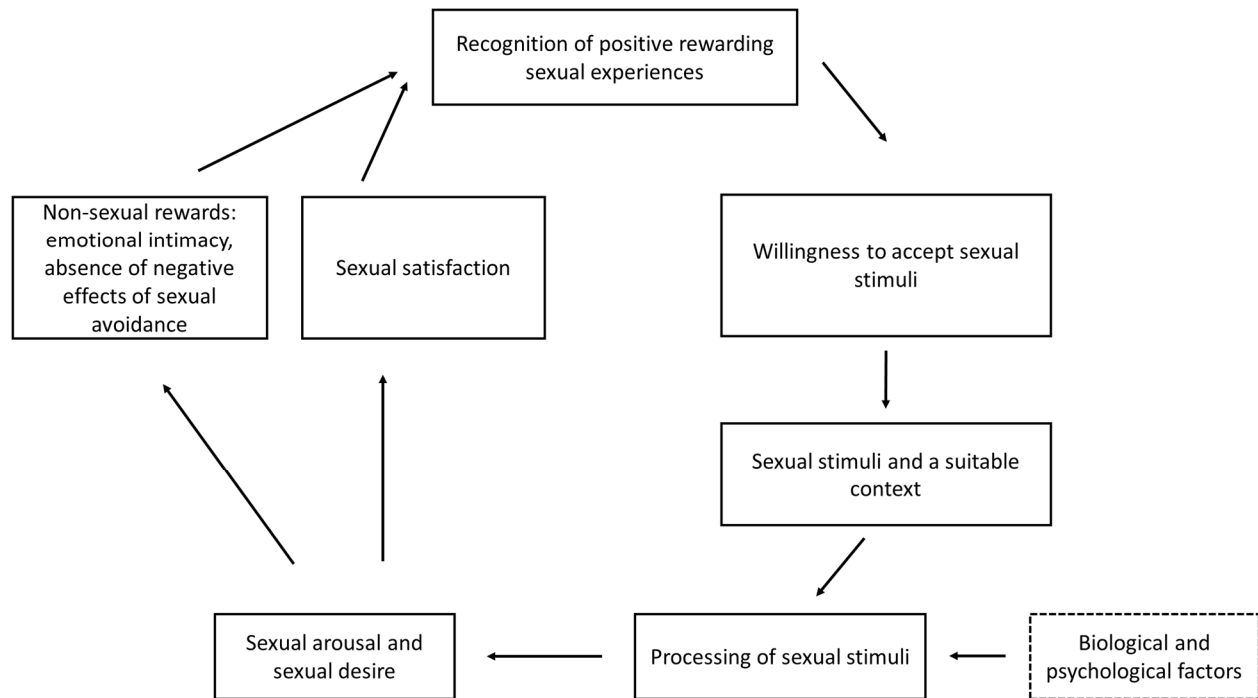


Figure 1. Model of female sexual response (Basson, 2000; Both, Laan, & Schultz, 2010).

1.1.2. Sexual arousal – the emotion perspective

Sexual arousal is recognized as multifaceted construct comprising physiological, cognitive, affective, and behavioural factors, that can involve different patterns of emotional processing (Janssen, Everaerd, Spiering, & Janssen, 2000). This conceptualization is based on regarding sexual arousal as an emotion (Everaerd, 1988; Frijda, 1986, Geer, Lapour, & Jackson, 1993). This perspective is based on the notion that sexual stimuli can hold different (not only sexual) emotional meanings, e.g. anger or disgust (Everaerd 1988, Janssen et al., 2000). Furthermore, emotional responses can be affected by cognitive processes of appraisal and interpretation, which can alter the meaning of sexual stimuli and generate a sexual response.

For the purpose of the work presented in this thesis, sexual arousal is regarded as a response to visual sexual stimuli, which is an outcome of the combination of cognitive and peripheral physiological changes (Basson, 2002; Heiman, 1980; Janssen, et al., 2000; Palace & Gorzalka,

1992; Rupp & Wallen, 2008). *Cognitive* factors that can influence sexual arousal include appraisal, attention, motivation, memory, and the perception of the current social context. Appraisal relies on automatic and controlled processes, i.e. sexually-relevant cue are pre-attentively selected and automatically appraised as sexually meaningful, whereas the role of conscious appraisal is to cognitively elaborate the stimuli and evaluate them (Everaerd, 1988). These processes may work in line with but also opposed to each other, thus having different effects on the outcome, i.e. sexual arousal (Bush & Geer, 2001; Chivers, Seto, Lalumière, Laan, & Grimbos, 2010; Dewitte, 2016). A commonly observed discordance between subjective and genital arousal, which is more often present in women than men, is an illustration of contrasting appraisal processes (Chivers et al., 2010). Attention is another important cognitive factor affecting sexual arousal. The role of attention processes is to select and differentiate relevant, i.e. sexual, information from irrelevant information (Mogg & Bradley, 1998). These processes can be influenced by individual's cognitive distortions (Mathews & McLeod, 2005). The focus of attention on sexually-relevant stimuli facilitates the experience of sexual arousal, while concentrating on other cues, e.g. pain, may draw away attention and diminishes feelings of pleasure (de Jong, 2009). Furthermore, the strength of sexual motivation, reflected by the frequency and intensity of sexual desires (Baumeister, Catanese, & Vohs, 2001), and any previous experiences, like satisfactory encounters or a history of sexual abuse (Bancroft, 2009) can also affect sexual arousal. Beyond these factors the perception of the current social context provides the wider picture of factors that are involved in generating sexual arousal. Societal norms incline individuals to respond according to sex role expectations (Fisher, 2007) and may contribute to developing dysfunctional sexual beliefs (Nobre & Pinto-Gouveia, 2006).

Peripheral *physiological* factors of generating sexual arousal include genital and general arousal, e.g. increased heart rate. As cognitive processes are necessary in focusing attention and assigning meaning to sexual cues, physiological changes can further enhance the subjective feelings of sexual excitement (Bancroft, 2009; Everaerd, 1988). Despite the co-occurrence of these changes, subjective arousal does not always correspond to physiological changes (Chivers, Reiger, Latty, & Bailey, 2004; Suschinsky, Lalumière, & Chivers, 2009). Such discordances exemplify the diversity of individuals' responses to sexual stimuli (Suschinsky et al., 2009) and the importance of cognitive factors in sexual experiences.

Figure 2 illustrates cognitive and physiological factors in determining subjective sexual arousal.

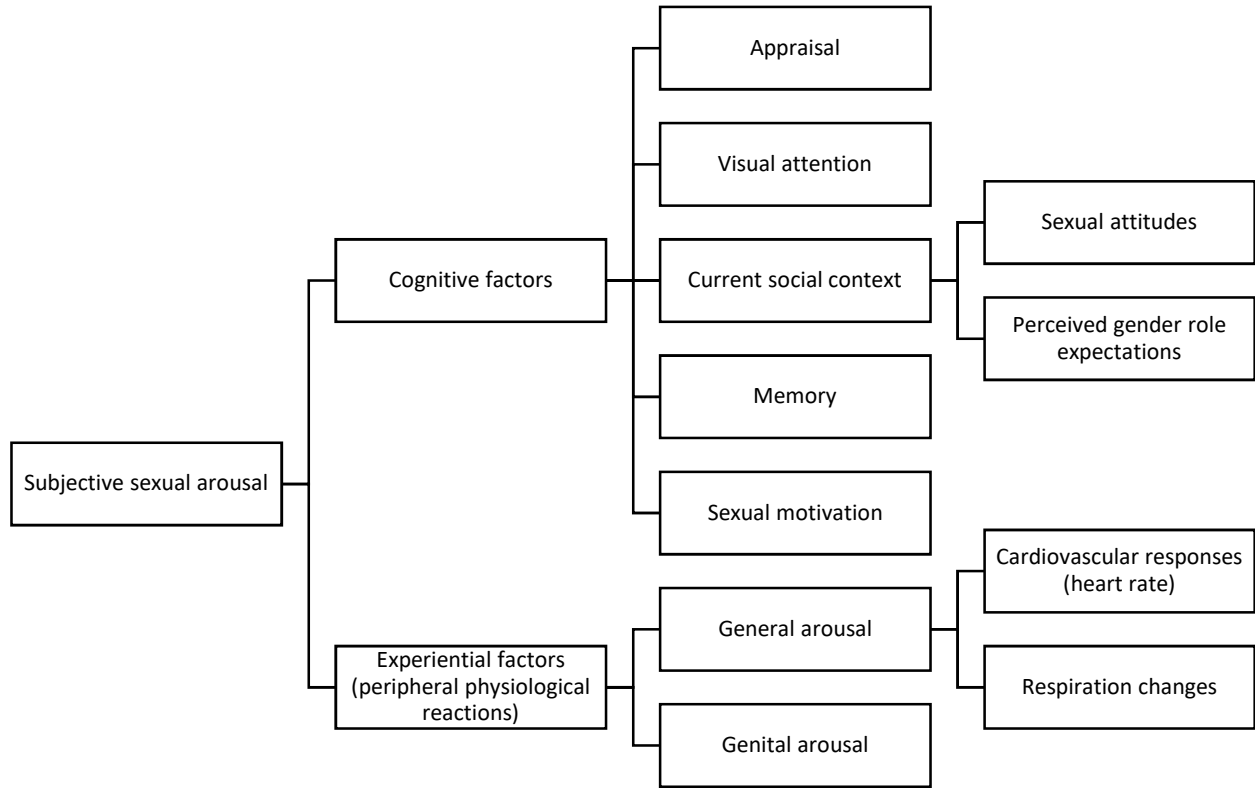


Figure 2. Model of subjective sexual arousal as the product of physiological sexual arousal within the current cognitive state (Basson, 2002; Heiman, 1980; Janssen, et al., 2000; Palace & Gorzalka, 1992; Rupp & Wallen, 2008).

1.1.3. Female sexual dysfunctions

Women's sexual functioning can be disturbed in four major areas: sexual desire, sexual arousal, orgasm, and sexual pain (Palacios, Castaño, & Grazziotin, 2009). The Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) distinguishes six female sexual dysfunctions not associated with organic conditions, while the DSM-5 modified the existing diagnostic terminology into three categories (American Psychiatric Association, 2013). Table 1 shows a comparison of terminology between the DSM-IV-TR and the DSM-5.

Table 1. *List of nonorganic sexual dysfunctions in women in the DSM-IV-TR and the DSM-5*

	DSM-IV-TR	DSM-5
Sexual desire	Female hypoactive sexual desire disorder	Female sexual interest/arousal disorder
Sexual arousal	Female sexual arousal disorder	
Orgasm	Female orgasmic disorder	Female orgasmic disorder
Sexual pain	Vaginismus Dyspareunia	Genito-pelvic pain/penetration disorder
Other	Sexual aversion disorder	-

Female sexual desire and arousal disorders were previously conceptualised as distinct conditions, which has been questioned and criticized because of the reported comorbidity of these dysfunctions (Bozman & Beck, 1991; Sanders, Graham, & Milhausen, 2008) and problems with distinguishing between sexual interest and subjective arousal by some women (Graham, Sanders, Milhausen, & McBride, 2004). The current diagnostic definition of *female sexual desire*

and arousal disorder refers to reduced or absent sexual thoughts or fantasies, lack of interest in sexual activity, and lower or lack of desire in response to sexual cues (American Psychiatric Association, 2013). In addition, among the listed symptoms are impaired genital arousal and subjective feelings of sexual pleasure. Female sexual function can be also disturbed in experiencing orgasm, which can result in *female orgasmic disorder*. This condition is manifested by delay, infrequency, absence or reduced sensations of orgasm. The next category, *genito-pelvic pain/penetration disorder*, has been proposed to replace the previous sexual pain disorders sub-categories, i.e. dyspareunia (pain associated with genital penetration) and vaginismus (difficulties to allow entry of a penis or other object), because of the lack of the empirical foundation to support its conceptualization (Binik, 2010a, 2010b). The current diagnosis of *genito-pelvic pain/penetration disorder* is based on reported pain during penetration attempts, fear or anxiety about the pain or penetration (American Psychiatric Association, 2013). Symptoms of each of the three sexual dysfunctions listed in the DSM-5 must cause marked distress in order to be defined as a disorder (American Psychiatric Association, 2013). *Female sexual aversion disorder* is described as continuous or recurring aversion to, and avoidance of having any genital sexual contact (American Psychiatric Association, 2000). It is not included in the latest version of DSM-5 because of the pointed conformity with characteristics of specific phobia (Brotto, 2009).

Dissatisfaction with sexual life is common and more than half of all women are not content with their actual sexual functioning, e.g. too low a frequency of intercourse (Mulhall et al., 2008). A significant percentage of women (40-69%) reported experiencing at least one sexual problem during their life (Christensen et al., 2011; Ferenidou et al., 2008; Lewis et al., 2004; Shifren, Monz, Russo, Segreti, & Johannes, 2008), and the most commonly reported include low

sexual desire (21-38%), low sexual arousal, e.g. lubrication problems (11-26%), and orgasmic dysfunctions (9-20%) (Burri & Spector, 2011; Shifren et al., 2008).

Experiencing sexual difficulties does not necessarily impact the experience of sexual satisfaction (Ferenidou et al., 2008); rather, the experience of personal distress is one of the crucial criteria in diagnosing the existing problem as a sexual dysfunction (American Psychiatric Association, 2013). Nevertheless, the vast majority of epidemiological studies investigate the prevalence of sexual dysfunction without controlling for the experience of personal distress. Sexual dysfunctions in the presence of marked personal distress have been reported for a lower proportion of the female population, ranging from 11-12% (Christensen et al., 2011; Shifren et al., 2008) to 24% (Bancroft, Loftus, & Long, 2003). It is still important to note, however, that almost half of all women experience at least one sexual problem during their life, and even though they cannot be described as a clinical sample in terms of meeting diagnostic criteria for sexual dysfunction, they still may benefit from information and education as the majority of the women affected express a desire to improve the quality of their sexual life (Mulhall et al., 2008). Moreover, more than half of those who are struggling with more than one sexual problem, and feel distressed by this, would like to get professional advice (Ferenidou et al., 2008).

1.2. Body image

Body image is a multidimensional construct including four major components, i.e. perceptual, affective, cognitive and behavioural factors (Menzel, Krawczyk, & Thompson, 2011). The perceptual dimension represents the accuracy of defining one's own body size and shape, whereas the affective component refers to one's emotions toward one's body or body parts, e.g. negative states such as distress, anxiety, or displeasure, or their positive counterparts. The cognitive component of the body image construct includes functional or dysfunctional

schemas, thoughts, attitudes and appearance investment. The behavioural component is characterized by avoidance or non-avoidance of body exposure and involvement or non-involvement in body-checking behaviours (Menzel et al., 2011). There is also evidence that body image can be conceptualized as a trait disposition and as a contextual experience (Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002; Cash, Maikkula, & Yamamiya, 2004).

Body image can be impacted by interpersonal, individual, physical and cultural factors (Garner, 1997). Sex also seems to affect body image, as men and women may possess different internal representations of their ideal body shape (Murnen, 2011). This seems to be the result of sex-dependent beauty ideals in society, i.e. drive for muscularity in men and drive for thinness in women, respectively (Murnen, 2011). Women may feel under pressure to fight their natural instinct for developing a biologically healthy body according to the existing trend of slenderness, whilst men may strive for a well-conditioned and healthy body, not too muscular or too fat (Morgan & Arcelus, 2009). The image of the ideal body presented in the media is considered an important determinant of satisfaction and attractiveness (Tiggemann, 2002).

Body weight dissatisfaction, measured as the discrepancy between ideal and current body weight (Neighbors & Sobal, 2007; Swami et al., 2010), and body shape dissatisfaction, measured as the discrepancy between ideal and current body shape (Forbes, Adams-Curtis, Rade, & Jaberg, 2001; Neighbors & Sobal, 2007; Phillips & de Man, 2010; Pruis & Janowsky, 2010) are common phenomena in female populations. Women who are constantly dissatisfied with their body, concerned about their weight and investing more into their appearance, have been reported to be also more anxiously focused on their body (Cash et al., 2004).

In general, women have more body image and weight concerns than men (Brand, Rothblum, & Solomon, 1992; Davison & McCabe, 2005; Garner, 1997; Fairburn, Cooper, Cooper,

McKenna, & Anastasiades, 1991; Hoyt & Kogan, 2001; Matthiassdottir, Jonsson, & Kristjansson, 2010; Palladino Green & Pritchard, 2003). This has been explained by women's dysfunctional belief that men prefer slimmer bodies than they actually do (Forbes et al., 2001; Swami et al., 2010) and/or higher pressure on women to conform social beauty ideals (Morgan & Arcelus, 2009). Women who are dissatisfied with their bodies tend to rely on upward social comparison strategies, which is reflected by comparing oneself with thin and attractive bodies (Cattarin, Thompson, Thomas, & Williams, 2000). A meta-analytic review of 156 studies revealed that using other bodies as a reference point is associated with a more critical view of one's own body and may contribute to body image dissatisfaction (Myers & Crowther, 2009). It has been also shown that young women assumed that other women have a lower BMI, possess a thinner ideal body figure, and exercise more often (Sanderson, Darley, & Messinger, 2002). These results reflect the tendency in women to overestimate their own body weight (Zaccagni, Masotti, Donati, Mazzoni, & Gualdi-Russo, 2014). It is possible that women lower their own expectations and do not believe they could achieve the ideal body norms as other women. Furthermore, a stronger drive to be thin was found to be associated with more negative feelings about one's own body (Heider, Spruyt, & De Houwer, 2015; Sanderson et al., 2002) and an assumption of having a higher body weight (Sanderson et al., 2002). Body image dissatisfaction can occur regardless of actual body size (Matthiassdottir et al., 2010); however, higher BMI status may reinforce negative feelings towards one's own body (Weaver & Byers, 2006; Yates, Edman, & Aruguete, 2004).

The wish to be thinner is more often observed in women when compared to men (Matthiassdottir et al., 2010; Radwan et al., 2019). The percentage of women not satisfied with their body weight is significant, ranging from 50 to 67%, with an even higher percentage of

women who would like to lose weight (80%-89%; Garner, 1997; Matthiassdottir et al., 2010). Putting on weight (Garner, 1997) and feeling pressure to lose weight (Matthiassdottir et al., 2010) was indicated as one of the strongest reasons for appearance displeasure. Interestingly, 64 to 87% of women with normal BMI status also expressed a willingness to be thinner (Matthiassdottir et al., 2010; Neighbors & Sobal, 2007). This finding highlights the subjective component of body image dissatisfaction that can occur regardless of an objective index of one's body size.

Body image dissatisfaction may negatively impact health and health behaviours. For example, in order to change their current weight, 84% of women were found to use dieting practices (Garner, 1997). Radical and risky weight-loss behaviours, e.g. vomiting, taking diet pills, laxatives or diuretics, were associated with female's negative attitudes towards their own body (Garner, 1997; Markey & Markey, 2005). The maladaptive preoccupation with one's body has been shown to be associated with dysfunctional eating behaviours and attitudes, such as extreme dieting (Crowther & Williams, 2011), and may also be a risk factor for the development and maintenance of eating disorders, e.g. bulimia nervosa (Johnson & Wardle, 2005) and anorexia nervosa (Brytek-Matera & Schiltz, 2011). A negative body image has a negative impact on overall quality of life, resulting in diminished self-esteem (Ambwani & Strauss, 2007), increased stress and depression symptoms (Johnson & Wardle, 2005; Siegel, 2002; Stice, Hayward, Cameron, Killen, & Taylor, 2000).

1.3. Relationship between sexual functioning and body image

Body image is regarded as an important aspect of sexual functioning and confidence in individual's sexual abilities (Silvaggi & Tripodi, 2013). The vast majority of research on sexuality and body image has been conducted on women, generally providing evidence that in females sexuality and body image are closely associated. Positive and confident attitudes

towards one's own body are considered a facilitator for experiencing sexual arousal, i.e. a physiological response to sexual stimuli (Graham, et al., 2004). Furthermore, lower weight concerns and more positive evaluations of sexual attractiveness may contribute to higher levels of experienced sexual desire (Seal, Bradford, & Meston, 2009) and sexual satisfaction (Pujols, Meston, & Seal, 2010). A positive body image has also been associated with women's better sexual functioning in terms of higher sexual drive, increased sexual activity (Ackard, Kearney-Cooke, & Peterson, 2000; Schooler, Ward, Merriwether, & Caruthers, 2005; Werlinger, King, Clark, Pera, & Wincze, 1997), higher sexual assertiveness, higher sexual esteem, lower sexual anxiety, and fewer sexual problems (Weaver & Byers, 2006). Again, it is important to highlight that it is not actual body weight but women's subjective evaluation of their own body size that has a significant effect on a range of aspects of sexuality and well-being (Seal et al., 2009; Weaver & Byers, 2006; Wiederman & Hurst, 1998). Women who perceived their body in a more positive way expressed greater sexual confidence and drive for sexual contact (La Rocque & Cioe, 2011), and felt more satisfied with their sexual life (Hoyt & Kogan, 2001; La Rocque & Cioe, 2011). Furthermore, having a satisfactory and rewarding sexual life is considered to help improve body image satisfaction (Garner, 1997). Young adult women who more positively evaluated their own appearance and body, were more sexually active, and less frequently engaged in risky sexual behaviours (Gillen, Lefkowitz, & Shearer, 2006; Schooler et al., 2005).

In contrast to these beneficial effects of a positive body image on sexuality, preoccupation with a negative body image may result in decreased quality of sexual life in women (Peplau et al., 2009). Body image concerns were found to be negatively associated with sexual desire (Seal et al., 2009), subjective sexual arousal (Sanchez & Kiefer, 2007), and orgasm (Nobre & Pinto-Gouveia, 2006). A more negative evaluation of one's own body may be associated with leading a

less active sexual life and experiencing less sexual opportunities (Andersen & LeGrand, 1991; Faith & Schare, 1993; Koch, Mansfield, Thureau, & Carey, 2005; Trapnell, Meston, & Gorzalka, 1997). Negative body image evaluation can increase the experience of negative aspects of sexuality, which in turn can increase dissatisfaction with sexual life and lead to a decrease in body image satisfaction (Garner, 1997). Non-erotic thoughts that can occur during sexual activity with a partner were found to be related to lower satisfaction with sexual life and avoidance of sexual activity in both men and women, with important differences in the content of these thoughts: women tend to focus more on their bodies, while men reported more often concerns about their performance (Nelson & Purdon, 2011). Remaining vigilant to aspects that are not directly connected with sexual activity can lead to lower quality and enjoyment of sex. Women who consider themselves as unable to meet ideal body shape standards were found to experience difficulties in sexual arousal and sexual pleasure (Sanchez & Kiefer, 2007). Women diagnosed with orgasmic disorders expressed more dysfunctional beliefs about their body image than sexually healthy women, and they associated physical attractiveness with sexual satisfaction (Nobre & Pinto-Gouveia, 2006, 2008). Furthermore, Evans & Stukas (2007) showed that women who are dissatisfied with their bodies engaged in relationships with partners who confirmed their negative body attitudes. This loop of disapproving comments was also found to be negatively related to relationship satisfaction.

The ways how a negative body image impacts on human sexual functioning are still being debated; however, at least two mechanisms have been suggested: first, negative body image attitudes towards one's own body may result in the avoidance of sexual contacts, and second, a negative body image may act as a distractor during intimate experiences and thereby prevent the experience of sexual satisfaction (Wiederman, 2011). The more negative self-perception of one's

body and the focus on specific body parts in the context of sexual situations was found to be associated with body-related cognitive distraction during sexual activity (Pascoal, Narciso, & Pereira, 2012) and less confidence to show one's own body during sexual encounters (Cash et al., 2004).

The origin of this assumption goes back to observations of male sexual dysfunctions and has been termed "spectatoring" (Masters and Johnson, 1970). Focusing on one's body and being preoccupied with adequate performance may lead to disturbed sexual responses and diminish quality and satisfaction from sexual experience (Nelson & Purdon, 2010). This has been transferred to women, and it has been shown that female's sexual functioning is affected by appearance-based spectatoring, i.e. they monitor how their body appears during sexual encounters (Meana & Nunnink, 2006). It should be noted that the preoccupation with looking fat or heavy during intimate situation was found to have a negative impact on female sexual function regardless of their current BMI or self-perceived body attractiveness (Wiederman, 2000).

Furthermore, body image dissatisfaction may redirect attention to one's own body and in turn may lead to the avoidance of situations that are associated with body exposure, e.g. during sexual activities (La Rocque & Cioe, 2011; Wiederman, 2000, 2011). Avoidance of sexual behaviour has been found to be associated with negative body-evaluations (La Rocque & Cioe, 2011; Reissing, Laliberté, & Davis, 2005), and with decreased sexual self-esteem, sexual satisfaction and sexual desire (La Rocque & Cioe, 2011). Anxious preoccupation with one's appearance and body avoidance during sexual activities has been reported to be related to poorer sexual functioning, which is associated with a less pleasurable sexual life, diminished sexual desire and arousal, and more orgasm difficulties (Cash et al., 2004).

Women with a more positive body image expressed less concerns about their body during sexual activity and experienced higher satisfaction from their sexual life (Pujols et al., 2010). Feeling more comfortable when being nude and exposing one's body during sexual activities was associated with better sexual functioning, as expressed by higher sexual drive, more fantasies and thoughts about sex, and stronger confidence during sexual contacts (Wentland, Herold, Desmarais, & Milhausen, 2009). Nevertheless, even women who are satisfied with their body image, but experience cognitive distraction by appearance-based cues during sexual activity, may struggle with low sexual esteem, sexual satisfaction, and may experience orgasm difficulties (Dove & Wiederman, 2000).

In summary, the present literature suggests a crucial role for body image in sexual function and dysfunction. Nevertheless, as the vast majority of studies are based on self-report measures and are cross-sectional, the direction of this association remains unclear. Although some results are suggestive of potential mechanisms linking a negative body image and sexual dysfunction, e.g. avoidance of sexual contacts and/or distraction during intimate experiences (Wiederman, 2000, 2011), a direct test of the cognitive processes underlying these associations is still outstanding. Not only would experimental investigations provide the basis for a better understanding of the links between negative body image and sexual dysfunction; the expected results of such studies would also enable the further development of prevention and treatment strategies in this area.

1.4. Attentional bias to body-relevant stimuli

Attentional bias to threat-relevant cues is one of the cognitive processes that has been shown to be important for the development and maintenance of a range of mental disorders, e.g. anxiety disorders (MacLeod, Mathews, & Tata, 1986), affective disorders (Armstrong & Olantunji,

2012), eating disorders (Blechert, Ansorge, & Tuschen-Caffier, 2010; Brooks, Prince, Stahl, Campbell, & Treasure, 2011; Jansen, Nederkoorn, & Mulkens, 2005; Smeets, Roefs, van Furth, & Jansen, 2008), and sexual dysfunction (Beard & Amir, 2010). For the investigation of attentional bias, a range of mostly reaction time (RT) based behavioural paradigms have been used, e.g., the dot probe task, the Stroop task, the go/no-go task, attention network tasks, visual search tasks, and recognition tasks (Weierich, Treat, & Hollingworth, 2008).

Using a modified dot probe task, undergraduate females were found to show facilitated attention (i.e. faster RT) to slim rather than to overweight body shapes (Dondzilo, Rieger, Palermo, Byrne, & Bell, 2017; Glauert, Rhodes, Fink, & Grammer, 2010). Furthermore, being more dissatisfied with own appearance was found to be reflected by spending less time looking at own body and displaying difficulties to disengage attention from areas which produce the most dissatisfaction compared to being less dissatisfied with own body (Janelle, Hausenblas, Ellis, Coombes, & Duley, 2009). Attentional bias to body-related information has also been found to be associated with drive for thinness, which can reflect one's body shape and weight concerns (Hewig et al., 2008). Women who had high scores on the drive for thinness scale spent more time looking at waist, hips, legs, and arms of young males and females. These body parts are perceived to be especially related to body changes, which can occur during weight gain or weight loss (Hewig et al., 2008). Furthermore, body image dissatisfaction is characterised by focusing more on self-unattractive body parts, while the effect is reversed when looking at body photos of other person (Glashouwer, Jonker, Thomassen, & de Jong, 2016; Roefs et al., 2008; Smeets, Jansen, & Roefs, 2011).

Attentional bias to body-related cues has also been demonstrated in participants with eating disorders or disordered eating behaviour: patients with anorexia nervosa symptoms showed

faster saccade latencies to self-body targets than others' body targets. In addition, this bias for self-photos correlated with body dissatisfaction (Blechert et al., 2010). Furthermore, individuals with disordered eating patterns showed decreased eye blink rate, and spent more time looking at their self-defined ugly than beautiful body parts (Jansen et al., 2005). The non-symptomatic control participants focused more on their own 'beautiful' body parts and less on their own 'ugly' body parts. When viewing other bodies this pattern was reversed: high symptom participants allocated their attention to the beautiful parts of other bodies, whereas normal controls concentrated on the ugly parts of the other bodies (Jansen et al., 2005).

More recently, the cognitive paradigms originally used to demonstrate information-processing biases have been further modified to treat these biases, with some studies providing evidence that attenuating bias toward threatening stimuli leads to lasting symptom relief in anxious individuals (Hallion & Ruscio, 2011) and to alleviate depression (Wells & Beevers, 2010). In a similar vein, it has been suggested that redirecting attention towards positive aspects of self-body images could prevent negative, body-related feelings and thoughts, and that this may even contribute to an increase in overall body image satisfaction (Glashouwer et al., 2016; Smeets et al., 2011; Smith & Rieger, 2006). On the basis of these results it may be hypothesized that persons with greater body image dissatisfaction have greater attentional bias toward self-body cues compared to other-body cues, and hence, redirecting attention from negative body parts may have more positive consequences when based on individual's own body than neutral body.

1.5. Attentional bias to sexually-relevant stimuli

In general, sexual stimuli attract one's attention with greater strength compared with non-sexual stimuli (Buodo, Sarlo, & Palomba, 2002; Fromberger et al., 2012; Spiering, Everaerd, &

Laan, 2004). This phenomenon has been called the sexual content-induced delay phenomenon (SCID), which appears when responding to the sexual cues is delayed (Geer & Bellard, 1996; Geer & Melton, 1997). The SCID was found in response to semantic and visual information in primed and un-primed conditions. Previous studies demonstrated the SCID effect to be significant only for women (Geer & Bellard, 1996; Geer & Melton, 1997), whereas other studies found that men and women respond in the same manner (Conaglen, 2004; Spiering et al., 2004). The use of an un-primed lexical decision task provided results of participants' slower responses to sexual words compared to neutral words (Conaglen, 2004; Geer & Bellard, 1996). In accordance to the SCID it was also shown that pictures with sexual content might create greater interference than neutral stimuli. In a choice reaction task participants needed more time to detect the dot, which could occur in 5 possible positions on the picture with erotic gender-preferred content (nude women or nude men), on one-colour slides (Wright & Adams, 1999), or on the photos of nude individuals with invisible sexually-relevant parts (Santtila et al., 2009). Other studies have shown that images with sexual content were assigned to a corresponding group in a slower manner when consciously preceded by sexual primes compared to neutral primes (Spiering et al., 2004). In the primed condition the SCID may be elicited only when both stimuli, prime and target, are sexually related (Spiering et al., 2004), whilst other studies showed that only one of the stimuli, prime or target, needs to be sexually relevant (Geer & Melton, 1997).

Interesting results consistent with these findings come from studies using the startle reflex paradigm (Bradley, Codispoti, Cuthbert, & Lang, 2001a). The smallest startle eye blink responses to an acoustic stimulus was found in response to viewing positive/attractive stimuli, which included pictures of opposite-sex nudes or erotic couples, compared to neutral stimuli

(Giargari, Mahaffey, Craighead, & Hutchison, 2005; Simons & Zelson, 1985; Vrana, Spence, & Lang, 1988), and pleasant nonsexual stimuli and unpleasant stimuli (Bradley et al., 2001a; Bradley, Codispoti, & Lang, 2006; Prause, Janssen, & Hetrick, 2008). One of the possible explanations for this phenomenon may be that the more pleasant and intense the stimulus is, the more visual attention resources are involved in processing this stimulus in order to prepare for an adequate reaction (Bradley et al., 2001a; Bradley et al., 2006; Simons & Zelson, 1985; Vrana et al. 1988). The reaction to sexual stimuli compared to neutral ones is also characterized by the higher ratings of attractiveness, longer viewing time (Vrana et al. 1988), and higher arousal as measured by stronger physiological changes, e.g. increased skin conductance and heart rate deceleration (Bradley et al., 2001a).

In contrast, sexual stimuli may also influence individual's attention in the opposite direction, and stimuli with sexual content may be perceived as potentially threatening (Beard & Amir, 2010) and less attractive (Giargari et al., 2005). Studies examining the relationship between sexual difficulties and emotional valence of sexual stimuli indicated that persons with lower levels of sexual desire showed increased startle responses when viewing opposite-sex images than persons with higher levels of sexual desire (Giargari et al., 2005). More specifically, startle magnitude did not differ after exposure to sexual and neutral stimuli in a group with low sexual desire, which may imply that individuals with sexual desire disorders may have a reduced appetitive response to sexual stimuli (Giargari et al., 2005). Using the dot probe task it has also been shown that the greater attentional bias toward sexual cues may be connected with sexual difficulties. A nonclinical sample of persons with disordered sexual functioning was faster compared to a non-symptomatic control group in detecting targets that replaced sexual words compared to neutral words (Beard & Amir, 2010), and persons experiencing low levels of sexual

desire needed less time to detect the dot that occurred in a place previously occupied by sexual image than neutral image (Prause et al., 2008). Thus, it could be argued that cognitive processes such as a stronger attentional bias toward sexual cues, may contribute to the maintenance of sexual dysfunction, especially in experiencing sexual desire, sexual arousal, and orgasm (Beard & Amir, 2010). The greater attention directed toward sexual stimuli may be associated with sexual difficulties in such a way that individuals with low levels of sexual desire may be less familiar with sexual information and engage in less sexual activities (Prause et al., 2008).

Women without sexual dysfunctions were slower in detecting sexual words than neutral words (Beard & Amir, 2010). This result, although not reaching statistical significance, may indicate that the stimuli with sexual content may cause a delay, which is consistent with the assumptions of the SCID phenomenon.

The results of Conaglen's study (2004) showed that when sexual cues are perceived as threatening due to sexual desire disorders the SCID effect may be even stronger. Results from the lexical decision task employed by the authors showed that women with low levels of sexual desire were slower in detecting sexual words than those with high levels of sexual desire but this difference did not reach statistical significance (Conaglen, 2004). They also associated them with less positive emotions and perceived them as less common and more disturbing (Conaglen, 2004). It was suggested that one of the mechanisms creating the SCID effect is the emotional appraisal of the sexual stimulus and not its intensity (Conaglen, 2004). As the valence of the stimuli becomes negative, detection times become slower.

2. Research questions – study aims

The overall aim of the project is to investigate the perception and evaluation of sexually-relevant stimuli using self-report, cognitive-experimental and psychophysiological methods. Studies 1 and 2 investigate the relationship of body image with evaluative judgements to sexually explicit stimuli and level of sexual functioning in a nonclinical sample of adult men and women. In Study 3 specific mechanism underlying attentional bias towards self-body and sexual stimuli were assessed experimentally. Furthermore, state body image satisfaction was manipulated to further investigate its effects on state sexual and general arousal in a clinical sample of adult women with diagnosed sexual dysfunctions.

3. Empirical studies

3.1. Evaluative judgements of sexual visual stimuli and level of sexual functioning: the mediating role of contextual body image

Submitted as:

Czeluscinska-Peczkowska, A., Schulz, A., Blechert, J., Lutz, A. P. C., Deuter, Ch. E., & Vögele, C.

Evaluative judgements of sexual visual stimuli and level of sexual functioning: the mediating role of contextual body image. Manuscript in submission.

ABSTRACT

Sexual problems and body image dissatisfaction are common and may negatively affect health and overall well-being. The current study investigated whether body image mediates the association of evaluative judgements of sexually explicit images and sexual functioning level. In addition, we examined differences in this mediation effect between men and women. Participants (135 women, 92 men) were presented with sexually explicit images and asked to provide self-report evaluations of these pictures in terms of valence, arousal and motivation. Trait and contextual body image as well as sexual functioning were also assessed. As expected, in women, valence ratings of sexually explicit stimuli were associated with sexual functioning level mediated by contextual body image: women, who rated sexually explicit pictures less positively scored lower on sexual functioning if they reported a more self-conscious focus and avoidance of the body in the context of sexual experiences. This effect was not present in men. Sex differences were statistically explained by significantly higher body image dissatisfaction and lower sexual functioning levels in women than men. We conclude that there is a pronounced association between body image (dis)satisfaction and sexual functioning in heterosexual women. Further research should focus on this population and on the role of contextual body image in sexual situations.

Keywords: body image dissatisfaction, contextual body image, sexual functioning, sexually explicit images

INTRODUCTION

Sexual functioning

Dissatisfaction with sexual life is common, with more than half of women and men reporting not to be content with their sexual functioning, e.g. too low frequency of intercourse (Mulhall, King, Glina, & Hvidsten, 2008). The potential societal and health costs are considerable, as sexual dysfunctions (e.g. delayed ejaculation, erectile disorder, female orgasmic disorder) can negatively affect well-being and health. Prevalence rates of at least one sexual dysfunction are estimated at approximately 20-30% in adult men (Fugl-Meyer et al., 2010), and 40-69% in adult women (Christensen et al., 2011; Ferenidou et al., 2008; Lewis et al., 2004; Shifren, Monz, Russo, Segreti, & Johannes, 2008). The most common sexual difficulty experienced by men is erectile dysfunction, which concerns around 16-30% of the male population (Ponholzer et al., 2005; Rosen et al., 2004). In the female population among the most manifested dysfunctions are low levels of sexual interest and arousal, ranging between 17-55%, and 8-15%, respectively (Lewis et al., 2004). The marked prevalence of sexual concerns in the female population and the fact that the majority of the women affected express a desire to improve the quality of their sex life (Mulhall et al., 2008) illustrate the need for understanding the factors involved in the etiology of sexual dysfunction to develop adequate prevention and treatment strategies.

There are different cognitive factors, which have been suggested to play a role in responding to sexual events, e.g. evaluation of the stimuli, perceived sex role expectations and social pressure (Rupp & Wallen, 2008). The way a person evaluates and appraises sexual stimuli can affect the subjective and genital state of one's arousal. According to the information-processing model of sexual arousal (Janssen, Everaerd, Spiering, & Janssen, 2000) it is possible that nonsexual factors, e.g. current social context, which can occur during the process, may influence

appraisal of sexual cues and lead to lower subjective feelings of arousal. For example, women were expected not to show their interest in sexual activities or take the initiative, as this was expected for men (Crawford & Popp, 2003; Murnen & Stockton, 1997). These differences in socially constructed sex role expectations may lead women to respond according to these expectations, i.e. to under-report their actual sexual experience, whereas men tend to over-estimate their sexual behaviours (Fisher, 2007). Women might also experience social pressure to evaluate sexual stimuli less positively, which, according to the information-processing theory, would lead in turn to lower levels of sexual arousal.

Body image (dis)satisfaction

In general, women experience more body image and weight concerns than men, with prevalence rates ranging between 48-56% and 33-43%, respectively (Brand, Rothblum, & Solomon, 1992; Davison & McCabe, 2005; Garner, 1997; Hoyt & Kogan, 2001; Matthiasdottir, Jonsson, & Kristjansson, 2010; Palladino Green & Pritchard, 2003; von Lengerke & Mielck, 2012). This can be explained by women's dysfunctional belief that men prefer slimmer bodies than they actually do (Forbes, Adams-Curtis, Rade, & Jaberg, 2001; Swami et al., 2010) and/or higher pressure on women to conform to social beauty ideals (Morgan & Arcelus, 2009). Women may feel under pressure to resist their natural instinct for developing a biologically healthy body according to the existing trend of slenderness whilst men may strive for a well-conditioned and healthy body, not too muscular or too fat (Morgan & Arcelus, 2009). Body image dissatisfaction can occur regardless of actual body size (Matthiasdottir et al., 2010), and often it is not actual body weight but women's evaluations of their body size that has a significant effect on a range of aspects of sexuality and well-being (Seal, Bradford, & Meston, 2009; Weaver & Byers, 2006;

Wiederman & Hurst, 1998). Higher BMI, however, may reinforce negative feelings towards one's own body (Weaver & Byers, 2006; Yates, Edman, & Aruguete, 2004).

Dissatisfaction with body weight has been shown to impact overall quality of life (Johnson & Wardle, 2005), and the present literature suggests a crucial role for body image in sexual functioning in healthy women (see review by Woertman & Brink, 2012). Due to the high prevalence of body image dissatisfaction in women, the vast majority of research on sexuality and body image has been conducted in women, generally providing evidence that sexuality and body image are closely associated and may result in disadvantageous effects of preoccupation with body image on females' sexual life (Peplau et al., 2009). There is a scarcity of research using male samples, leaving possible links between negative body image and sexual functioning in men insufficiently explored. The current study aims to fill this gap by including men and women in the sample.

Body image and sexual functioning

It is well established that a positive body image has beneficial effects on sexuality, e.g. having positive and confident attitudes about one's own body is considered a facilitator for experiencing sexual arousal, i.e. a physiological response to sexual stimuli (Graham, Sanders, Milhausen, & McBride, 2004), and the reverse is true as well (Peplau et al., 2009). The mechanisms underlying these associations are, however, still under debate. Concerning the effects of a negative body image on sexual functioning at least two general mechanisms have been suggested (Wiederman, 2011): (1) negative attitudes towards one's own body may result in the avoidance of sexual contacts, and (2) negative body image may act as a distractor during intimate experiences and thereby prevent the experience of sexual satisfaction.

These two general mechanisms are not mutually exclusive, but may – on the contrary – interact in a number of ways: body image dissatisfaction may redirect attention to one’s own body and in turn lead to avoidance of situations that are associated with body exposure, e.g. during sexual activities (La Rocque & Cioe, 2011; Wiederman, 2011). Avoidance of sexual behaviour is associated with negative body-evaluations (La Rocque & Cioe, 2011; Reissing, Laliberté, & Davis, 2005) and also with decreased sexual self-esteem, sexual satisfaction and sexual desire (La Rocque & Cioe, 2011). *Contextual* body image describes state-fluctuations in body image experience during sexual activities and is, for example, more closely associated with lower sexual functioning than general body dissatisfaction (Cash, Maikkula, & Yamamiya, 2004; Steer & Tiggemann, 2008; Yamamiya, Cash, & Thompson, 2006). Anxious preoccupation with one’s appearance and body avoidance during sexual activities is related to poorer sexual functioning, which is reflected in a less pleasurable sexual life, diminished sexual desire and arousal, and more orgasm difficulties (Cash et al., 2004). These relationships between body image and sexual functioning are stronger in women than in men (Træen, Markovic, & Kvaem, 2016; Wiederman, 2011; Woertman & van den Brink, 2012).

Based on the information-processing model of sexual arousal (Janssen et al., 2000), the negative evaluation of sexual stimuli interferes with the experience of sexual arousal, which constitutes one mechanism leading to sexual dysfunction. The negative appraisal of sexual stimuli may redirect one’s attention to focus on nonsexual factors, i.e. a negative body image. Individuals may become more self-conscious about their own body and experience more negative feelings towards it, which in turn may prevent the occurrence of sexual arousal and impact sexual functioning negatively.

STUDY OBJECTIVES AND HYPOTHESIS

The aim of the current study was to investigate a possible effect of evaluative judgements of sexually-explicit stimuli on sexual functioning mediated by body dissatisfaction, and if this relationship differs between men and women. In line with previous results suggesting a larger prevalence of body image concerns (Matthiasdottir et al., 2010) and stronger correlations of body image and aspects of sex life in women than in men (Meana & Nunnink, 2006; Sanchez & Kiefer, 2007), we hypothesized that (I.) correlations of body image dissatisfaction with evaluative judgements of sexual stimuli are stronger in women than in men, and (II.) evaluative judgements of sexual stimuli are associated with sexual functioning levels through the mediating role of body image, and this effect is more pronounced in women than in men.

Available picture sets of sexual stimuli have been criticized for being outdated and not representing current trends of sexual attractiveness, and for only containing a limited number of pictures of heterosexual couples without sexually explicit content (Wierzba et al., 2015). An additional aim of the current study, therefore, was to provide data on evaluative judgements of a more up-to-date and extensive set of sexually explicit pictures for research on appetitive responding by collecting self-report evaluations of general arousal while viewing sexually explicit pictures. In line with previous studies (Bradley, Codispoti, Cuthbert, & Lang, 2001a; Bradley, Codispoti, Sabatinelli, & Lang, 2001b; Murnen & Stockton, 1997), providing evidence for sex differences in responding to sexual stimuli, we expected that (III.) men evaluate erotic images as more pleasant, more arousing, and express a higher motivation to keep looking at their content, than women.

METHOD

Participants

A total of 240 participants (143 females and 97 males) completed an online survey. According to exclusion criteria (self-reported current mental disorder or homosexual identity), 13 participants (8 female and 5 male) were excluded. The final analyses included 227 participants (135 female and 92 male). The nationality breakdown of the sample was as follows: 26.4% German, 19.8% Luxembourgish, 7% French, 4.4% Portuguese, 3.1% Belgian, 1.3% Italian, 12.3% multiple citizenships, and 25.6% other. The majority of participants reported to currently be in a relationship (46% partnership, 21% married, and 4% registered partnership). All participants gave informed consent and had normal or corrected-to-normal vision. Data collection was completed between January and November 2015 by English, French or German speaking participants from the University or the population at large. Every participant received a 20 Euro reimbursement in the form of a gift voucher upon completion. The study received ethics approval from the Ethics Review Panel of the University of Luxembourg.

Trait body image satisfaction was assessed using a short 8-item version of the Body Shape Questionnaire (BSQ-8C; Cooper, Taylor, Cooper, & Fairburn, 1987; Evans & Dolan, 1993), with higher scores indicating having more concerns with body shape. *Contextual body image* was measured with the Body Exposure During Sexual Activities Questionnaire (BESAQ; Cash et al., 2004). This self-report inventory assesses preoccupation with one's physical appearance and avoidance of body exposure in the sexual context, i.e. during sexual relations and activities. Higher BESAQ scores are associated with having more self-conscious focus and avoidance of body during sex. *Sexual functioning* was determined using the Changes in Sexual Functioning Questionnaire Short-Form (CSFQ-14; Keller, McGarvey, & Clayton, 2006), with higher scores

reflecting higher sexual functioning level. The CSFQ is valuable measure for assessing overall sexual function or dysfunction with the advantage of possibility to be used by individuals not currently in a relationship.

Demographic and questionnaire data are presented in Table 1. Female participants were younger and had a lower body mass index (BMI) compared to male participants. Furthermore, women scored higher on trait and contextual body image dissatisfaction, and scored lower on the sexual functioning questionnaire.

Table 1

Means and Standard deviations of Socio-Demographic and Questionnaire Data

	Women	Men	<i>t</i> (df)	<i>p</i>	<i>d</i>
<i>n</i>	135	92	-	-	-
Age (years)	26.72 (7.46)	34.97 (12.11)	-5.82 (137.89)	< .001	0.82
BMI (kg/m ²)	22.41 (3.57)	23.99 (2.93)	-3.51 (225)	< .001	0.48
SES	4.10 (1.02)	4.24 (1.08)	-0.96 (225)	=.34	0.13
BSQ-8C	19.87 (7.49)	13.12 (4.26)	8.31 (202.69)	< .001	1.11
BEASQ	1.47 (0.74)	0.99 (0.57)	5.53 (206.33)	< .001	0.73
CSFQ-14 Total	49.08 (7.29)	56.55 (5.59)	-7.75 (209)	< .001	1.15

Note. Group differences were tested with *t* tests. Degrees of freedom were corrected whenever equality of variances could not be assumed. Cohen’s *d* is reported as a measure of effect size.

BMI = body mass index, SES = Socio-economic status, BSQ-8C = Body Shape Questionnaire (Trait Body Image); BEASQ = Body Exposure during Sexual Activities Questionnaire (Contextual Body Image); CSFQ = Changes in Sexual Functioning Questionnaire

Materials and Design

The visual stimuli database has partly been used in previous research (Finke, Deuter, Hengsch, & Schächinger, 2017) and comprises 306 erotic pictures in a landscape or portrait orientation. Each picture contains sexually explicit content, i.e. nude bodies of an adult man and

an adult woman engaged in a sexual pose or act, or during sexual intercourse with uncovered genitalia. Images were collected from non-copyrighted Internet websites. In addition, we selected 30 stimuli of different valence categories from the IAPS (Lang, Bradley, & Cuthbert, 1999)¹ as control stimuli: neutral ($n = 10$, e.g. household objects), negative ($n = 10$, e.g. accidents, loss, attacking animals, attacking humans), and positive ($n = 10$, e.g. families, children, nature, animals).

The erotic picture database together with the IAPS pictures was divided into six picture sets containing 81 stimuli each: 51 sexually explicit pictures (different for each subset), and 10 neutral, 10 negative, and 10 positive IAPS pictures. For each of the subsets four blocks with a different sequence of pictures were prepared with the constraint that no more than two pictures with erotic content were presented consecutively. Each participant was randomly assigned to one of the six subsets and then was randomly presented with one of four blocks of picture presentation within the relevant subset.

Visual analog scales (VAS) were used to obtain ratings of three dimensions: valence (“I am judging this image as...”, from *negative* to *positive*), arousal (“Confronted with this image I am feeling...”, from *relaxed* to *aroused*), and motivation (“My reaction to this image is to ... looking”, from *stop* to *keep*). The scales represented 101 points (from 1 to 101) and were afterwards reduced to 9-point scales (from 1 to 9).

Each picture was presented on a separate webpage until the participant provided ratings for each scale. Rating scales were displayed below each stimulus.

¹ Image numbers were: neutral – 7000, 7002, 7003, 7004, 7006, 7009, 7018, 7020, 7021, 7025; negative – 1525, 3530, 6313, 9075, 9412, 9414, 9421, 9433, 9900, 9940; positive – 1441, 1463, 1710, 2040, 2050, 2071, 2340, 5760, 5830, 5833.

Procedure

Participation included two face-to-face appointments with the researcher or research assistants. This procedure was introduced to ascertain the age of a participant and to obtain informed consent. During the first appointment, examples of each picture category and rating scales were shown. After completing the informed consent form, participants received a code, which allowed access to the webpage with the online survey and picture material. Carrying out the evaluation of picture material online provided participants with a greater degree of privacy. After finishing the online part of the study, a debriefing appointment was arranged.

Data analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS; Version 25.0). Main effects between picture categories (neutral, positive, sexually explicit, negative) were assessed by one-way repeated-measures ANOVAs, separately for each rating scale (valence, arousal, motivation). Sex differences for the erotic category of stimuli were analysed by a two-factorial ANCOVA for repeated measurements with sex (male, female) and dimension (valence, arousal, motivation), and with age and BMI included as covariates. The Huynh-Feldt epsilon procedure was applied to correct for the violation of the sphericity assumption in repeated-measures designs. In the case of significant effects, Bonferroni corrected *t* tests were performed. Pearson correlations were calculated between picture ratings and self-report measures.

Mediation and moderation analyses were calculated using the PROCESS tool version 3.2.01, and were based on 5000 bootstrapped samples using 95% confidence intervals (Hayes, 2013). To establish the moderated mediation model, three steps of analyses were conducted. First, the indirect effects of picture ratings (independent variable) on sexual functioning level (outcome

variable) via BESAQ (mediator) were analysed separately for each rating scale by simple mediation model 4. In a second step, the interaction effects of sex (moderator) and each rating scale (independent variable) on BESAQ level (outcome variable) were assessed by simple moderation model 1. In the final step, we used model 7 in order to support the moderation effect of sex on the mediation model from step 1 (Hayes, 2015). Age and BMI were included as covariates.

RESULTS

Picture ratings – category and sex differences

We found a significant main effect of picture category on ratings of valence ($F[2.51, 567.33] = 1796.32, p < .001, \eta_p^2 = .89$), arousal ($F[2.88, 650.95] = 400.48, p < .001, \eta_p^2 = .64$), and motivation ($F[2.82, 637.13] = 412.93, p < .001, \eta_p^2 = .65$). Images with high valence content (i.e. positive and sexually explicit) received more positive and more ‘to approach’ ratings than neutral and negative images. The most arousing were sexually explicit and negative stimuli. Negative pictures received the most negative and the most ‘to avoid’ ratings (see Figure 1, Table 2).

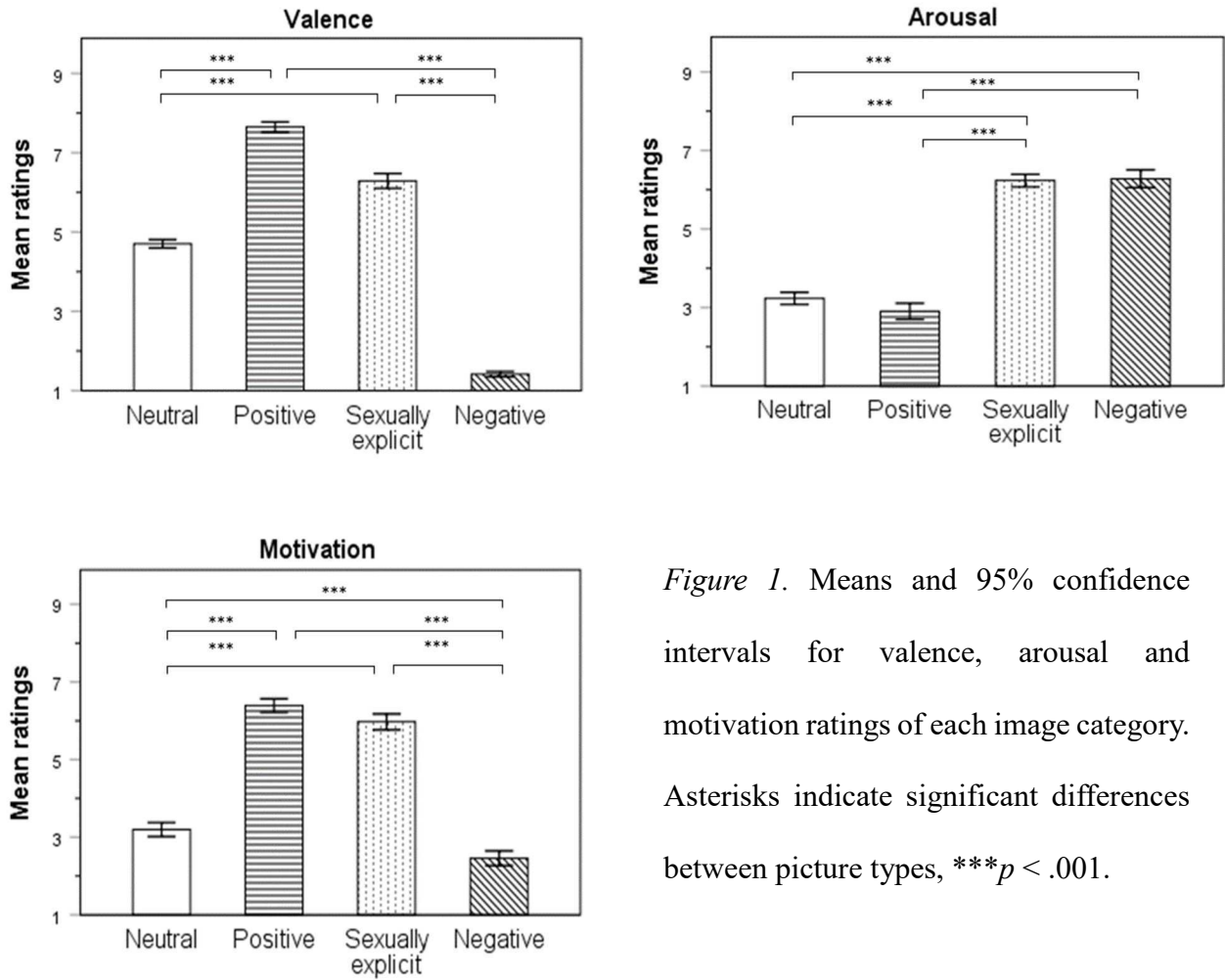


Figure 1. Means and 95% confidence intervals for valence, arousal and motivation ratings of each image category. Asterisks indicate significant differences between picture types, *** $p < .001$.

Table 2

Means and standard deviations of valence, arousal and motivation ratings

	Neutral	Positive	Sexually explicit	Negative
Valence	4.70 (0.80)	7.65 (0.99)	6.29 (1.42)	1.42 (0.52)
Arousal	3.23 (1.19)	2.90 (1.57)	6.23 (1.23)	6.28 (1.73)
Motivation	3.20 (1.37)	6.39 (1.34)	5.97 (1.56)	2.46 (1.45)

Note. SD of the mean is given in parentheses.

There were sex differences in response to sexual stimuli, with men being more responsive to erotic images than women (Figure 2). The interaction effect between sex and dimension on ratings remained significant after controlling for age and BMI, $F(1.82, 406.7) = 4.65, p < .05, \eta_p^2 = .02$. We found significant differences between men and women in ratings of valence ($F[1, 223] = 11.04, p < .001, \eta_p^2 = .05$) and motivation ($F[1, 223] = 8.16, p < .01, \eta_p^2 = .04$) of sexually explicit images, but not for arousal ratings ($p = .103$). Mean valence and motivation ratings were higher in male than female participants, with a mean difference of 0.636, 95% CI [0.259, 1.013], $p = .001$, and 0.607, 95% CI [0.188, 1.026], $p = .005$, respectively.

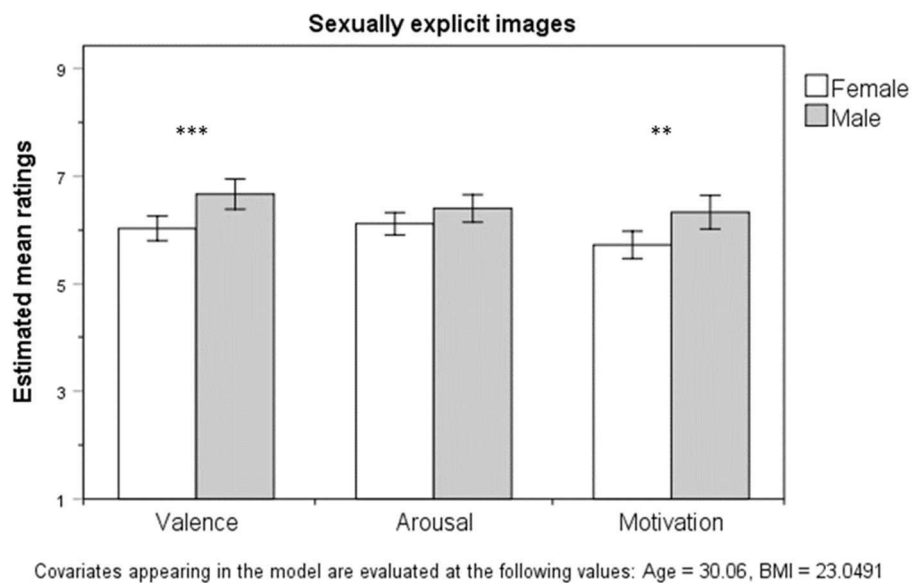


Figure 2. Sex differences in estimated marginal means and 95% confidence intervals for ratings of sexually explicit pictures on valence, arousal, and motivation dimensions. Asterisks indicate significant sex differences, *** $p < .001$, ** $p < .01$.

Body image and evaluative judgements of sexual stimuli

There were no significant correlations (see Table 3) between trait body image dissatisfaction as measured by the BSQ-8C and ratings of sexually explicit pictures, neither in women nor in men. Contextual body image dissatisfaction as assessed by the BESAQ was negatively correlated with women's ratings of sexually explicit pictures on the dimension of valence-and motivation. In men BESAQ scores showed a negative correlation only with valence ratings. There were no significant associations between arousal and contextual body image, neither in women nor in men. Taking these results into consideration, we included contextual body image as a potential mediator of the relationship between evaluative judgements of sexual stimuli and sexual functioning level.

Table 3

Pearson correlations between BESAQ, and BSQ scales and sexually explicit picture ratings for women and men

Sexually explicit pictures	BESAQ	BSQ
<i>Women</i>		
Valence	-.39*** [-.544, -.244]	-.09 [-.293, .095]
Arousal	-.14 [-.284, .016]	.01 [-.151, .178]
Motivation	-.29*** [-.449, -.117]	-.06 [-.254, .110]
<i>Men</i>		
Valence	-.26** [-.440, -.032]	-.08 [-.286, .118]
Arousal	-.17 [-.359, .049]	.04 [-.160, .223]
Motivation	-.18 [-.371, .046]	.01 [-.212, .197]

Note. BSQ = Body Shape Questionnaire, BESAQ = Body Exposure during Sexual Activities Questionnaire. BCa bootstrap 95% CIs reported in brackets.

*** $p < .001$, ** $p < .01$.

Partial mediation effect of contextual body image on the relationship between evaluative judgements of sexual stimuli and sexual functioning

Correlation coefficients between the main study variables are provided in Table 4. While the correlations between sexual functioning level (as measured by the CSFQ) and picture ratings were positive, those between contextual body image (as measured by the BESAQ) and picture ratings were negative. Furthermore, contextual body image and sexual functioning level were negatively correlated.

Table 4

Pearson correlations among sex, age, BMI, CSFQ and BESAQ scales and sexually explicit picture ratings

	1	2	3	4	5	6	7	8
1. Sex	-							
2. Age	.390***							
3. BMI	.227***	.280**						
4. CSFQ	.484***	.263***	.173**					
5. BESAQ	-.331***	-.316***	.029	-.436***				
6. Valence ratings	.336***	.349***	.222***	.450***	-.391***			
7. Arousal ratings	.223***	.289***	.204**	.347***	-.192**	.738***		
8. Motivation ratings	.311***	.345***	.230***	.418***	-.311***	.894***	.800***	-

Note. Sex: 0 = Female, 1 = Male, CSFQ = Changes in Sexual Functioning Questionnaire, BESAQ = Body Exposure during Sexual Activities Questionnaire.

*** $p < .001$, ** $p < .01$.

To assess the role of body image avoidance in a sexual context (as measured by the BESAQ) as a mediator of the relationship between evaluations of sexual stimuli and sexual functioning level (as measured by the CSFQ) separate simple mediation analyses were conducted for each rating scale, i.e. valence, arousal and motivation (see Figure 4 for conceptual and statistical

models). Age of participants and BMI were included in the mediation models as covariates to reduce unexplained variability in the outcome variable, i.e. CSFQ.

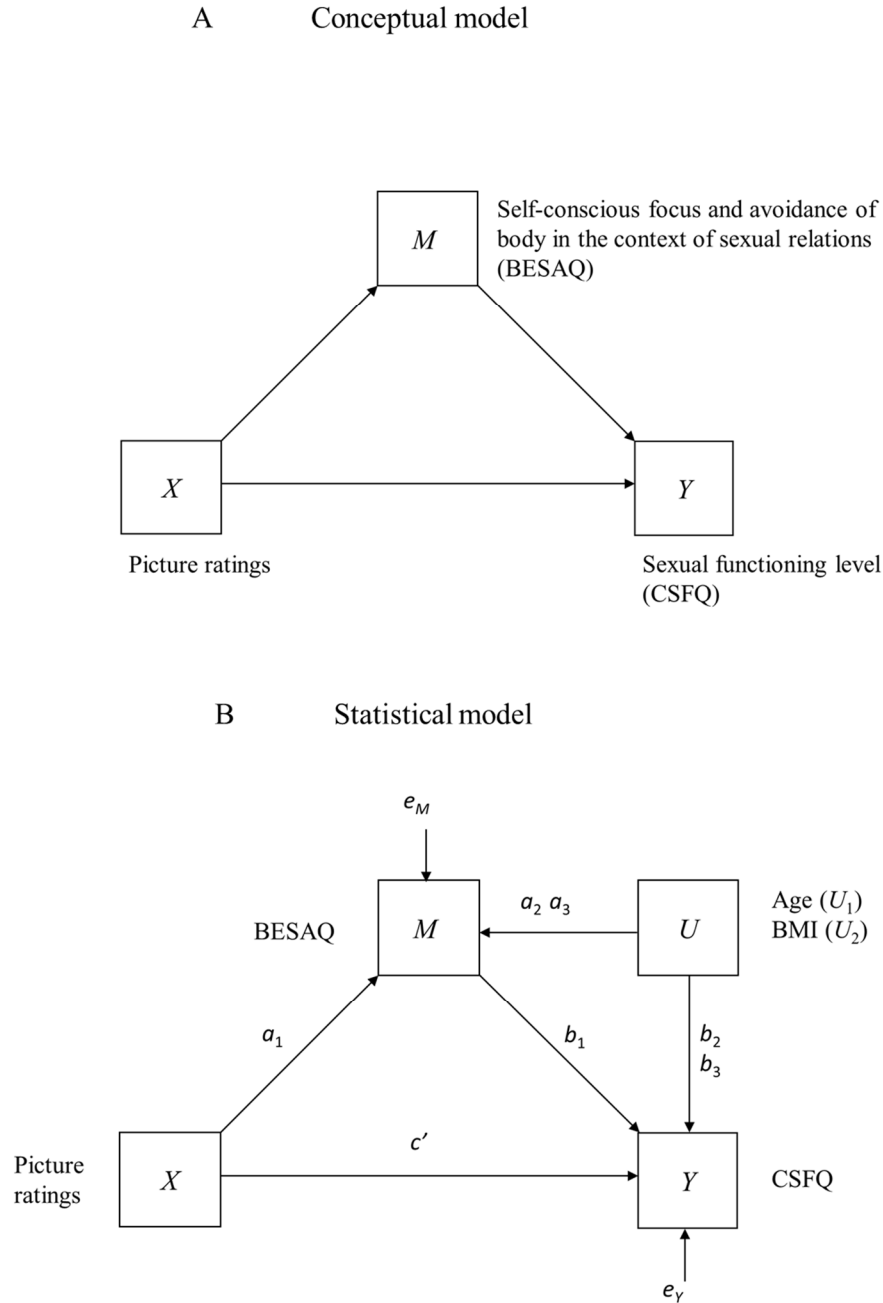


Figure 4. A mediation model in conceptual form (panel A) and in the form of a statistical model (panel B).

As shown in Table 5, evaluations of sexually explicit images in terms of valence, $b = 0.583$, 95% CI [0.279, 0.941], and motivation, $b = 0.425$, 95% CI [0.181, 0.707] were associated with sexual functioning level, and this effect was partially mediated by contextual body image. Participants who rated sexually explicit pictures less positively, and scored lower on ‘to approach’ ratings, reported lower sexual functioning levels if they had a more self-conscious focus on and avoidance of body exposure in the context of sexual experiences. Although the indirect effect of arousal ratings was significant, $b = 0.303$, 95% CI [0.035, 0.608], the mediation model was not significant because arousal ratings of sexually explicit images only marginally predicted BESAQ scores ($b = -0.075$, $p = .052$).

Table 5

Regression coefficients with confidence intervals (standard errors in parentheses) estimating the mediation effects of BESAQ

		BESAQ (<i>M</i>)		CSFQ (<i>Y</i>)	
		Coeff.	95% CI	Coeff.	95% CI
Valence ratings (<i>X</i>)	a_1	-0.17*** (0.03)	-0.24, -0.11	c'	1.56*** (0.35) 0.88, 2.24
BESAQ (<i>M</i>)				b_1	-3.35*** (0.68) -4.68, -2.02
Age (U_1)	a_2	-0.02*** (0.00)	-0.03, -0.01	b_2	0.02 (0.05) -0.07, 0.11
BMI (U_2)	a_3	0.04 [†] (0.01)	0.01, 0.06	b_3	0.24 [†] (0.13) -0.02, 0.51
Constant	i_M	2.03*** (0.32)	1.41, 2.65	i_Y	40.29*** (3.48) 33.44, 47.14
		$R^2 = 0.217$		$R^2 = 0.296$	
		$F(3, 223) = 20.620, p < .001$		$F(4, 222) = 23.309, p < .001$	
Arousal ratings (<i>X</i>)	a_1	-0.08 [†] (0.04)	-0.15, 0.00	c'	1.46*** (0.37) 0.73, 2.19
BESAQ (<i>M</i>)				b_1	-4.06*** (0.65) -5.34, -2.78
Age (U_1)	a_2	-0.02*** (0.01)	-0.03, -0.01	b_2	0.03 (0.05) -0.07, 0.12
BMI (U_2)	a_3	0.03* (0.01)	0.00, 0.06	b_3	0.28* (0.14) 0.01, 0.55
Constant	i_M	1.70*** (0.35)	1.01, 2.39	i_Y	40.91*** (3.55) 33.92, 47.90
		$R^2 = 0.130$		$R^2 = 0.281$	
		$F(3, 223) = 11.093, p < .001$		$F(4, 222) = 21.672, p < .001$	
Motivation ratings (<i>X</i>)	a_1	-0.12*** (0.03)	-0.18, -0.06	c'	1.3*** (0.31) 0.74, 1.94
BESAQ (<i>M</i>)				b_1	-3.67*** (0.66) -4.96, -2.37
Age (U_1)	a_2	-0.02*** (0.01)	-0.03, -0.01	b_2	0.02 (0.05) -0.07, 0.11
BMI (U_2)	a_3	0.04* (0.01)	0.01, 0.06	b_3	0.25 [†] (0.14) -0.01, 0.52
Constant	i_M	1.74*** (0.32)	1.12, 2.36	i_Y	42.43*** (3.30) 35.92, 48.94
		$R^2 = 0.170$		$R^2 = 0.292$	
		$F(3, 223) = 15.265, p < .001$		$F(4, 222) = 22.931, p < .001$	

Note. Picture ratings are mean centered. Sex: 0 = Females, 1 = Males.

*** $p < .001$, ** $p < .01$, * $p < .05$, [†] $p < 0.10$.

Sex differences for the associations between ratings of explicit stimuli and contextual body image

Simple moderation analyses were used to test for sex differences concerning the association between valence, arousal and motivation ratings of sexually explicit pictures and BESAQ. The interaction between sex and valence ratings of sexually explicit images was significant, $b = 0.136$, $t(221) = 2.118$, $p = .035$. The conditional effects (see Figure 3a) indicated that women who evaluated erotic stimuli less positively reported more avoidance of body in sexual context, $b = -0.201$, $t(221) = -5.078$, $p < .001$. In men there was no relationship between valence ratings and BESAQ, $b = -0.065$, $t(221) = -1.243$, $p = .215$. Furthermore, the interaction of sex and motivation ratings was marginally significant, $b = 0.106$, $t(221) = 1.763$, $p = .079$. Analysis of conditional effects (see Figure 3b) revealed that women who expressed less motivation to look at erotic images, had more body avoidance in sexual contexts, $b = -0.134$, $t(221) = -3.676$, $p < .001$. In men there was no relationship between motivation ratings and BESAQ, $b = -0.028$, $t(221) = -0.562$, $p = .575$.

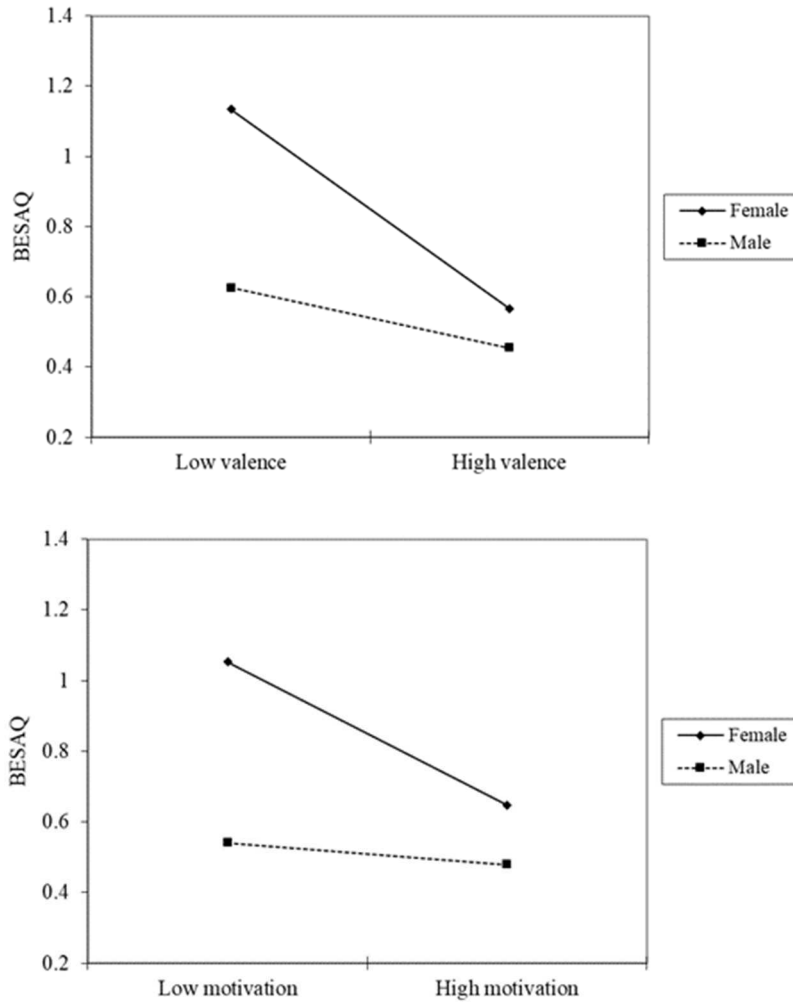


Figure 3a and 3b. Sex differences in the relationship between valence (a) and motivation (b) ratings of sexually explicit images and BESAQ. *Note.* Covariates include age and BMI.

The interaction between sex and arousal ratings on sexually explicit images was not significant, $b = 0.049$, $t(221) = 0.666$, $p = .506$. Neither in men, $b = -0.033$, $t(221) = -0.593$, $p = .554$, nor in women, $b = -0.018$, $t(221) = -1.628$, $p = .105$, was there a significant relationship between arousal ratings and BESAQ levels.

Moderated mediation model

In the final analysis, we tested if the indirect effect of valence and motivation ratings of sexual stimuli on sexual functioning level via contextual body image was moderated by sex (see

Figure 5 for conceptual and statistical models). A first stage moderation was applied as sex was included as a moderator of the a path. An analysis of arousal ratings was not conducted because of the insignificance of the moderation effect.

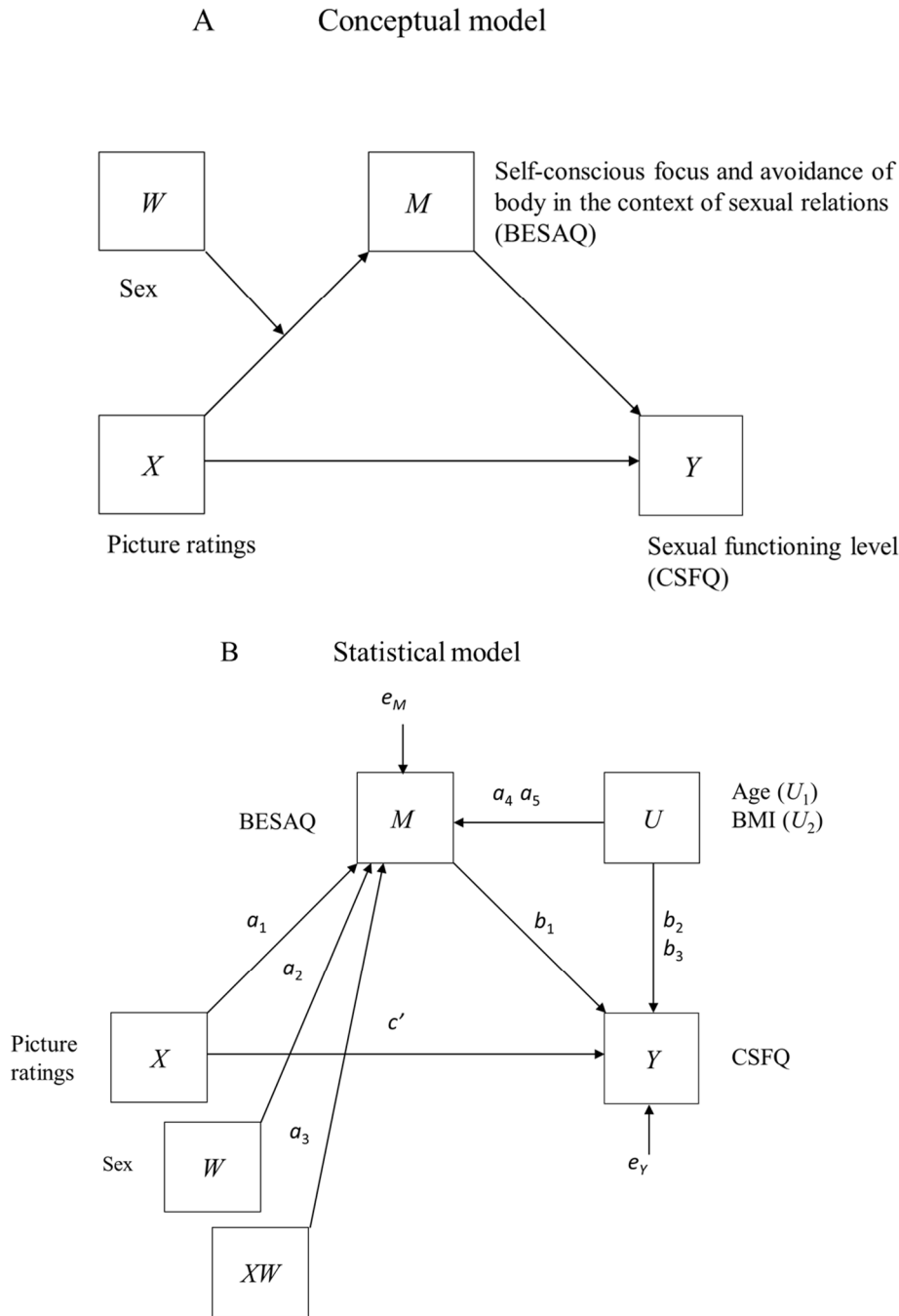


Figure 5. A first stage moderated mediation model in conceptual form (panel A) and in the form of a statistical model (panel B).

The indirect effect of valence ratings on CSFQ level through BESAQ was significant for women, $b = 0.675$, 95% CI [0.288, 1.134], but not for men, $b = 0.218$, 95% CI [-0.094, 0.527] (Table 6). The index of moderated mediation was negative, $b = -0.457$, 95% CI [-1.006, -0.052], indicating that women evaluated sexually explicit images less positively and reported lower levels of sexual functioning if they also reported a stronger avoidance of showing their body in a sexual context.

Table 6

Regression coefficients with confidence intervals (standard errors in parentheses) estimating the moderating effect of sex on valence ratings

	BESAQ (M)		CSFQ (Y)	
	Coeff.	95% CI	Coeff.	95% CI
Valence ratings (X)	a_1 -0.20*** (0.040)	-0.28, -0.12	c' 1.56*** (0.35)	0.88, 2.24
BESAQ (M)			b_1 -3.35*** (0.68)	-4.68, -2.02
Sex (W)	a_2 -0.31*** (0.095)	-0.50, -0.13		
$X * W$	a_3 0.14* (0.064)	0.01, 0.26		
Age (U_1)	a_4 -0.01** (0.005)	-0.02, -0.01	b_2 0.02 (0.05)	-0.07, 0.11
BMI (U_2)	a_5 0.04** (0.013)	0.02, 0.07	b_3 0.24 [†] (0.13)	-0.02, 0.51
Constant	i_M 0.85** (0.298)	0.26, 1.44	i_Y 50.10*** (3.14)	43.92, 56.29
	$R^2 = 0.264$		$R^2 = 0.296$	
	$F(5, 221) = 15.878, p < .001$		$F(4, 222) = 23.309, p < .001$	

Note. Picture ratings are mean centered. Sex: 0 = Females, 1 = Males.

*** $p < .001$, ** $p < .01$, * $p < .05$.

The indirect effect of motivation ratings (see Table 7) was significant for women, $b = 0.490$, 95% CI [0.172, 0.862], but again not for men, $b = 0.102$, 95% CI [-0.232, 0.415]. As confidence intervals of the index of moderated mediation included zero, $b = -0.39$, 95% CI [-0.91, 0.02], no definitive conclusions can be drawn that sex is a moderator of the mediation effect of motivation responses on the sexual functioning level by contextual body image (Hayes, 2015).

Table 7

Regression coefficients with confidence intervals (standard errors in parentheses) estimating moderating effect of sex on motivation ratings

	BESAQ (<i>M</i>)			CSFQ (<i>Y</i>)		
		Coeff.	95% CI		Coeff.	95% CI
Motivation ratings (<i>X</i>)	a_1	-0.13*** (0.04)	-0.21, -0.06	c'	1.34*** (0.31)	0.74, 1.94
BESAQ (<i>M</i>)				b_1	-3.67*** (0.66)	-4.96, -2.37
Sex (<i>W</i>)	a_2	-0.35*** (0.10)	-0.54, -0.16			
<i>X</i> * <i>W</i>	a_3	0.11 [†] (0.06)	-0.01, 0.23			
Age (<i>U</i> ₁)	a_4	-0.02** (0.01)	0.03, -0.01	b_2	0.02 (0.05)	-0.07, 0.11
BMI (<i>U</i> ₂)	a_5	0.04** (0.01)	0.02, 0.07	b_3	0.25 (0.14)	-0.01, 0.52
Constant	i_M	0.90** (0.31)	0.30, 1.51	i_Y	50.41*** (3.16)	44.18, 56.64
		$R^2 = 0.223$			$R^2 = 0.292$	
		$F(221, 5) = 12.678, p < .001$			$F(222, 4) = 22.931, p < .001$	

Note. Picture ratings are mean centered. Sex: 0 = Females, 1 = Males.

*** $p < .001$, ** $p < .01$, * $p < .05$, [†] $p < 0.10$.

DISCUSSION

Body image is a relevant aspect of one's sexual life with the available evidence suggesting that positive attitudes towards one's own body facilitate satisfactory sexual experiences (Graham et al., 2004), whereas dissatisfaction with one's body negatively affects sex life (Peplau et al., 2009). The aim of the current study was to investigate a possible effect of evaluative judgements of sexually-relevant stimuli on sexual functioning mediated by body dissatisfaction, and if this relationship differs between men and women.

Trait vs contextual body image

In partial support of hypothesis (I.), body image dissatisfaction in the context of sexual experiences was negatively correlated with women's ratings of sexually explicit pictures on the dimensions of valence and motivation. In men, BESAQ scores showed a negative correlation only with valence ratings. Trait body image dissatisfaction and ratings of sexually explicit

pictures were not correlated, neither in women nor in men. These results support the notion that contextual body image is a more important factor in explaining difficulties in sexual functioning than general body image (Cash et al. 2004; Steer & Tiggemann, 2008; Yamamiya et al., 2006). It is not overall body image dissatisfaction, but the focus on negative aspects and observations of one's body in sexual contexts that affect responding during sexual experiences (Woertman & van den Brink, 2012) and the evaluation of sexually-relevant stimuli. The present results could be interpreted in terms of negative body image as a distractor during sexual activities (Wiederman, 2011). Women are more prone to distraction during sexual activities than men, especially by cues connected with their appearance, i.e. a negative body image (Meana & Nunnik, 2006; Woertman & van den Brink, 2012). Although, body image dissatisfaction can affect cognitive distraction in both men and women, women are more concerned about their physical appearance during a sexual encounter than men (Meana & Nunnik, 2006). The process of evaluating sexual cues as sexually arousing is influenced, among others, by cognitive state and previous experiences (Rupp & Wallen, 2008). In this context, women who are more dissatisfied with their bodies may pay more attention to cues that are only indirectly associated with the sexual activity, e.g. how they look during intimate encounters, resulting in distracting themselves from concentrating on sexual reactions or experiences. An interesting aspect is that actual body weight does not impact sexual functioning in women, as does the subjective perception of one's body (Weaver & Byers, 2006). Altogether, this evidence extends the knowledge on contextual body image and shows that appraisal and evaluation of one's body plays an important role for responses to sexual stimuli.

Partially mediating role of contextual body image on the association between evaluations of sexual stimuli and sexual functioning

To test whether evaluative judgements of sexual stimuli are associated with sexual functioning levels through the mediating role of body image moderated by sex (hypothesis II) we calculated moderated mediation models, based on the correlations between valence/motivation ratings, sexual functioning and contextual body image satisfaction levels. Valence ratings of sexually explicit images were associated with sexual functioning level, partially mediated by contextual body image. This model was significant for women, but not for men. To the best of our knowledge this is a novel finding, as there is no published evidence of such sex differences, as yet. In accordance with the information-processing model of sexual arousal (Janssen et al., 2000), more negative evaluations of sexual stimuli may be associated with being more attentive to nonsexual cues, like one's own body. This redirection of attention to one's body may lead to avoidance of situations when the body is exposed, i.e. during sexual experiences, and thereby further diminish sexual functioning (La Rocque & Cioe, 2011). Cognitive distraction, which is more pronounced in women, may further intensify a focus on one's body rather than sexual cues (Meana & Nunnik, 2006). The high pressure on women to conform to social beauty ideals (Morgan & Arcelus, 2009) may contribute to stronger body image concerns when confronted with sexual visual stimuli. Sexual attributes that normally are associated with positive affect and sexual arousal may be perceived and evaluated less positively depending on current context (Rupp & Wallen, 2008). In contrast, men may be less prone to withdraw attention from sexual cues, as they tend to respond to sexual stimuli in a more positive way and to be more focused on performance during sexual activities (Meana & Nunnik, 2006).

Sex differences in ratings of sexual stimuli

Finally, the current results provide partial support of hypothesis (III.) concerning sex differences in ratings of sexual stimuli. Men evaluated sexually explicit images more positively and expressed stronger motivation to keep looking at these stimuli as measured by the VAS scales than women. These findings are in line with general assumptions that men are more responsive to sexual stimuli than women (Bradley et al., 2001a; Bradley et al., 2001b; Murnen & Stockton, 1997). These sex differences are likely to be explained by a combination of sociological, evolutionary, physiological and psychological factors (Rupp & Wallen, 2008). Women may feel more social pressure to suppress their interest and reactions to sexual stimuli, and to respond in the manner that is socially desirable and in accordance with gender role expectations present in society (Fisher, 2007; Rupp & Wallen, 2008). Another possible explanation might be a milder sex drive, i.e. a lower level of sexual motivation, expressed by women (Baumeister, Catanese, & Vohs, 2001; Lippa, 2009).

The null findings concerning sex differences in arousal ratings of sexually explicit images may reflect the specificity of this rating dimension, i.e. evaluations of arousal during picture viewing provide information on the intensity of stimulus valence, whereas self-report *sexual* arousal is more complex and based on cognitive and physiological reactions (Basson, 2002; Janssen et al., 2000; Rupp & Wallen, 2008). Participants were asked to assess the intensity of their feelings towards erotic pictures in terms of general and not explicitly sexual arousal. Hence, it is possible that for some participants, sexually explicit pictures elicited more negative valence, which could in turn be associated with higher arousal. An inclusion of an additional scale of subjective sexual arousal in future studies could provide more information about the evaluative judgements when confronted with visual erotic stimuli.

Limitations

Firstly, the correlational aspect of the study does not allow for causal conclusions to be drawn. Secondly, the current sample only included self-identified heterosexual men and women. Broadening the study population to include those with other sexual orientations would allow for testing the generalizability of the proposed mediation model. Furthermore, the lack of self-report measures of sexual arousal did not allow for the assessment of the effect of sexually explicit images on general sexual arousal. Another limitation concerns the uneven sized male and female subgroups, although the difference in percentages in the current study was not as large (41% men, 59% women) as in other studies on body image and sexual functioning with approx. 70% female participants (e.g. La Rocque & Cioe, 2011; Peplau et al. 2009). It has been pointed out that the unequal number of men and women, which can occur when undergraduate student samples are used, often affects research on sexuality (Dickinson, Adelson, & Owen, 2012) and can be a result of the higher percentage of female students in psychology study programs (Ayalon, 2003). Nevertheless, characteristics on which men and women significantly differed in the current study (i.e. age and BMI) were included in the analyses as covariates and did not affect the results.

CONCLUSIONS

Results from the current study support the notion of an association between body image (dis)satisfaction and sexual functioning in heterosexual women. Cognitive factors, such as body image concerns, that modify self-report sexual arousal seem important to further understand the mechanisms involved in sexual (dys)function. Advancing the knowledge of the role of these cognitive factors may contribute to the improvement of interventions to treat sexual dysfunctions (Rupp & Wallen, 2008). It has been argued that, especially in women, current sexual therapeutic

approaches emphasize physiological aspects (e.g. sufficient vaginal lubrication) and that this should be complemented or even replaced by cognitive therapy (Rupp & Wallen, 2008). Future research should focus on the role of contextual body image as a component of trait body image or – alternatively – as a separate construct. In addition, the present study provides data on evaluative judgements of the picture-set used, which contributes to its validation and, therefore, its use in future research on affective responding to sexually explicit pictures.

3.2. Psychophysiological responses to sexually explicit visual stimuli

Czeluscinska-Peczkowska, A., Schulz, A., Blechert, J., Lutz, A. P. C., Deuter, Ch. E., & Vögele, C.

Psychophysiological responses to sexually explicit visual stimuli. Manuscript in preparation.

ABSTRACT

In the current study, 25 women and 21 men were presented with sexually explicit pictures while psychophysiological measures of general arousal (heart rate and startle reflex) were continuously monitored. Furthermore, data on trait and contextual body image and sexual functioning was collected. The psychophysiological findings support the assumption of stronger general arousal in response to sexually explicit visual stimuli indicated by reduced startle magnitudes when compared to neutral images. Heart rate changes during the presentation of images revealed content differences in heart rate waveform. During the first 4 s after stimulus presentation HR decelerated more in response to neutral stimuli than to sexual stimuli. The last phase of picture viewing, i.e. 5-6 s, was associated with HR acceleration for neutral images and HR deceleration for sexual stimuli.

Keywords: body image dissatisfaction, sexual functioning, sexually explicit images, heart rate, startle modulation

INTRODUCTION

Self-report sexual arousal is based on the combination of the individual's physiological and cognitive changes, which appear concurrently and can depend on each other (Bancroft, 2009; Barlow, 1986; Basson, 2002; Janssen, Everaerd, Spiering & Janssen, 2000; Laan & Janssen, 2007; Rupp & Wallen, 2008). While physiological responses refer to general, i.e. cardiovascular and respiratory changes, genital sexual arousal refers to sex specific changes, i.e. in men erection of the penis and in women lubrication of the vagina. Cognitive processes attribute sexual meaning to these changes (Bancroft, 2009; Rupp & Wallen, 2008). Physiological changes can occur while a sexual stimulus is encountered, yet they do not serve as an ultimate determinant in responding to it, as cognitive factors play an important role (Rupp & Wallen, 2008; Winton, Putnam, & Krauss, 1984).

The process of generating sexual arousal, i.e. subjective experiences of excitement and pleasure, is liable to the effects of cognitive factors in different ways for men and women (Dewitte, 2016; Everaerd, 1988; Rupp & Wallen, 2007; Spiering, Everaerd, & Laan, 2004). The discordance between subjective and physical arousal is more frequently observed in women (Chivers, Seto, Lalumière, Laan, & Grimbos, 2010), and may reflect the effects of the social context and cognitive mechanisms in female's responding, such as suppressing subjective evaluations and responding according to social norms (Rupp & Wallen, 2008). This phenomenon has been demonstrated in studies where - despite of increased genital arousal - women tend to report lower or no increase in their subjective experiences (Laan, Everaerd, van Bellen, & Hanewald, 1994) or express negative feelings (Peterson, & Janssen, 2008). Thus, the differences between men and women in subjective responses to sexual stimuli may reflect the relevance of cognitive factors and effects of social factors.

The process of evaluation of sexual cues determines subjective sensations of being excited and may further facilitate or suppress physical and subjective arousal (Janssen et al., 2000). In case of the negative evaluation of the on-going process, the interest and motivation in sexual behaviour can be diminished (Toates, 2009). This inhibition of engaging in sexual activity may be triggered by internal factors, e.g. social pressure of having a slim body in women. As women are found to express lower ratings of valence and arousal (Bradley, Codispoti, Cuthbert, & Lang, 2001b), it is important to explore at which stage of sexual responding these sex differences occur and to what extent specific cognitive factors impact arousal. The evaluation of sexual cues, including physiological arousal evoked by sexually relevant stimuli, therefore, represents an important determinant of sexual functioning. To understand the determinants of sexual response, it is mandatory to compare both physiological and cognitive processes between men and women.

The high pressure to conform to social beauty ideals is indisputable (Morgan & Arcelus, 2009), although it seems to have more impact on females, as suggested by the high prevalence rate of body image dissatisfaction in women, ranging between 48-56% (Matthiasdottir, Jonsson, & Kristjansson, 2010). The relationship between body image and sexual functioning has been well established and there is evidence that dissatisfaction with one's body can inhibit the experience of sexual arousal (Peplau et al., 2009). Focusing on negative aspects and observations of one's own body can affect responding during sexual experiences by leading to the avoidance of stimuli that have sexual content and/or by acting as a distractor during intimate experiences, thereby preventing the experience of sexual satisfaction (Wiederman, 2011). The more negative evaluation of sexual cues may lead to paying more attention to one's own body (Janssen et al., 2000).

To date, the relationship between body dissatisfaction and sexual functioning is mainly based on correlational studies using self-reports, and has rarely been investigated experimentally. This is, however, of high importance, as self-reports can be biased by sexual ideations and social desirability (Fisher, 2007; Rupp & Wallen, 2008). Psychophysiological measures may represent, therefore, another level of observation to differentiate between self-report and physiological responses to erotic stimuli, especially in women who often experience discordance between these two indices of sexual arousal (Laan & Everaerd, 1995; Suschinsky, Lalumière, & Chivers, 2009) and may even show significant changes in genital response without experiences of subjective arousal (Chivers & Bailey, 2005). To address this yet unresolved issue, the current study aims to investigate the relationship between body image and responses to visual sexual stimuli as an indicator of sexual functioning. Importantly, to overcome the possible shortcomings of self-reports of sexual arousal in body dissatisfaction, we focus on psychophysiological responses, which are independent of subjective bias (Lang, Bradley, & Cuthbert, 1990).

Sexual arousal includes the activation of specific neural networks in the central and the autonomic nervous system as well as cognitive processes (Bancroft, 2009). One aspect is the affective-motivational state that affects approach or avoidance behaviour towards affectively relevant stimuli, such as erotic pictures (Bradley, Codispoti & Lang, 2006; Lang et al., 1990). These states are mediated by the activation of structures in the limbic system (e.g. amygdala), which can be indirectly observed by the modulation of the startle eye blink response to acoustic probes (Koch, 1999; Davis, 2006). Eye blink responses to acoustic startle stimuli while presenting a foreground stimulus of affective valence reflect an affective-motivational state of approach or avoidance (Bradley et al., 2001a; Cuthbert, Bradley, & Lang, 1996; Lang, et al., 1990). Another indication of sexual arousal is the activation of autonomic circuits, whose

activity can be indexed by heart rate changes (Bancroft, 2009). Both of these measures, i.e. startle response modulation and heart rate, have been extensively used as indicators of affective responding to visual sexual stimuli (e.g. Bradley et al., 2001a, 2001b). Previous studies reported a similar pattern of startle modulation for men and women with the smallest startle eye blink responses to an acoustic stimulus in response to viewing positive/attractive stimuli, which included pictures of opposite-sex nudes or erotic couples, compared to neutral stimuli (Giargari, Mahaffey, Craighead, & Hutchison, 2005; Simons & Zelson, 1985; Vrana et al., 1988), and pleasant nonsexual stimuli and unpleasant stimuli (Bradley et al., 2001a; Bradley et al., 2006; Prause, Janssen, & Hetrick, 2008). The emotional arousal evoked by affective pictures has been shown to result in different heart rate patterns, with the most commonly observed pattern in men representing a triphasic waveform, first showing initial deceleration, with subsequent acceleration, and latter deceleration (e.g. Bradley et al., 2001a; Wood & Obrist, 1968), or in both men and women sustained deceleration (Brosschot & Thayer, 2003; Rowland, 2010; Palomba, Angrilli, & Mini, 1997; Pollatos, Herbert, Matthias, & Schandry, 2007). As exposure to visual sexual stimuli is associated with activation of appetitive motivation in both men and women, we do not expect any sex differences in startle reflex modulation and heart rate.

It has been suggested that the way men and women perceive and process sexual stimuli may be one of the possible explanations for the reported discordance between subjective arousal and physiological responses in females (Rupp & Wallen, 2008). The more positive evaluations of sexual stimuli and greater awareness of body changes may facilitate appraisal of subjective sexual arousal (Basson, 2002). Even though women may experience significant genital changes when shown sexual stimuli, they may inhibit self-report sensations of being aroused and evaluations of stimuli.

STUDY AIM

The purpose of this study was to investigate sex differences in evaluative judgments, psychophysiological indicators of affective arousal (heart rate) and a measure of affective-motivational state of approach or avoidance (startle response modulation) while viewing sexually explicit images. As the presentation of affective stimuli causes a stronger deceleration in heart rate than neutral stimuli (Bradley et al., 2001a), we expected to find the same effect for sexually-explicit images. In line with the affective startle modulation approach (Giargari et al., 2005; Simons & Zelson, 1985; Vrana et al., 1988), startle stimuli evoke lower responses when paired with stimuli of positive affective valence and high arousal than neutral stimuli. We, therefore, hypothesised that (I.) sexually-explicit images are evaluated as more positive, more arousing and receive more motivation to continue looking, and these ratings are higher in men; (II.) viewing erotic stimuli elicits initial heart rate deceleration and attenuated startle magnitude compared to neutral stimuli (increased general arousal); (III). body image and sexual functioning level is correlated with general arousal.

An additional aspect of the study concerned the use of a new stimulus set to evoke sexual arousal. The potential utility of sexually-explicit stimuli underlie rapid changes associated with social norms of aesthetic and erotic attractiveness. Databases of sexual pictures have to be updated continuously. To validate the image database used in the current study, the aim was to test if, in addition to self-report ratings, psychophysiological indicators also provide evidence for stronger arousal in response to sexually-explicit stimuli.

METHOD

Participants

A total of 46 participants (25 female and 21 male) were invited to participate in the experimental session. The nationality breakdown of the sample was as follows: 28% Luxembourgish, 11% French, 7% German, 11% multiple citizenships, and 28% other. The majority of participants declared to be currently in a relationship (37% partnership, 28% married, and 2% registered partnership). All participants gave informed consent and had normal or corrected-to-normal vision. Data collection was completed between June and October 2015 by English, French or German speaking participants recruited from the University and the population at large. Participants received a 20 Euro reimbursement in the form of a gift voucher upon completion. The study received ethics approval by the Ethics Review Panel of the University of Luxembourg.

Trait body image satisfaction was assessed using a short 8-item version of the Body Shape Questionnaire (BSQ-8C; Cooper, Taylor, Cooper, & Fairburn, 1987; Evans & Dolan, 1993), with higher scores indicating having more concerns with body shape. *Contextual body image* was measured with the Body Exposure During Sexual Activities Questionnaire (BESAQ; Cash, Maikkula, & Yamamiya, 2004). Higher BESAQ scores are associated with having more self-conscious focus and avoidance of body in sexual context, i.e. during sexual relations and activities. *Sexual functioning* was determined using the Changes in Sexual Functioning Questionnaire Short-Form (CSFQ-14; Keller, McGarvey, & Clayton, 2006), with higher scores reflecting higher sexual functioning level.

Demographic and questionnaire data are shown in Table 1. Women had a lower BMI and scored lower on the sexual functioning questionnaire compared to men.

Table 1

Means and Standard deviations of Socio-Demographic and Questionnaire Data

	Women	Men	<i>t</i> (df)	<i>p</i>	<i>d</i>
<i>n</i>	25	21	-	-	-
Age (years)	29.08 (7.48)	32.48 (9.40)	-1.37 (44)	.18	0.40
BMI (kg/m ²)	21.94 (2.88)	25.09 (2.52)	-3.91 (44)	< .001	1.16
SES	4.44 (1.04)	4.57 (1.03)	-0.43 (44)	.67	0.13
BSQ-8C	19.64 (8.31)	17.14 (5.04)	1.253 (40.36)	.217	0.36
BEASQ	1.22 (0.73)	0.93 (0.53)	1.503 (44)	.140	0.45
CSFQ-14 Total	51.44 (7.19)	57.24 (5.80)	-2.970 (44)	< .01	0.89

Note. Group differences were tested with *t* tests. Degrees of freedom were corrected whenever equality of variances could not be assumed. Cohen's *d* is reported as a measure of effect size. BMI = body mass index, SES = Socio-economic status, BSQ-8C = Body Shape Questionnaire (Trait Body Image); BEASQ = Body Exposure during Sexual Activities Questionnaire (Contextual Body Image); CSFQ = Changes in Sexual Functioning Questionnaire

Materials and Design

Eighteen erotic pictures that contains sexually explicit content, i.e. nude bodies of an adult man and an adult woman engaged in a sexual pose or act, or in sexual intercourse with uncovered genitalia, were included. Images were collected from non-copyrighted Internet websites and has partly been used in previous research (Finke, Deuter, Hengesch, & Schächinger, 2017). In addition, eighteen neutral stimuli served as a control condition: nine pictures of fully clothed men and women in a daily situation (downloaded from www.fotolia.com), and nine pictures of households from the IAPS (Lang, Bradley, & Cuthbert, 1999)². All stimuli were presented for 6 seconds, i.e. the time frame presentation used in previous studies (Bradley et al., 2001a).

² Neutral image numbers were: 7000, 7002, 7003, 7004, 7006, 7009, 7020, 7021, 7025.

Visual analog scales (VAS) were used to obtain ratings of three dimensions: valence (“I am judging this image as...”, from *negative* to *positive*), arousal (“Confronted with this image I am feeling...”, from *relaxed* to *aroused*), and motivation (“My reaction to this image is to ... looking”, from *stop* to *keep*). The scales represented 101 points (from 1 to 101) and were afterwards reduced to 9-point scales (from 1 to 9).

The acoustic startle stimulus (i.e. burst of white noise, 50 ms, 105dB[A], binaural stimulation, instantaneous rise time) was emitted via headphones between 3 and 5 s (randomized) after picture onset. Fifteen out of eighteen pictures of each category (sexually explicit and neutral) were randomly paired with the white noise.

Psychophysiological Responses

Heart rate (HR) was derived from an electrocardiogram (ECG) using three Ag/Ag–Cl electrodes placed onto the thorax (Einthoven lead II configuration) and recorded with a BIOPAC MP150 Bio-Amplifier (BIOPAC Systems, Inc.). Startle eye- blink response were derived from the electromyogram (EMG) of the M. orbicularis oculi and recorded with two Ag/Ag–Cl electrodes placed below the non-dominant eye using the same amplifier set-up.

Psychophysiological data was recorded on hard disk with a Biopac MP150 amplifier system (Biopac Systems, Inc., Goleta, CA) with an EMG100C for EMG, an ECG100C module for ECG at 16-bit resolution and 1 kHz sampling rate. Hardware band-pass filter settings for EMG assessment were 10–500 Hz, followed by a 28 Hz software high-pass filter (van Boxtel, Boelhouwer, & Bos, 1998). The raw signal was rectified and integrated online with a time constant of 10 ms (Blumenthal, 1994). The ECG signal was high-pass filtered (0.5 Hz) before storage.

Procedure

Participants attended a single laboratory session. Before obtaining informed consent, participants were shown examples of each picture categories and rating scales. In the next step, information about sociodemographic and health status was collected. Participants were then instructed to passively view images on a computer screen. They were also informed about loud noises that they may hear during the presentation. At the end of the experiment, participants evaluated the pictures on three dimensions. All participants received a written debriefing form after completion of the experiment and were given the opportunity to ask any questions.

Data reduction and analysis

Analysis of the ECG signal was performed with WinCPRS software (Absolute Aliens, Turku, Finland). Software-filtered raw data was manually inspected for artefacts and the interbeat intervals were converted into HR expressed in beats per minute (bpm). The ECG time series were linearly interpolated and resampled with a sampling rate of 4 Hz. The reference point was set as an average activity over the 1 s prior to the stimuli presentation, during the inter-trial interval. HR change score was calculated by subtracting the reference point from the average activity during each half-second response.

The startle eye blink response was categorized as the first maximum increase of EMG activity of the M. orbicularis oculi in a time interval between 20 and 150 ms after startle probe onset. Startle attenuation was calculated by subtracting the standardized startle responses during presentation of sexual stimuli from the standardized startle responses during presentation of neutral stimuli (households or people) following within-subject *T* score standardization of the raw startle response. The use of standardized startle responses has been shown to be a validate measure of affective responding (Bradford, Starr, Shackman, & Curtin, 2015).

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS; Version 25.0). Main effects and sex differences between picture categories (neutral households, neutral people, sexually explicit) were assessed by a two-way ANOVA for repeated measures separately for each rating scale (valence, arousal, motivation). Furthermore, a three-way repeated measures ANOVA was run to determine the sex differences of the effect of different picture category over time on heart rate changes (Bradley et al., 2001a). Planned contrast were conducted to test the pattern of the waveform, i.e. cubic or quadratic. Next, in order to evaluate the effect of picture category and sex on startle response magnitudes, 3×2 mixed ANOVAs were performed. The Greenhouse-Geisser epsilon procedure was applied to correct for the violation of the sphericity assumption in repeated-measures designs. In the case of significant effects, Bonferroni corrected t tests were performed. Finally, to elucidate the potential relationships between the physiological and the subjective measures of arousal, Pearson correlations were performed between heart rate responses, startle attenuation and self-report measures of body image dissatisfaction (BESAQ) and sexual functioning level (CSFQ).

RESULTS

Picture ratings

We found a significant main effect of picture category on ratings of valence ($F[1.71, 75.38] = 53.24, p < .001, \eta_p^2 = .55$), arousal ($F[1.50, 65.87] = 131.16, p < .001, \eta_p^2 = .75$), and motivation ($F[1.50, 66.10] = 81.23, p < .001, \eta_p^2 = .65$). As illustrated in Figure 1, ratings of sexually explicit pictures on each dimension were significantly higher than both type of the neutral pictures. Sexually-relevant images were rated as more positive and more arousing, and received more ‘to approach’ motivation ratings than neutral images of households or than photos of people in daily situations. Additionally, pictures with people in daily situations were rated as more positive,

more arousing, and received higher ratings of motivation to continue looking at than pictures of households items.

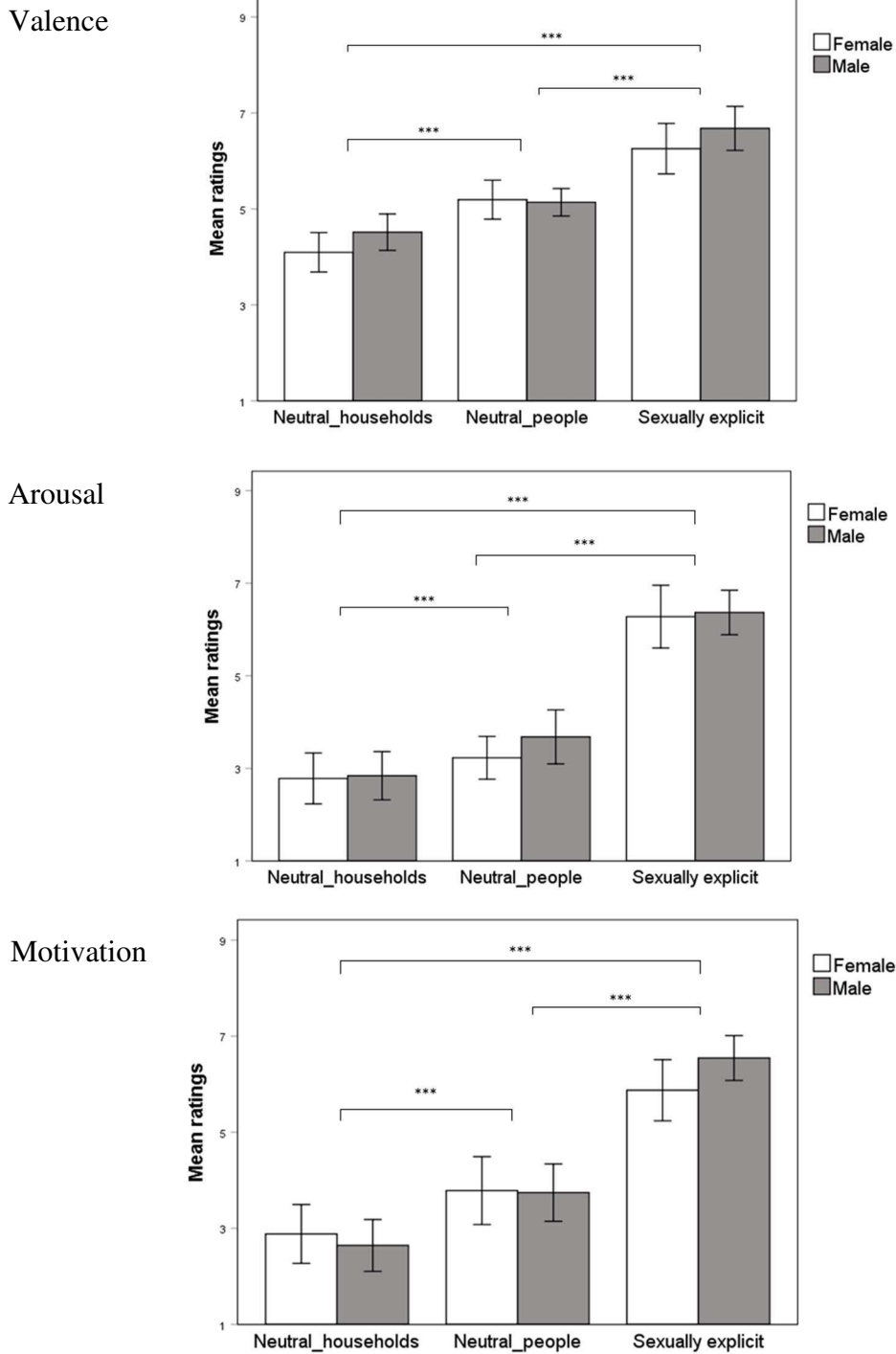


Figure 1. Means and 95% confidence intervals for valence, arousal, and motivation ratings of each image category. Asterisks indicate significant differences between picture types, *** $p < .001$.

There was no statistically significant interaction between sex and picture category on valence, $F(1.71, 75.38) = 0.85, p = .42, \eta_p^2 = .02$; arousal, $F(1.50, 65.87) = 0.45, p = .58, \eta_p^2 = .01$; and motivation ratings, $F(1.50, 66.10) = 1.48, p = .24, \eta_p^2 = .03$, indicating that there are no differences in ratings reflecting the three categories between men and women. As shown in Table 2, men and women gave comparable ratings to neutral pictures of households, images of people in daily situations and sexually explicit images. Furthermore, we found no statistically significant main effect of sex on valence, $F(1, 44) = 2.68, p = .11, \eta_p^2 = .06$; arousal, $F(1, 44) = 0.54, p = .47, \eta_p^2 = .01$; and motivation, $F(1, 44) = 0.23, p = .63, \eta_p^2 = .01$.

Table 2

Mean ratings of valence, arousal and motivation of neutral and sexually explicit images in males and females

	Neutral households		Neutral people		Sexually explicit	
	F	M	F	M	F	M
Valence	4.10 (1.00)	4.52 (0.83)	5.19 (0.99)	5.14 (0.63)	6.26 (1.27)	6.68 (1.01)
Arousal	2.78 (1.33)	2.84 (1.15)	3.23 (1.12)	3.68 (1.28)	6.28 (1.65)	6.37 (1.06)
Motivation	2.88 (1.48)	2.64 (1.18)	3.78 (1.71)	3.74 (1.31)	5.87 (1.54)	6.54 (1.02)

Note. *SD* of the mean is given in parentheses.

Heart rate

As illustrated in Figure 2, there was a significant interaction between picture category and time on heart rate changes, $F(5.59, 246.13) = 4.99, p < .001, \eta_p^2 = .10$. In general, the initial HR response to neutral and sexual stimuli was characterized by an initial deceleration. After the first two seconds, however, an acceleration could be observed for neutral images of households and sexually explicit images, while the HR response remained stable for the neutral images of people. The last phase of picture viewing, i.e. 5-6 s, was associated with HR acceleration for

neutral images and HR deceleration for sexual stimuli. The observed HR waveforms were confirmed by a significant cubic trend when viewing images with sexually explicit content, $F(1, 44) = 8.30, p < .01, \eta_p^2 = .16$, and neutral images of households, $F(1, 44) = 5.37, p < .05, \eta_p^2 = .11$. A significant quadratic trend was observed during presentation of neutral images of people, $F(1, 44) = 4.93, p < .05, \eta_p^2 = .10$.

Simple effects revealed that HR change from the reference point was not statistically different between picture categories in the first 5 s of picture viewing. In the last phase of picture viewing, however, sexually relevant stimuli showed greater average HR decrease from the reference point when compared to either neutral images category. HR change in the 5.5th second of stimuli presentation was statistically different between pictures with sexual content ($M = -0.69, SD = 1.73$) and neutral images of households ($M = 0.44, SD = 1.95$), $F(2, 90) = 4.35, p < .05, \eta_p^2 = .10$. Moreover, in the 6th second sexually relevant images ($M = -1.02, SD = 1.71$) produced further HR decrease from the reference point when compared to neutral images of households ($M = 0.68, SD = 1.87$), and to the neutral images of people ($M = 0.15, SD = 2.09$), $F(2, 90) = 9.49, p < .001, \eta_p^2 = .17$.

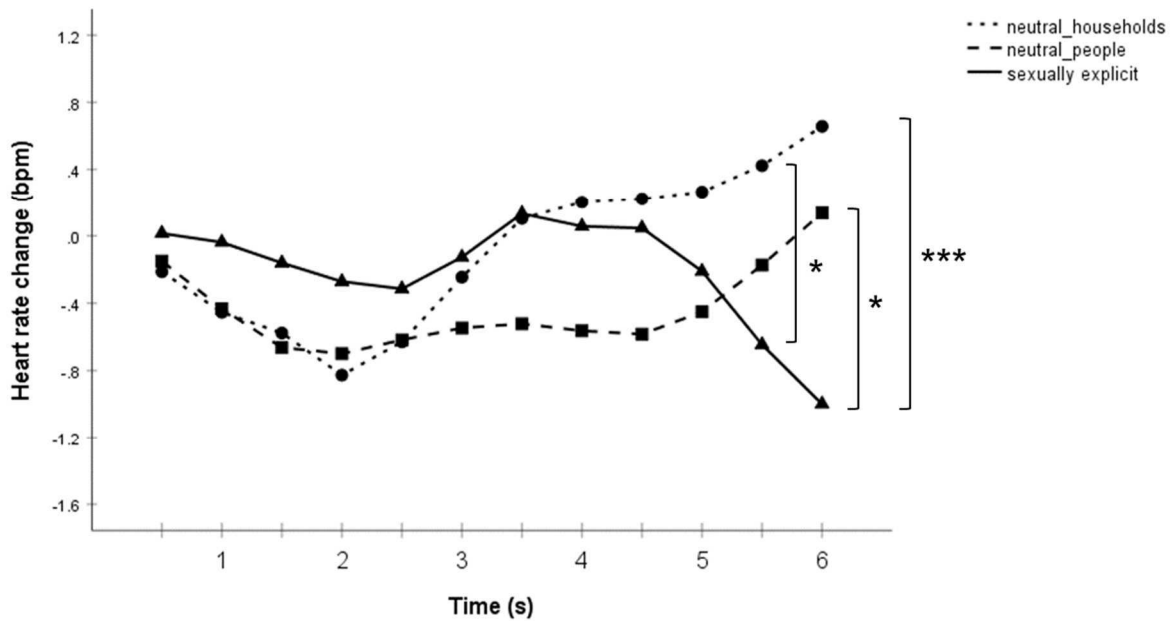


Figure 2. Averaged waveforms for HR change when viewing sexually explicit and neutral images (* $p < .05$, *** $p < .001$).

There were no significant sex differences in interactions between picture category and time on heart rate changes, $F(5.59, 246.13) = 1.17$, $p = .32$, $\eta_p^2 = .03$. Furthermore, no significant correlations were found between HR change during presentation of neutral and sexually explicit images, and self-report measures of body image and sexual functioning levels.

Startle modulation

There was a statistically significant main effect of picture category and startle eye blink responses to an acoustic stimulus, $F(1.72, 63.69) = 9.00$, $p < .01$, $\eta_p^2 = .20$. As illustrated in Figure 3, sexually explicit pictures produced significantly smaller startle eye blink responses ($M = 48.30$, $SD = 2.21$) when compared to neutral images of households ($M = 51.94$, $SD = 4.54$; $p < .01$), or photos of people in daily situations ($M = 50.56$, $SD = 3.55$; $p < .05$). There were no

significant differences in startle magnitudes between the two types of neutral pictures categories ($p = .36$).

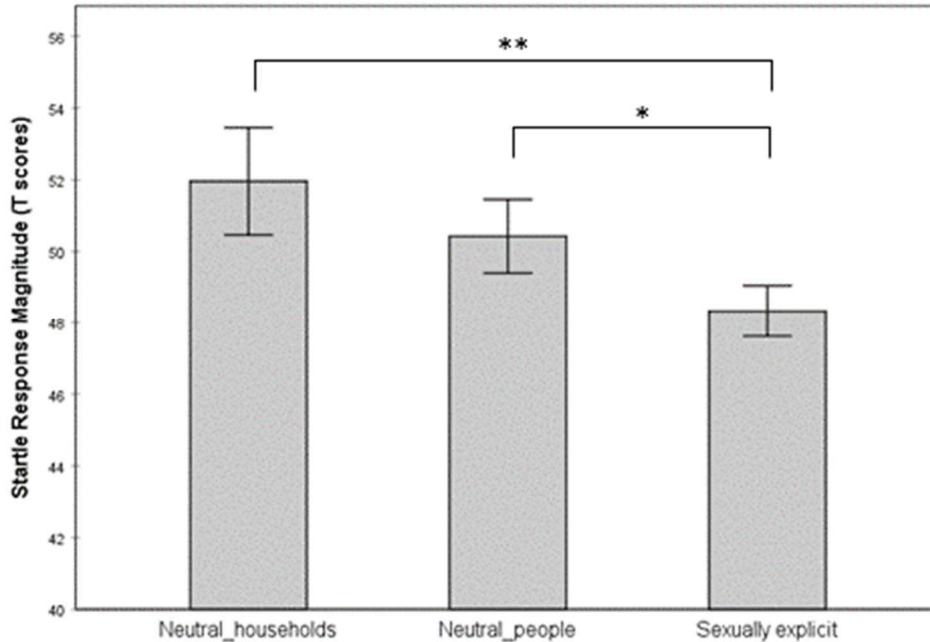


Figure 3. Means and 95% confidence intervals for T -scored startle response magnitudes when viewing sexually explicit and neutral images. Asterisks indicate significant differences between picture type, ** $p < .01$, * $p < .05$.

The interaction of sex and picture category on startle response was significant ($F[1.72, 63.69] = 3.89, p < .05, \eta_p^2 = .10$). There was a significant effect of picture category on startle response in women ($F[1.54, 30.84] = 7.84, p < .01, \eta_p^2 = .28$), and in men $F[2, 34] = 5.24, p < .05, \eta_p^2 = .24$). In women (Figure 4), sexually explicit images produced the smallest startle magnitude when compared to neutral photos of people and photos of households with a mean difference of -4.252, 95% CI [-6.335, -2.170], $p < .001$, and -3.814, 95% CI [-7.280, -0.349], $p < .05$, respectively. In men, sexually explicit images produced smaller startle magnitude when compared to the photos

of households (-3.434, 95% CI [-6.654, -0.214], $p < .05$) but not when compared to the photos of people ($p > .99$).

No significant correlations were found between startle magnitudes (measured as a difference between sexually-explicit and neutral images), and self-report measures of body image and sexual functioning levels.

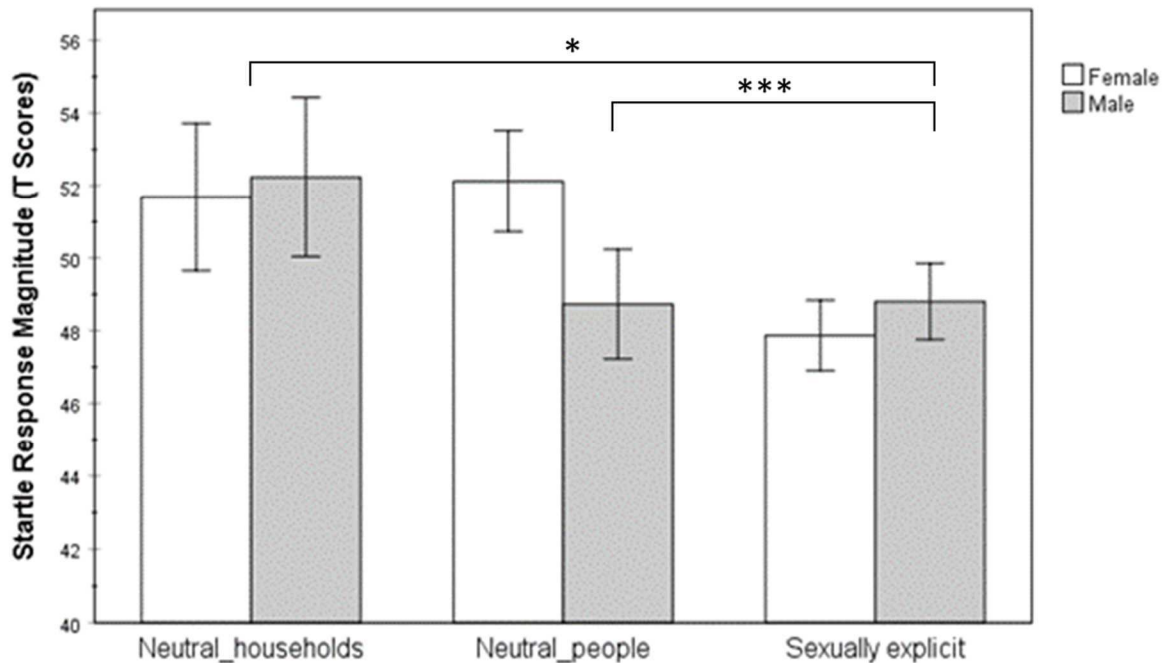


Figure 4. Sex differences in means and 95% confidence intervals for T scored startle response magnitudes when viewing sexually explicit and neutral images.

DISCUSSION

The aim of this study was to explore sex differences in evaluative judgments, psychophysiological indicators of affective arousal (heart rate) and a measure of affective-motivational state of approach or avoidance (startle response modulation) while viewing sexually

explicit images. Furthermore, the possible association of body image dissatisfaction on psychophysiological responding to visual sexual stimuli was investigated.

In support of hypothesis (I.) the current results provide evidence that sexual images are viewed as highly arousing and positive (Bradley et al., 2001a; Bradley, Codispoti, Sabatinelli, & Lang, 2001b). Sexually explicit images elicited increased affective engagement in both men and women. Participants reported higher pleasantness and arousal ratings for images with sexual content compared to neutral pictures. Furthermore, we found significant differences in evaluations of neutral pictures category; images with people in daily situations received higher ratings of arousal and valence than pictures of households. Not finding sex differences could be explained by comparable levels of body image satisfaction and sexual functioning in men and women in the study sample. Furthermore, the continued social changes may diminish the differences between men and women in sexual expression by reducing the existing sexual double standard and social pressure on women to underreport their interest and attitudes toward sex (Bancroft, 2009; Rupp & Wallen, 2008).

Concerning heart rate changes (hypothesis II.), the observed tri-phasic waveform confirms that sexually explicit stimuli produce emotional arousal following a particular pattern (Bradley et al., 2001a; Wood & Obrist, 1968). Images with sexual content produced smaller initial deceleration compared to neutral images but they maintained greater deceleration in the last phase of picture viewing. Sustained cardiac deceleration can demonstrate a marked motivational engagement in response to sexual stimuli by parasympathetic activation, which is observed during experiencing sexual arousal (Graham & Clinton, 1966; Hamrick, 1974; Palomba, Angrilli, & Mini, 1997).

In further support of hypothesis (II.), we found that viewing erotic stimuli elicited attenuated startle response magnitudes compared to neutral stimuli (Prause et al., 2008; Giargari et al., 2005; Koukounas & McCabe, 2001). Inhibited startle responses can be regarded as a neurophysiological correlate of approach behaviour toward sexually explicit stimuli (Vrana & Lang, 1990). In women the attraction of attentional resources was found to be stronger for sexually explicit stimuli than both types of neutral images, whereas in men, sexually explicit images produced smaller startle magnitude only when compared to the photos of households but not when compared to the photos of people. It has been suggested that men may perceive the interaction of two persons of opposite sex in a more sexual way than do women (Abbey, 1982; Abbey & Melby, 1986; Harnish, Abbey, & DeBonno, 1990; Johnson et al., 1991; Koukounas & Letch, 2001; Saal, Johnson, & Weber, 1989).

Limitations

The current study focused on the general population and it seems to be relevant to include individuals with sexual dysfunctions to explore the psychophysiological differences in responding to visual sexual stimuli. Another limitation is that self-report sexual arousal was not assessed, which would allow for the investigation of any effects of sexually explicit images on general sexual arousal. Finally, the moderate sample size of the current study could reduce the likelihood of finding significant relationships with body image satisfaction.

CONCLUSIONS

The current results provide evidence for emotional arousal in response to sexually explicit pictures, indicated by self-reports and physiological indices. The new sexually-explicit image data-base was shown to elicit sexual arousal, as reflected in evaluative judgments and psychophysiological indicators of arousal. The appraisal of sexual cues, including physiological

arousal evoked by sexually relevant stimuli, therefore, represents an important determinant of sexual responding. In order to investigate the contribution of cognitive processes and existing sex differences, the further investigation of the physiological and evaluative responding should be continued especially with regard to people who are concerned with sexual difficulties.

3.3. Attentional bias to body- and sexually-relevant stimuli

Czeluscinska-Peczkowska, A., Schulz, A., Blechert, J., van Ryckegehem, D. M. L., Lutz, A. P. C. & Vögele, C.

Attentional bias to body- and sexually-relevant stimuli. Manuscript in preparation.

ABSTRACT

Distraction through body image dissatisfaction is suggested to play a role in the development and maintenance of sexual problems, e.g. avoidance of sexual contacts and dissatisfaction with sexual life. Previous studies have examined body image dissatisfaction and sexual functioning separately. Research linking both areas is still lacking. The present study aims to compare responses to sexual stimuli and stimuli related to body image dissatisfaction (images of one's own body) in participants with sexual dysfunctions (SD) and a healthy control group (HC), matched for body mass index.

Forty-four adult heterosexual women (22 with sexual dysfunctions) were asked in the first phase to passively look at self-body images, non-self-body images and sexually explicit images. Contrary to our hypotheses, women in the SD group looked significantly longer and more frequently at self-defined most satisfying than dissatisfying body parts when compared to HC participants. There were no significant group differences in gaze duration and frequency of sexually explicit images, but the women with SDs rated these stimuli as less positive, less arousing and expressed less motivation to keep looking at them.

In the second phase of the study a positive or negative attentional bias (AB) to body parts was induced and state sexual arousal in response to a sexually explicit video-clip was assessed. We found a significant change in skin conductance level in HC and SD groups, regardless of the training type, but not in heart rate. Furthermore, results indicated that HC participants reported lower state body image satisfaction and mood after the AB induction. Women in the SD group who received the positive training expressed lower state body satisfaction, whereas women in the neutral training condition did not report any difference. Finally, AB induction did not change ratings of sexual stimuli and state sexual arousal.

These findings suggest that women with SD do not differ from HC participants in visual attention and general arousal in response to sexual stimuli but rather in their process of evaluation.

Keywords: body image dissatisfaction, sexual dysfunction, attentional bias induction, eye tracking

INTRODUCTION

Body image is intrinsically associated with female's sexuality. During intimate contact, one's body is exposed to the partner's view and may be subjected to evaluations. Especially women are vulnerable to developing a negative body image, supported by the high prevalence rates of body and weight dissatisfaction in female populations, ranging between 49-56% (Brand, Rothblum, & Solomon, 1992; Davison & McCabe, 2005; Hoyt & Kogan, 2001; Matthiasdottir, Jonsson, & Kristjansson, 2010; Palladino Green & Pritchard, 2003; von Lengerke & Mielck, 2012). Pre-occupation with a negative body image may result in decreased quality of sexual life in women (Peplau et al., 2009), and having more dysfunctional beliefs about one's own body may lead to associating physical attractiveness with sexual satisfaction (Nobre & Pinto-Gouveia, 2006, 2008). Moreover, body image dissatisfaction may redirect attention to one's own body and in turn may lead to an avoidance of situations that are associated with body exposure, e.g. during sexual activities (La Rocque & Cioe, 2011; Wiederman, 2011).

Attentional bias to threat-relevant cues is one of the cognitive processes that has been shown to be important for the development and maintenance of a range of mental disorders, e.g. anxiety disorders (MacLeod, Mathews, & Tata, 1986), affective disorders (Armstrong & Olanunji, 2012), eating disorders (Blechert, Ansorge, & Tuschen-Caffier, 2010; Brooks, Prince, Stahl, Campbell, & Treasure, 2011; Jansen, Nederkoorn, & Mulkens, 2005; Smeets, Roefs, van Furth, & Jansen, 2008), and sexual dysfunctions (Beard & Amir, 2010). Body image dissatisfaction has been shown to be associated with stronger attentional bias to body parts that are perceived as dissatisfying: women who were more dissatisfied with their appearance spent less time looking at their own body and had more difficulties to disengage attention from areas which were regarded as dissatisfying compared to women who were less dissatisfied with their bodies

(Janelle, Hausenblas, Ellis, Coombes, & Duley, 2009). Furthermore, attentional bias to body-related information has also been found to be associated with drive for thinness, which can reflect one's body shape and weight concerns (Hewig et al., 2008; Joseph, LoBue, Rivera, Irving, Savoy, & Shiffrar, 2016). In particular, women who had high scores on the drive for thinness scale spent more time looking at waist, hips, legs, and arms of young males and females. These body parts are perceived to be especially related to body changes, which can occur during weight gain or weight loss (Hewig et al., 2008). Attentional bias to body-related cues has also been demonstrated in women with eating disorders or disordered eating behaviours: patients with anorexia nervosa symptoms showed faster saccade latencies to self-body targets than others' body targets (Blechert et al., 2010). In the latter study, bias towards self-images correlated with body dissatisfaction. Furthermore, individuals with disordered eating patterns spent more time looking at their self-defined ugly than beautiful body parts (Jansen et al., 2005). The non-symptomatic control participants focused more on their own 'beautiful' body parts and less on their own 'ugly' body parts. When viewing other bodies this pattern was reversed: high symptom participants allocated their attention to the beautiful parts of other bodies, whereas healthy controls concentrated on the ugly parts of the other bodies (Jansen et al., 2005).

More recently, the cognitive paradigms originally used to demonstrate information-processing bias have been further modified for treatment, with some evidence that reducing bias towards threatening stimuli leads to lasting symptom relief in anxious individuals (Hallion & Ruscio, 2011) and depression (Wells & Beevers, 2010). In a similar vein, it has been suggested that redirecting attention towards positive aspects of self-body images prevents negative, body-related feelings and thoughts, and that this may even contribute to an increase in overall body image satisfaction (Smeets, Jansen, & Roefs, 2011; Smith & Rieger, 2006). We would argue,

therefore, that individuals with greater body image dissatisfaction have greater attentional bias towards self-body cues compared to other-body cues, and hence, redirecting attention from negative body parts may have more positive consequences when based on individual's own body than computer-generated body pictures.

In general, sexual stimuli attract one's attention with greater strength compared with non-sexual stimuli (Spiering, Everaerd, & Laan, 2004; Lykins, Meana, & Kambe, 2006). When a sexual cue is present, attention resources are directed towards it and, in case of a positive appraisal (based on for example on previous sexual experiences), self-report sexual arousal increases. Furthermore, at the level of visual perception, sexual stimuli are processed preferentially, as indicated by longer viewing time and more fixations on sexual content of erotic images (Lykins et al., 2006). Nevertheless, sexual cues may also affect individuals' attention in the opposite direction, i.e. stimuli with sexual content may be perceived as potentially threatening (Beard & Amir, 2010) and less attractive (Giargari, Mahaffey, Craighead, & Hutchison, 2005). Results from studies examining the relationship between sexual difficulties and emotional valence of sexual stimuli show that persons with lower levels of sexual desire responded with increased startle responses when viewing opposite-sex images than persons with higher levels of sexual desire (Giargari et al., 2005). Furthermore, avoidance of sexual stimuli might be related to sexual dysfunction: women reporting pain during intercourse were found to look more frequently at non-sexual parts of the image when compared to women with low levels of sexual desire or a healthy control group (Lykins, Meana, & Minimi, 2011).

STUDY OBJECTIVES AND HYPOTHESIS

Previous research has separately examined body image dissatisfaction and sexual functioning but research linking these two areas is missing. Despite the fact that sexual dysfunction is

associated with a high level of body dissatisfaction, little is known about the visual attention patterns of women with sexual problems. The present study aimed to fill this gap by directly contrasting stimuli related to body image dissatisfaction (images of the own body) with sexual stimuli while investigating participants with sexual dysfunctions. Specific mechanisms underlying attentional bias (AB) to body and sexual stimuli were examined, and furthermore, the attentional bias induction was used to manipulate the effect of state body image satisfaction levels on responding to sexual stimuli.

Based on previous results linking body image dissatisfaction and sexual functioning in women we hypothesised that:

(I.) Free viewing task

(Ia). Women with sexual dysfunction (SD) show stronger attentional bias towards self-defined most dissatisfying vs satisfying body parts (i.e. they will spend more time looking at self-defined dissatisfying body parts) than women in the healthy control (HC) group.

(Ib). Women with SD show stronger attentional bias away from sexual vs nonsexual content of a sexually explicit image (i.e. they will look at the nonsexual content more frequently – attentional avoidance) than women in the HC group.

(II.) AB induction

(IIa.) *HC group*: Participants who are experimentally trained to attend to self-defined most dissatisfying own body parts (negative body bias training) show an increase in state body image dissatisfaction and are more likely to experience lower state sexual arousal evoked by sexual stimuli (i.e., erotic video-clip) than persons who receive the control body training (i.e., towards average-rated body parts).

(IIb.) *SD group*: After training to attend to self-defined most satisfying own body parts (positive body bias training), SD participants experience a decrease in state body image dissatisfaction and higher state sexual arousal evoked by sexual stimuli than persons who receive the neutral body training.

Heart rate and skin conductance were recorded as indicators of general sexual arousal to explore the potential differences in sexual arousal between stimuli and groups.

METHOD

Participants

A total of 44 adult heterosexual women were included in the final sample. The diagnosis of participants with sexual dysfunction (SD; $n = 22$) was based on DSM-5 criteria for female's sexual dysfunctions (American Psychiatric Association, 2013). The most commonly observed sexual issues in the current sample were orgasmic disorder (59%), and sexual interest/arousal disorder (46%). Genito-pelvic pain/penetration problems were reported by 4 females (18%). Exclusion criteria were past or current psychotic or mental disorders, paraphilic disorders, gender dysphoria, conditions with potentially disfiguring consequences (e.g. breast cancer history), substance abuse or dependence, impaired vision, taking medications that might directly affect sexual functioning, other potentially confounding factors (e.g., partner's sexual dysfunction), or current pregnancy. Based on the listed above criteria 15 participants were not included in the study.

Participants in the HC group were matched on body mass index (BMI, $\pm 1.5 \text{ kg/m}^2$) with participants in the SD group. The nationality breakdown of the sample was as follows: 27% German, 11% Luxembourgish, 11% Portuguese, 7% French, 9% multiple citizenships, and 34% other. More than half of the participants reported to be in a relationship or married (68% in the

SD group and 59% in the HC group) at the time of testing. Participants were required to be aged between 18 to 40 years, had no colour-blindness or other eye diseases, and had normal or corrected-to-normal vision.

Data collection was completed between February and December 2018 by English, French or German speaking participants from the University and the population at large. Every participant gave informed consent and received a 50 Euro reimbursement in the form of a gift voucher upon experiment completion. The study received ethics approval from the Ethics Review Panel of the University of Luxembourg.

Task stimuli

Body image. To generate individual body stimuli photos of the participant's whole body were taken in standardized skin-coloured underwear in the corresponding size. The pictures were taken from four perspectives (front, back, left, and right) under standardized light conditions and in front of a black screen using a digital camera (Alpha a6000, Sony). Afterwards, the digital images were processed (Adobe Photoshop) by cropping the size so that only the body from the neck to the ankles was visible and by changing the background to white colour. Additionally, any potentially identifying information, e.g. tattoos, were removed. The size of the image for the *Free viewing task* was 1680 x 1050 pixels. For the *Attention bias induction task* body images were additionally processed to prepare individual stimuli of most/least/average-rated body parts. Relevant body parts were chosen based on self-report rankings from the most to the least satisfying predefined body areas. As the most satisfying were classified the three ranked as the first, while as the least satisfying – the last three body parts. The body parts that fell in between were categorized as average-rated. The images were cropped to the size of 346 x 350 pixels and a blur filter was applied so that only the relevant body part was visible. Furthermore, participants

were asked to choose one most attractive and one most unattractive body part of own body image and the other participant's body image.

Sexually explicit stimuli. Eight images in landscape orientation were taken from the erotic visual stimuli database that has been used in previous research (Finke, Deuter, Hengesch, & Schächinger, 2017) as part of the *Free viewing task*. Each picture contains sexually explicit content, i.e. nude bodies of an adult man and an adult woman engaged in a sexual act, or during sexual intercourse with uncovered genitalia. Additionally, two women-centred sexually explicit video-clips (matched in terms of length and content) were used during the *AB induction task*.

Experimental tasks

Free viewing task. During the task, pictures of the following categories were presented: self-body, other-body, and sexually explicit images. Each participant was presented with a different sequence of pictures with constraint that stimuli of the same category were not presented consecutively. Participants were informed about the stimuli arrangement (i.e. self, sexual, other, etc.) and were given instructions to look at the pictures as they normally would. Each of the pictures was presented for a period of 15 seconds to give the opportunity to scan and re-scan the picture content. Between each stimulus a 500 ms fixation slide was presented. The sequence of an example trial is presented in Figure 1. The experiment was composed of 16 trials and included: eight sexually explicit images, four self-body and four non-self-body images.

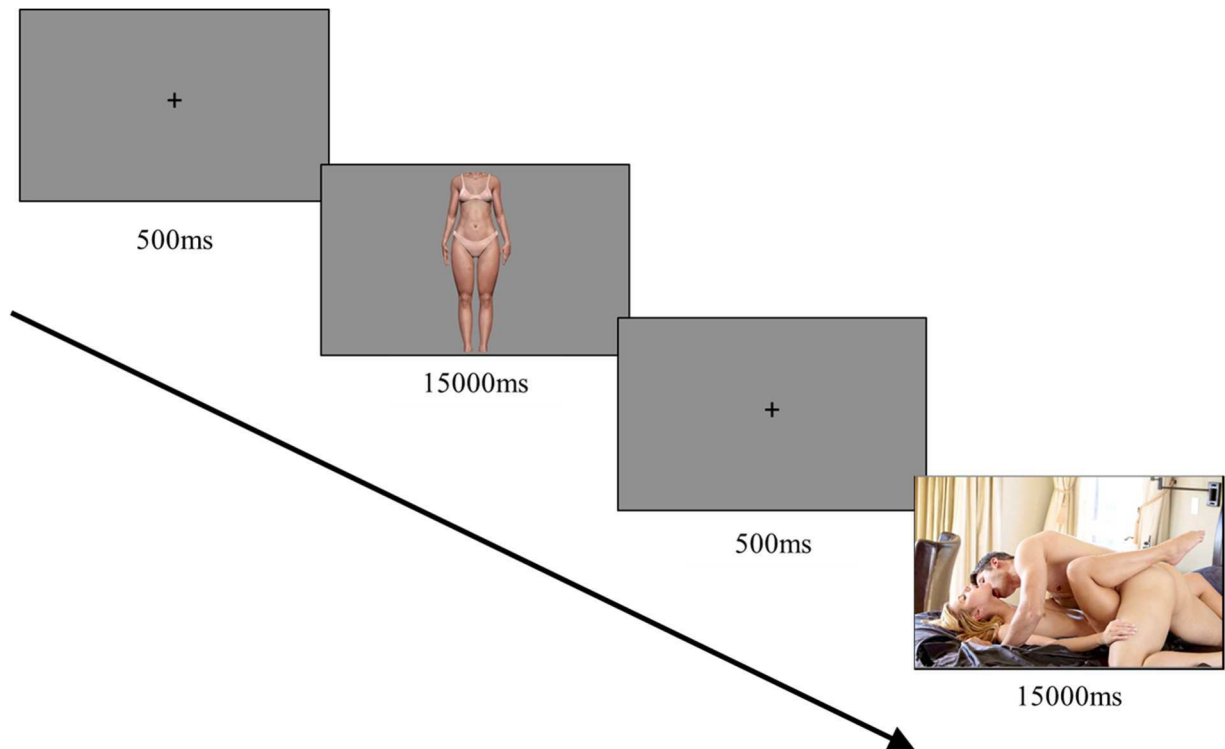


Figure 1. Sequence of events during a free viewing trial.

Attentional bias induction. The attention bias (AB) induction was based on the previously established modified versions of the visual dot-probe paradigms that used visual images of bodies (Joseph et al., 2016). Instead of computer-generated stimuli, we used individually adapted images of each participant. Stimuli were presented against a white background on a computer screen using E-Prime 2.0 software (Psychology Software Tools Inc., Pittsburgh, PA, USA). Each stimulus subtended a vertical visual angle of 8.83° . The AB induction was composed of three phases: (1) a pre-assessment of participants' AB for least satisfying body parts (pre-test); (2) a training phase (positive, negative or neutral); (3) a post-assessment of participants' AB for least satisfying body parts (post-test).

Each trial of the pre- and post-tests began with a 500 ms presentation of a black fixation cross in the centre of the screen (see Figure 2). Following the fixation point, the images were displayed on the left and on the right side of the screen for 2000 ms. After stimulus offset, a

visual probe (i.e. an arrow up or down) appeared at the location of one of the pictures presented before and remained visible until the corresponding button was pressed as quickly and accurately as possible (“↑” or “↓”). During the assessment phases, the 9 body image pairs were: most satisfying/average-rated, least satisfying/average-rated, and most/least satisfying. Each images pair was presented for a total of 8 times at random, once across each possible location combination: left or right, arrow up or arrow down, congruent or incongruent. This resulted in 72 trials per each assessment phase.

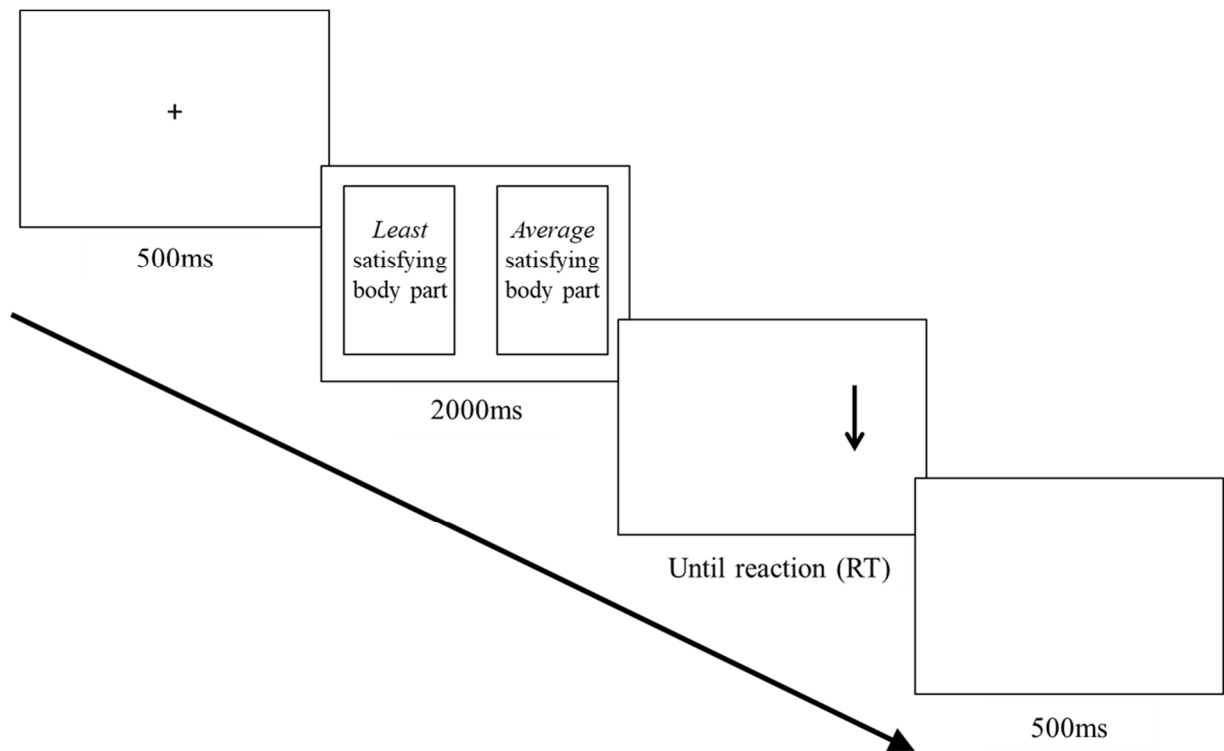


Figure 2. Sequence of events in an AB pre- and post-assessment trial.

For the AB induction training, an individually adapted version was developed, with three conditions: (1) *positive* training (i.e., focusing on three self-defined most satisfying body parts), (2) *negative* training (i.e., focusing on three self-defined most dissatisfying body parts), and (3) *neutral* training (i.e., exposure to average-rated body parts). During the positive training, the picture with the most satisfying body part was replaced by the probe on 100% trials (positive congruent), while during the negative training the picture with the least satisfying body part was replaced by the probe on 100% trials (negative congruent). During the neutral training, two types of pairs were used depending on the experimental group, i.e. in the HC group average-rated/least satisfying body parts; in SD group average-rated/most satisfying body parts. In this training the probe replaced the average-rated body parts on 100% trials (average congruent). The summary of pre- and post-assessment of attentional bias and training conditions are presented separately for HC and SD groups in Table 1.

Table 1

Summary of pre-/post-assessment of attentional bias and training conditions per experimental group

	Control	SD
Pre-/post-test	AB score = incongruent (probe replaced average body part) – congruent (probe replaced least satisfying body part)	
AB training	Negative (100 % least satisfying congruent)	Positive (100 % most satisfying congruent)
	Neutral (100 % average rated congruent/least satisfying incongruent)	Neutral (100 % average rated congruent/most satisfying incongruent)

Note. SD = sexual dysfunction.

Each trial began with a 500 ms presentation of a black fixation cross in the middle of the screen (see Figure 3). Then, the stimulus pair composed of one image of least or most satisfying and one image of average-rated body part was presented for 500 ms. Participants were randomly assigned to one of the two conditions: negative or neutral training in HC group; positive or neutral training in SD group. During the training phase, 9 body image pairs were presented for a total of 4 times at random, once across each possible congruent location combination: left or right, arrow up or arrow down, resulting in 36 trials with 10 repetitions, i.e. a total of 360 trials.

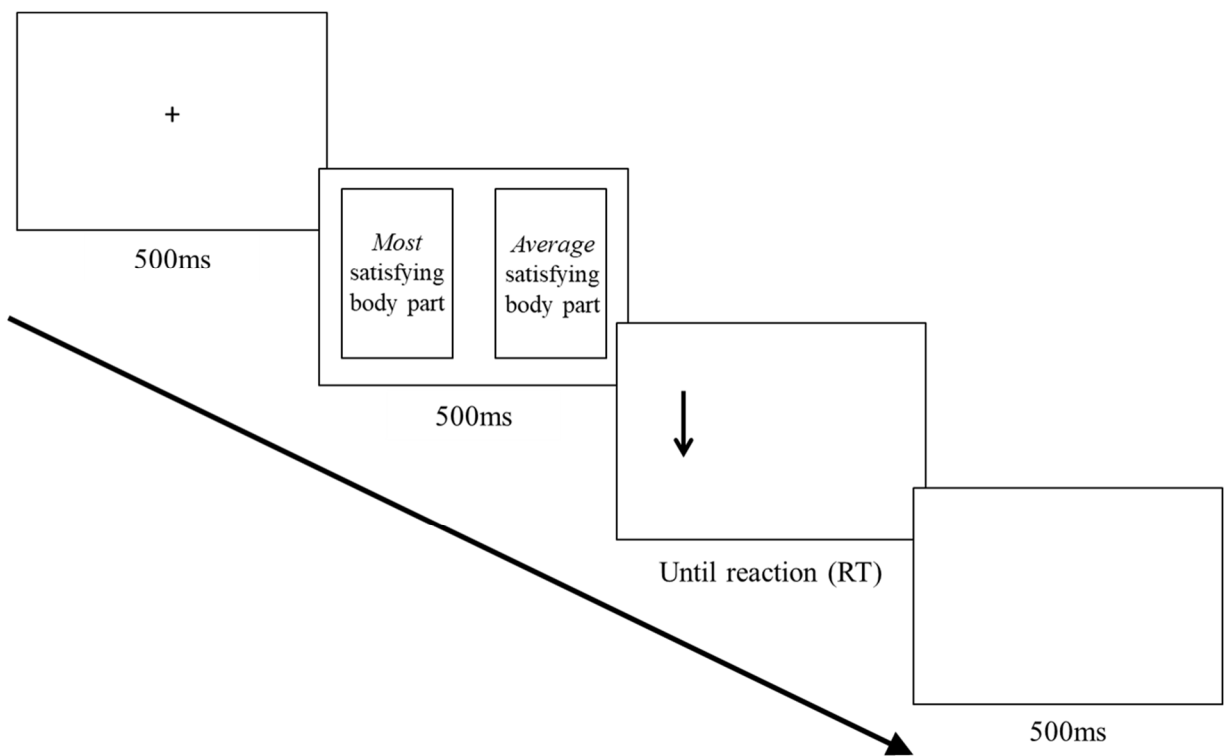


Figure 3. Sequence of events in an AB induction trial during positive training.

Eye-movement recording

Eye movements were recorded during the free viewing task with the iViewX Hi-Speed eye tracking system (SMI, Berlin, Germany) with a 500 Hz sampling rate and $< 0.4^\circ$ gaze position accuracy. Participants' eye movements were calibrated with a nine-point calibration procedure with the subsequent validation procedure during which dots were displayed on the screen. Calibration was repeated when maximum error at validation was not more than 2° of visual angle. The mean of the average validation errors was: 0.92° of visual angle with SD of 0.66° . The images were displayed on a computer screen as part of the *Free viewing task* using SMI BeGaze software.

Psychophysiological recording

Heart rate (HR) was derived from an electrocardiogram (ECG) using three Ag/Ag–Cl electrodes placed onto the thorax (Einthoven lead II configuration) and electrodermal activity (EDA) was obtained from two Ag/Ag–Cl electrodes placed at the palmar site of the non-dominant hand. HR and EDA were recorded by means of bipolar BrainAmp ExG MR amplifier and the BrainVision Recorder software (Brain Products, Gilching, Germany). Data were sampled at a rate of 1 kHz, with a resolution of $0.5 \mu\text{V}$ for ECG. and $0.1 \mu\text{V}$ for EDA. Recording filters were set to a time constant of 10 s for the high-pass filter and 1 kHz for the low-pass filter.

Self-report measures

Body image. *Trait* body image dissatisfaction was assessed using the 8-item version of the Body Shape Questionnaire (BSQ-8C; English: Cooper, Taylor, Cooper, & Fairburn, 1987; Evans & Dolan, 1993; French: Rousseau, Knotter, Barbe, Raich, & Chabrol, 2005; German: Pook,

Tuschen-Caffier, & Stich, 2002), with higher scores indicating that one has more concerns with body shape. Internal consistency of the inventory for the current sample was Cronbach's $\alpha = .92$.

Contextual body image was measured with the Body Exposure During Sexual Activities Questionnaire (BESAQ; Cash, Maikkula, & Yamamiya, 2004). This self-report inventory assesses pre-occupation with one's physical appearance and avoidance of body exposure in the sexual context, i.e. during sexual relations and activities. Higher BESAQ scores are associated with having more self-conscious focus and avoidance of body during sex (Cronbach's $\alpha = .96$).

Individual Stimuli Selection. Participants were asked to rank body parts from the following list: neckline, breasts, arms, waist, stomach, hips, thighs, legs, back, and buttocks, from the most to the least satisfying. The three body parts ranked as the first were classified as the most satisfying, while the three body parts ranked as the last – as the least satisfying. The average-rated body parts were the ones falling in between most and least satisfying. Additionally, participants were asked to choose one most attractive and one most unattractive body part of own body image and the other participant's body image.

Sexual functioning. The Derogatis Interview for Sexual Function-Self-Report Inventory (DISF-SR) is a self-report instrument measuring quality of current sexual functioning (Derogatis, 1997). It is composed of five main domains: Sexual Cognition/Fantasy, Sexual Arousal, Sexual Behaviour/Experience, Orgasm, and Sexual Drive/Relationship. For the purpose of the current study, the standardized T-scores of global summary and subscales were used. Internal consistency scores ranged between $\alpha = .64$ to $\alpha = .95$.

The Changes in Sexual Functioning Questionnaire Short-Form (CSFQ-14; Keller, McGarvey, & Clayton, 2006) is a brief self-administrated measure that assesses sexual health of an individual with higher scores reflecting higher sexual functioning level. It is designed to

adequately reflect symptoms of sexual problems that are specific for women, e.g. low desire. The total score as well as five domains of sexual functioning (i.e. sexual pleasure, frequency of desire, sexual interest, sexual arousal, and sexual completion) were calculated. Internal consistency for each subscale ranged between $\alpha = .65$ to $\alpha = .87$.

Female Sexual Distress Scale-Revised. FSDS-R (Derogatis, Clayton, Lewis-D'Agostino, Wunderlich, & Fu, 2008) is assessing sexually related personal distress in women with higher scores indicating higher personal distress (Cronbach's $\alpha = .93$).

Sexual Arousal and Desire Inventory. SADI (English: Toledano & Pfaus, 2006; French: Toledano, 2006) is a 54 adjective-rating questionnaire measuring subjective experiences of sexual arousal and desire. Ratings are done on a 5-point Likert-scale, ranging from 0 (*does not describe it at all*) to 5 (*describes it perfectly*). Four subscales can be derived from the SADI: evaluative (cognitive-emotional aspect), negative (sexual aversion or inhibition), physiological (subjective feelings of physiological changes that occur during state of sexual arousal), and motivational (a need to satisfy one's appetite for sexual activity). In the current study, the SADI was used to assess the state sexual experience induced by visual sexual stimuli. Internal consistency for each subscale ranged between $\alpha = .81$ to $\alpha = .96$.

Beck Depression Inventory. Depression symptoms were assessed with the BDI-II (English: Beck, Steer, & Brown, 1996; French: Beck, Steer, & Brown, 1998; German: Hautzinger, Keller, & Kühner, 2006). The BDI-II is a 21-item, self-report questionnaire. In the current study, the BDI-II total score was calculated as the mean of all items (Cronbach's $\alpha = .90$).

The Dutch Eating Behavior Questionnaire. DEBQ (van Strien, Frijters, Bergers, Defares, 1986) assesses individual's eating habits in terms of the following eating patterns: restrained eating, external eating, and emotional eating. Restrained eating describes preoccupation with

dietary behaviours and periods of overeating, emotional eating means eating in response to emotional arousal rather than to internal signals of hunger, while external eating suggests eating in response to the external food cues. Items on the DEBQ range from 1 (*never*) to 5 (*very often*), with higher scores indicating stronger eating behaviour. Internal consistency for each subscale ranged between $\alpha = .89$ to $\alpha = .96$.

Visual analog scales. VAS were used to obtain ratings of sexually explicit images and erotic video-clips on three dimensions: valence (“I am judging this image/movie as...”, from *negative* to *positive*), arousal (“Confronted with this image/movie I am feeling...”, from *relaxed* to *aroused*), and motivation (“My reaction to this image/movie is to ... looking”, from *stop* to *keep*). Furthermore, state body/weight satisfaction (from *extremely dissatisfied* to *extremely satisfied*) and mood (from *sad* to *happy*) were evaluated on VAS scales directly before and after each phase of the experiment. Finally, VAS scales were used to obtain evaluations of most attractive/unattractive body parts of self and other body image (from *attractive* to *unattractive*). The scales represented 101 points (from 1 to 101) and were afterwards reduced to 9-point scales (from 1 to 9).

Detailed sample characteristics are presented in Table 2. There were no significant differences between experimental groups in age, Body-Mass-Index (BMI), Waist-to-Hip-Ratio (WHR), and socio-economic status.

Table 2

Means and Standard Deviations of Socio-Demographic Sample Characteristics

	Control	SD	<i>t</i> (df)	<i>p</i>	<i>d</i>
<i>n</i>	22	22	-	-	-
Age (years)	25.71 (4.86)	27.16 (5.64)	-0.92 (42)	.36	0.28
BMI (kg/m ²)	23.21 (3.36)	23.62 (3.46)	-0.40 (42)	.69	0.12
WHR	0.76 (0.05)	0.77 (0.05)	-0.67 (42)	.51	0.2
SES	5.20 (1.85)	5.86 (1.64)	-1.23 (42)	.22	0.38

Note. Group differences were tested with *t* tests. Degrees of freedom were corrected whenever equality of variances could not be assumed. Cohen's *d* is reported as a measure of effect size. SD = sexual dysfunction; BMI = body mass index; WHR = Waist/Hip Ratio; SES = Socio-economic status.

Participants in the SD group scored higher on trait and contextual body image dissatisfaction, and scored lower on each sexual functioning scale when compared to the HC group (see Table 3). Furthermore, women in the SD group scored higher on the subscale of restrained eating symptomatology and reported more symptoms of depression. Despite higher mean scores on the BDI-II scales, participants in SD group did not fall within the range of scores indicative of clinical depression.

Table 3

Means and Standard Deviations of Psychometric Sample Characteristics

	Control	SD	<i>t</i> (df)	<i>p</i>	<i>d</i>
<i>n</i>	22	22	-	-	-
<i>Body image</i>					
BSQ-8C (trait)	17.77 (4.62)	26.23 (8.32)	-4.17 (32.83)	< .001	1.26
BEASQ (contextual)	0.86 (0.42)	1.79 (0.82)	-4.72 (31.47)	< .001	1.43
<i>DISF-SR (T-scores)</i>					
Total	56.77 (9.15)	39.86 (12.49)	5.12 (42)	< .001	1.54
Cognition/Fantasy	53.82 (9.50)	45.27 (9.88)	2.93 (42)	< .01	0.88
Arousal	56.50 (8.51)	42.05 (13.43)	4.27 (42)	< .001	1.29
Behaviour/ Experience	53.59 (11.04)	43.91 (12.04)	2.78 (42)	< .01	0.84
Orgasm	51.91 (6.10)	39.68 (9.58)	5.05 (42)	< .001	1.52
Relationship	53.77 (8.10)	40.95 (10.64)	4.50 (42)	< .001	1.36
<i>CSFQ-14</i>					
Total	53.50 (5.24)	41.95 (7.33)	6.01 (42)	< .001	1.81
Pleasure	3.82 (0.80)	2.73 (1.03)	3.93 (42)	< .001	1.18
Desire-frequency	7.55 (1.41)	5.64 (1.53)	4.31 (42)	< .001	1.30
Desire-interest	10.45 (1.82)	8.45 (2.50)	3.03 (42)	< .01	0.91
Arousal	11.27 (1.54)	8.64 (2.13)	4.70 (42)	< .001	1.42
Orgasm	11.77 (1.77)	8.77 (2.58)	4.50 (42)	< .001	1.36
<i>FSDS</i>	7.18 (5.78)	20.05 (9.74)	-5.33 (34.14)	< .001	0.61
<i>BDI-II</i>	3.82 (4.67)	8.41 (8.68)	-2.19 (32.21)	< .05	0.66
<i>DEBQ</i>					
Restrained	2.10 (0.78)	2.88 (1.17)	-2.58 (42)	< .05	0.78
Emotional	1.95 (0.93)	2.36 (0.91)	-1.49 (42)	.15	0.45
External	3.04 (0.58)	3.25 (0.80)	-0.97 (42)	.34	0.29

Note. Group differences were tested with *t* tests. Degrees of freedom were corrected whenever equality of variances could not be assumed. Cohen's *d* is reported as a measure of effect size. SD = sexual dysfunction; BSQ-8C = Body Shape Questionnaire; BEASQ = Body Exposure during Sexual Activities Questionnaire; DISF-SR = Derogatis Interview for Sexual Functioning Self-Report; CSFQ = Changes in Sexual Functioning Questionnaire; FSDS = Female Sexual Distress Scale; BDI-II = Beck Depression Inventory; DEBQ = Dutch Eating Behavior Questionnaire.

Procedure

Before inclusion in the study, volunteers were screened to determine initial eligibility. The self-administered questionnaires measuring sexual functioning and body image levels (BSQ-8C, BESAQ and CSFQ-14-F) were posted online. Participants that scored ≤ 41 on CSFQ scale were classified as having sexual problems. Study participation involved two face-to-face appointments. After informed consent, the participants' weight and height was registered, and their waist and hip circumference was measured. Waist-to-hip ratio (WHR) was calculated as waist circumference in centimetres divided by hip circumference in centimetres. Afterwards, participants underwent psychometric testing and a diagnostic interview to assess any comorbid mental disorders using the Structured Clinical Interview for DSM-IV (SCID-I; First, Spitzer, Gibbon, & Williams, 2002; Wittchen, Zaudig, & Fydrich, 1997). An additional, custom-made interview was conducted to collect socio-demographic data (e.g. age, socio-economic background, self-report health status). Questionnaires were completed for the further assessment of sexual functioning (DISF-SR and FSDS), and information about the most/least satisfying body parts (Individual Stimulus Selection Questionnaire), as well as potentially confounding variables such as depression (BDI-II) or eating disorders (DEBQ). At the end of the first meeting, photos of participants were taken.

The second appointment consisted of two testing phases in the following order: (1) free viewing task and (2) AB induction. Participants were seated in a quiet room facing the monitor at eye level at a viewing distance of approximately 60cm. During the first phase (*Free viewing task*), participants were requested to passively view pictures on a computer screen. Before the start of the task and immediately thereafter, participants were asked to evaluate how satisfied they feel with their body, their weight, and how did they feel. They were told the eye tracker system was used in order to control that they look at the computer screen. The free viewing task

lasted around 10 minutes. At the end of this phase, participants were given the opportunity to have a short break.

During the second phase (*AB induction*), the experimental manipulation was conducted with the aim to induce the negative or positive state body image satisfaction. Participants were randomly assigned to one of the training conditions. In order to induce sexual responding, participants were asked to view two sexually-explicit video-clips before and after the training. After the necessary technical preparations (i.e. attaching electrodes), participants reported once again on their current state of body/weight satisfaction and mood, after which a 5-minute baseline recording commenced. Next, participants were asked to passively watch a video-clip on a computer screen. During each video-clip session psychophysiological responses were monitored to assess participants' general arousal (heart rate and skin conductance; Bradley, Codispoti, Cuthbert, & Lang, 2001). Self-report state sexual arousal was measured with a questionnaire (SADI) immediately after each video-clip presentation, and the current state of body/weight satisfaction and mood was assessed. Between video-clip presentations an AB induction training was run. All participants received at the end of AB induction phase, i.e. after the second video-clip and last state body/weight satisfaction and mood measurement, a booster AB training, i.e. a short version of 36 trials positive AB training. The booster training was applied so that participants could end at the same training phase and benefit from the induction of positive body image satisfaction. The duration of the AB induction phase was approximately 60 minutes.

When the experimental session was finished, ratings of self- and other body images, sexually explicit images and erotic video-clips were collected. At the end of the appointment, participants were debriefed and given the opportunity to ask any questions.

Data reduction

Gaze data. Eye-tracking data was calculated and extracted using BeGaze (SMI, Berlin, Germany). The look zones (most/least satisfying and attractive/unattractive body parts) were determined by the experimenter for each body image individually to outline the desired area. Sexually explicit images were divided into two areas of interest (AOIs): sexual and nonsexual context. The sexual AOI included heads and bodies of the persons; everything else in the image, i.e. background and all of the objects included in it, was regarded as nonsexual AOI. The AOI coverage of sexual stimuli in terms of the proportion of the image accounted for by the sexual and nonsexual context was on average 38% and 62%, respectively. All AOIs of body images and sexual stimuli were mutually exclusive.

From the eye-tracking data, total gaze time and fixation count were derived. *Total gaze time* is operationalized as the total number of milliseconds the individual attended to a particular AOI across the entire stimulus presentation time, and is regarded as an indicator of selective attention. *Fixation count* refers to the number of fixations, i.e. continuously watching more than 100 milliseconds within a particular AOI.

AB reaction time (RT). One participant was excluded from data analysis because of the error responses rate higher than 25%, resulting in final sample consisting of 21 participants in the HC group and 22 in the SD group. The following three steps data preparation was implemented (Bradley, Mogg, White, Groom, & De Bono, 1999): (1) erroneous responses, i.e. when participants indicated the wrong arrow direction, were excluded; (2) RT less than 200 ms or more than 2000 ms were considered as inaccurate, i.e. overly early or late; (3) RTs below or above 2SD from participants' individual mean RT were considered outliers and removed.

According to the following criteria, 5.26% of the data was removed from RT analysis for pre-assessment and 5.17% for post-assessment.

RTs of correct responses were included for further analysis. Following the procedure of MacLeod, Mathews, & Tata (1986), the AB scores from pre- and post-assessments were calculated by subtracting the mean reaction time on trials when the probe replaced the image with the least satisfying body part (congruent trials) from the mean reaction on trials when the probe appeared after the image with the average-satisfying body part (incongruent trials). Positive values indicated AB towards least satisfying body parts (i.e. shorter RTs to dissatisfying body parts compared to average ones), while negative values showed AB away from least satisfying body parts. For the purpose of the study the AB scores towards least satisfying body parts were calculated and included in further analysis.

Psychophysiological responses. Analysis of ECG and EDA signals was performed with WinCPRS software (Absolute Aliens, Turku, Finland). Software-filtered raw data was manually inspected for artifacts and the interbeat intervals were reduced into HR expressed in beats per minute (bpm). The reference point was set as the 5 minutes prior to the erotic video-clip presentation. HR and EDA change scores were calculated by subtracting the reference point from the mean activity during erotic video-clip response.

Data analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS; Version 25.0).

Free viewing task. In order to evaluate the gaze data (total gaze duration and fixation count), two-factorial ANCOVAs for repeated measures were run with group (HC vs SD) and AOI type (body images: most vs least satisfying body parts; sexual images: sexual context vs background),

and with the contextual body image (measured by BESAQ) included as a covariate, separately for body and sexually explicit images. Furthermore, two-way repeated measures ANOVAs were performed to determine the group differences of the effect of body parts' attractiveness (most vs least attractive) on gaze data separately for each image identity (self vs other).

Ratings for attractiveness of self- and other-body and body parts were analysed using ANCOVAs with the between factor group (HC vs SD) and the within factor image identity (self vs other) separately for whole body images and attractive/unattractive body parts. Group differences for ratings (valence, arousal, motivation) of sexually explicit images were analysed with one-way MANOVA.

Body/weight satisfaction and mood assessments were analysed using a two-way repeated measures ANOVAs with time (pre- vs post-experiment) and group (HC vs SD) for each scale.

AB induction task. First, a series of univariate ANOVAs were performed to test baseline group differences (HC vs SD) in general arousal (HR, EDA), sexual arousal (as measured by SADI questionnaire), and ratings (valence, arousal, motivation) of the first erotic video-clip. Next, the effectiveness of AB induction was analysed with repeated measures ANOVAs with time (pre- vs post-test) as within-subject factor and training group (HC: negative vs neutral; SD: positive vs neutral) as between-group factor on AB score. Furthermore, two-way repeated measures ANOVA with time (pre- vs post-test) and training group (HC: negative vs neutral; SD: positive vs neutral) on HR and EDA changes separately.

In order to assess whether AB training had an effect on ratings of sexually-explicit video-clips (valence, arousal, motivation) a two-way repeated measures MANOVA with time (pre- vs post-test) as within-subject and training group (HC: negative vs neutral; SD: positive vs neutral) as between-group factor. The change in state sexual arousal (measured by SADI) was analysed

with two-way repeated measures ANOVAs with time (pre- vs post-test) and training group (HC: negative vs neutral; SD: positive vs neutral) separately for each SADI scale: evaluative, negative, physiological, motivational. Finally, repeated measures ANOVAs with time (pre- vs post-test) and training group (HC: negative vs neutral; SD: positive vs neutral) were run on each satisfaction dimension separately (body, weight and mood).

All pairwise comparisons were performed for statistically significant simple main effects. In the case of significant effects, Bonferroni corrected t tests were performed.

RESULTS

Free viewing task

Body and sexually explicit images – gaze data

Most/least satisfying self-body parts. The interaction between group and self-rated most and least satisfying body parts on gaze duration $F(1, 41) = 6.28, p < .05, \eta_p^2 = .13$, and on fixation count, $F(1, 41) = 7.07, p < .05, \eta_p^2 = .15$, remained significant after controlling for contextual body image level (as measured by BESAQ). Simple main effects revealed that women in SD group looked significantly longer, $F(1, 41) = 6.03, p < .05, \eta_p^2 = .13$, and more frequently, $F(1, 41) = 4.65, p < .05, \eta_p^2 = .10$, at self-defined most satisfying body parts than self-defined least satisfying body parts. In HC group there were no significant differences in gaze duration between the self-defined body parts, $F(1, 41) = 2.07, p = .16, \eta_p^2 = .05$, but there was a trend in fixations frequency in the opposite direction, $F(1, 41) = 3.92, p = .055, \eta_p^2 = .09$, i.e. more fixations on self-defined dissatisfying body parts than to satisfying body parts.

Most attractive/unattractive self- and other-body parts. The main effect of attractiveness of self-body parts was significant for gaze duration, $F(1, 42) = 7.22, p = .01, \eta_p^2 = .15$, and

fixation count, $F(1, 42) = 10.63, p = .002, \eta_p^2 = .20$. That is, participants from both groups looked longer and showed more fixations on unattractive body parts compared to attractive ones. The interaction of group and attractiveness of self-body parts was non-significant for both gaze duration $F(1, 42) = 0.68, p = .41, \eta_p^2 = .02$, and fixation count, $F(1, 42) = 0.06, p = .81, \eta_p^2 = .001$. We did not find significant group differences on gaze pattern for most attractive and unattractive self-bodies' parts (gaze duration: $F(1, 42) = 1.23, p = .27, \eta_p^2 = .03$; fixation count: $F(1, 42) = 1.61, p = .21, \eta_p^2 = .04$).

With regard to body parts of control images, the interaction effect of group and attractiveness was not significant for gaze duration, $F(1, 42) = 1.60, p = .22, \eta_p^2 = .04$, and number of fixation, $F(1, 42) = 2.59, p = .12, \eta_p^2 = .06$. The main effects of attractiveness and group differences were also nonsignificant (all $p > .05$).

Sexually explicit images. There was a significant main effect for AOI type on gaze duration, $F(1, 42) = 334.92, p < .001, \eta_p^2 = .89$, and on fixation count, $F(1, 42) = 354.97, p < .001, \eta_p^2 = .89$. Participants looked longer and showed more fixations on sexual content of an image compared to a background. We found no group differences between HC and SD group in gaze duration, $F(1, 42) = 0.08, p = .78, \eta_p^2 = .002$, nor in fixation frequency, $F(1, 42) = 0.02, p = .88, \eta_p^2 = .001$.

The results of gaze data are shown separately for HC and SD groups in Table 4.

Table 4
Means and standard deviations of eye-movements results

	Gaze duration (ms)		Fixation count	
	HC	SD	Control	SD
<i>Self-body parts</i>				
Most satisfying	1484.33 (808.46)	1637.02 (1183.20)	5.59 (3.12)	6.04 (3.72)
Least satisfying	1538.19 (828.06)	1312.96 (630.36)	6.22 (3.50)	5.23 (2.39)
Most attractive	1457.98 (949.16)	960.97 (713.11)	5.01 (3.21)	3.53 (2.30)
Most unattractive	1952.58 (1883.23)	1893.54 (956.50)	7.92 (7.62)	6.92 (2.97)
<i>Other-body parts</i>				
Most attractive	1937.14 (1716.80)	1286.14 (1516.28)	7.96 (7.44)	4.72 (4.60)
Most unattractive	1578.94 (1365.81)	1655.66 (1224.25)	5.87 (4.66)	6.38 (3.11)
<i>Sexually explicit images</i>				
Sexual content	10916.82 (2434.66)	10954.19 (2828.00)	41.91 (9.07)	42.44 (11.03)
Background	1180.43 (744.74)	1509.24 (1454.45)	5.18 (3.26)	6.30 (5.44)

Note. SD = sexual dysfunction group.

Self- and other-body images – attractiveness ratings

We found a significant main effect for group on ratings of attractiveness of body images, $F(1, 42) = 11.56, p < .01, \eta_p^2 = .22$ (see Figure 4). The SD group rated body images as less attractive ($M = 3.56, SD = 1.83$) than the HC group ($M = 5.10, SD = 1.87$). The interaction effect of image type and experimental group was significant, $F(1, 42) = 5.98, p < .05, \eta_p^2 = .13$. We found significant differences between SD and HC group in ratings of self-body images, $F(1, 42) = 18.24, p < .001, \eta_p^2 = .30$, but not for other-body images $F(1, 42) = 1.67, p = .20, \eta_p^2 = .04$. Women in the SD group evaluated their own body images as less attractive ($M = 3.25, SD = 1.86$) than women in the HC group ($M = 5.59, SD = 1.77$).

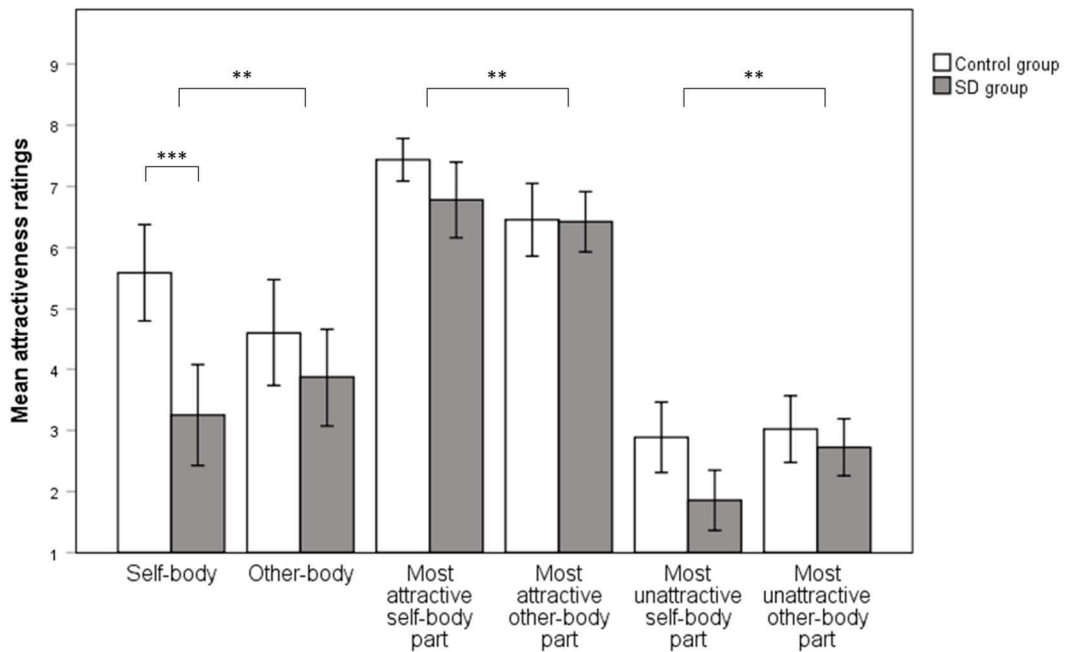


Figure 4. Means and 95% confidence intervals for attractiveness rating scores of self- and other-body images. Asterisks indicate significant differences between picture types, *** $p < .001$, ** $p < .01$.

Furthermore, we found a significant main effect for image type (self vs other) on attractiveness ratings of most attractive, $F(1, 42) = 7.43, p < .01, \eta_p^2 = .15$, and unattractive body parts, $F(1, 42) = 5.51, p < .05, \eta_p^2 = .10$. Most attractive self-body parts were evaluated as more attractive ($M = 7.11, SD = 1.17$) than other-body parts ($M = 6.44, SD = 1.22$), whereas most unattractive self-body parts were evaluated as less attractive ($M = 2.37, SD = 1.30$) than other-body parts ($M = 2.87, SD = 1.14$). The interaction between image type and experimental groups was not significant neither for attractive, $F(1, 42) = 2.14, p = .21, \eta_p^2 = .04$, nor unattractive body parts, $F(1, 42) = 2.95, p = .12, \eta_p^2 = .06$.

There was a significant main effect for group on evaluations of unattractive body parts, $F(1, 42) = 5.98, p < .05, \eta_p^2 = .13$. The SD group gave lower ratings of attractiveness of these body parts ($M = 2.29, SD = 1.08$), when compared to women from HC group ($M = 2.95, SD = 1.27$).

Among the most frequently reported attractive self- and other-body parts by women from HC group and by women with SD were from chest region, while unattractive self- and other-body parts were based on stomach and pelvic region (see Figure 5).

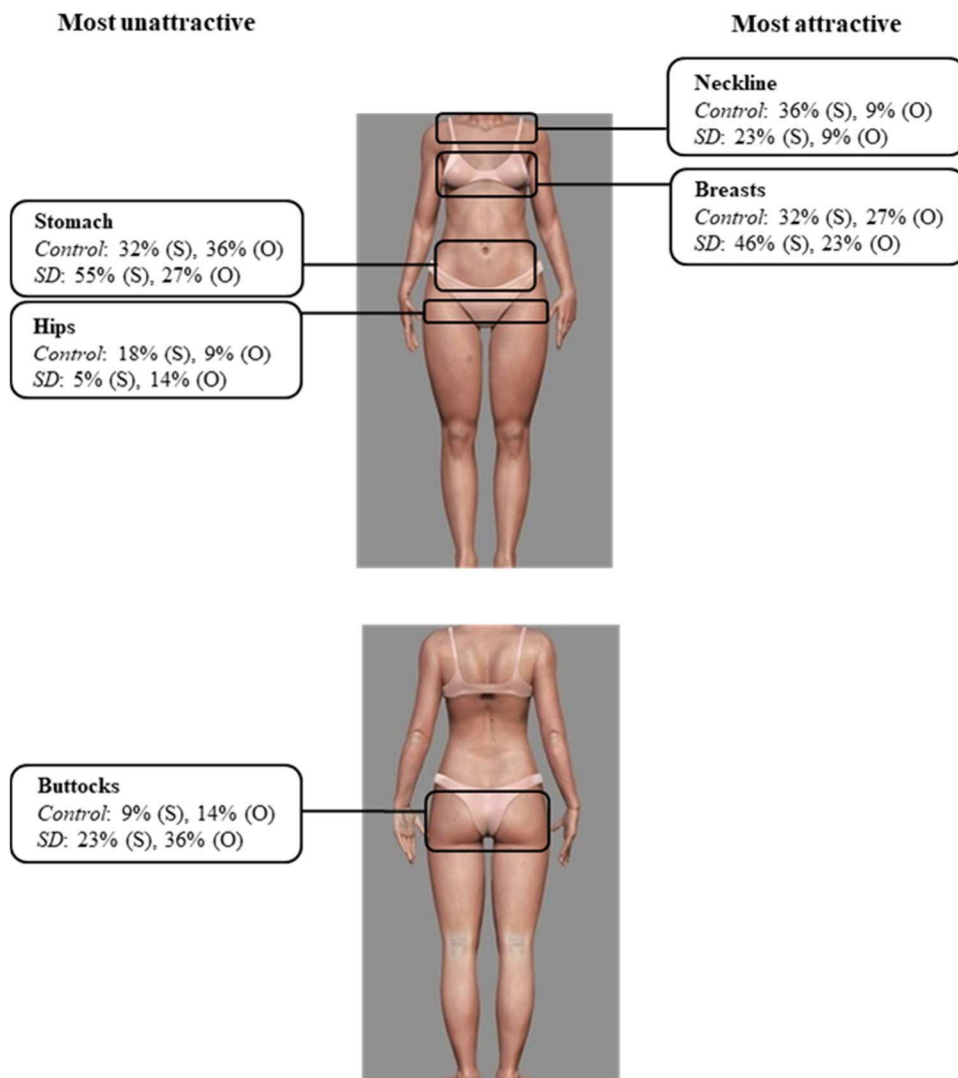


Figure 5. Frequencies (%) of most attractive and unattractive self- and other-body parts. SD = sexual dysfunction group; S = self-body; O = other-body.

Sexually explicit images ratings

There was a significant effect of experimental group on ratings of sexually explicit images, $V = 0.24$, $F(3, 40) = 4.30$, $p < .05$, $\eta_p^2 = .24$ (see Figure 6). Separate univariate ANOVAs on the outcome variables revealed significant group differences in ratings of valence, $F(1, 42) = 10.50$, $p = .002$, $\eta_p^2 = .20$, arousal, $F(1, 42) = 4.42$, $p = .042$, $\eta_p^2 = .10$, and motivation, $F(1, 42) = 7.40$, $p = .009$, $\eta_p^2 = .15$. Women in the HC group evaluated images with sexual content as more positive, more arousing and expressed more motivation to keep looking at them.

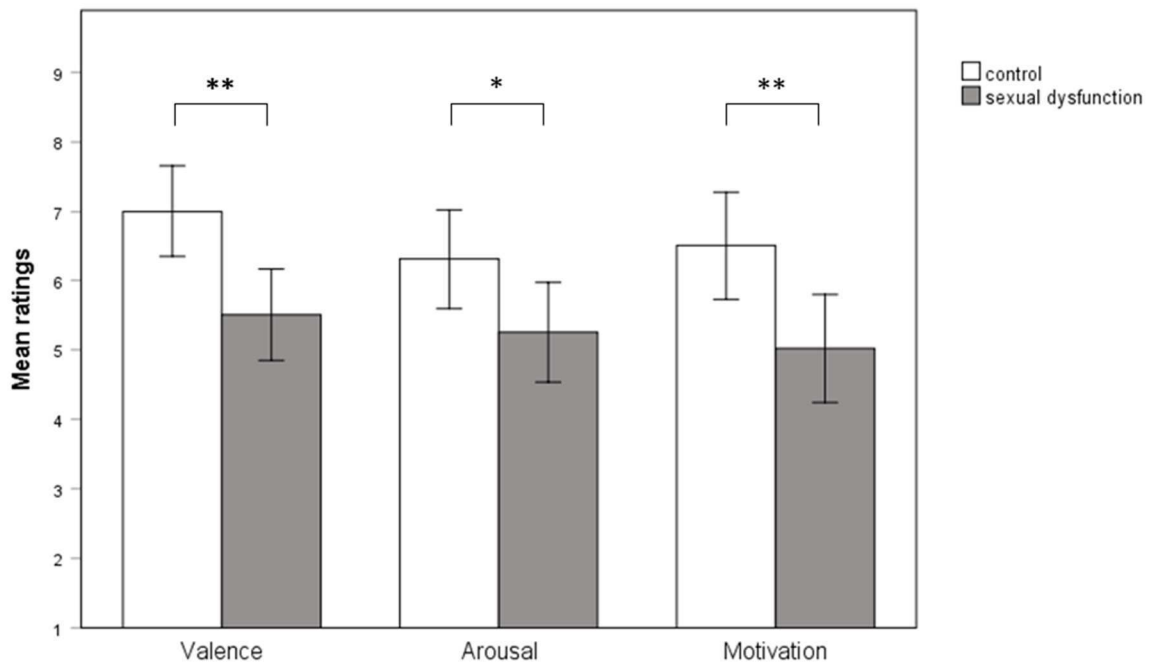


Figure 6. Means and 95% confidence intervals for valence, arousal and motivation rating scores of sexually explicit images. Asterisks indicate significant group differences, ** $p < .01$, * $p < .05$.

Body/weight satisfaction and mood

We found a significant main effect for group in body satisfaction, $F(1, 42) = 25.56, p < .001, \eta_p^2 = .38$, weight satisfaction, $F(1, 42) = 23.16, p < .001, \eta_p^2 = .36$, and mood levels $F(1, 42) = 10.86, p < .01, \eta_p^2 = .21$. That is, women in the SD group expressed lower state body satisfaction, weight satisfaction and mood levels than women from the HC group (see Table 5). Furthermore, there was a significant main effect of time for body satisfaction, $F(1, 42) = 9.57, p < .01, \eta_p^2 = .19$, and mood change $F(1, 42) = 7.60, p < .01, \eta_p^2 = .15$. Participants reported a decrease in state body satisfaction and mood level after the free viewing task. However, there were no significant interaction effects.

Table 5

Means and standard deviations of body, weight and mood satisfaction assessments during Free viewing task

	Control	SD
<i>Body satisfaction</i>		
Pre-experiment	6.34 (1.22)	3.68 (1.69)
Post-experiment	5.52 (1.71)	3.33 (2.10)
<i>Weight satisfaction</i>		
Pre-experiment	6.04 (2.02)	3.27 (1.79)
Post-experiment	5.92 (2.10)	3.03 (2.05)
<i>Mood</i>		
Pre-experiment	6.92 (1.56)	5.39 (1.77)
Post-experiment	6.49 (1.46)	4.87 (1.92)

Note. SD = sexual dysfunction group

Attentional bias induction

Group differences in response to sexually explicit video-clip before AB training

General arousal. We found no significant differences between HC and SD participants in HR, $F(1, 42) = 0.06$, $p = .81$, $\eta_p^2 = .001$, and EDA, $F(1, 42) = 0.12$, $p = .73$, $\eta_p^2 = .003$, response during the presentation of the first video-clip. We observed a similar pattern of HR deceleration and increased sweating in response to visual sexual stimuli in both groups.

Evaluative judgments. Results showed significant differences between groups on arousal ratings of erotic video-clips, $F(1, 42) = 4.80$, $p = .034$, $\eta_p^2 = .11$, and a trend for valence ratings, $F(1, 42) = 3.35$, $p = .075$, $\eta_p^2 = .08$. Women in the SD group evaluated sexually explicit video-clips as less arousing. We found no significant differences in motivation ratings, $F(1, 42) = 1.30$, $p = .26$, $\eta_p^2 = .031$.

Subjective sexual arousal. There were significant differences between the HC and SD groups on a negative subscale of state sexual arousal subscale, $F(1, 42) = 11.50$, $p = .002$, $\eta_p^2 = .22$, and a trend in an evaluative subscale, $F(1, 42) = 3.14$, $p = .083$, $\eta_p^2 = .07$. Women with SD reported having more negative attitudes in response to sexually explicit video-clips. We found no significant differences in physiological, $F(1, 42) = 1.47$, $p = .23$, $\eta_p^2 = .034$, and motivational evaluations, $F(1, 42) = 0.90$, $p = .35$, $\eta_p^2 = .021$.

The mean general and subjective sexual arousal, and evaluative judgments in response to sexually explicit video-clip are shown in Table 6.

Table 6

Means and standard deviations for physiological responses and ratings during first erotic video-clip presentation

	Control group ($n = 21$)	SD group ($n = 22$)
HR change (bpm)	-2.05 (2.77)	-2.25 (2.70)
EDA change (μ S)	3.26 (5.12)	3.77 (4.70)
<i>Erotic video-clip</i>		
Valence	6.98 (1.26)	6.05 (2.00)
Arousal	6.84 (1.51)	5.48 (2.44)
Motivation	6.51 (1.96)	5.78 (2.23)
<i>SADI</i>		
Evaluative	65.23 (26.57)	50.77 (27.49)
Negative	12.09 (9.91)	25.41 (15.53)
Physiological	39.14 (16.39)	33.09 (16.73)
Motivational	21.36 (10.10)	18.81 (7.54)

Note. SD = sexual dysfunction.

Attentional bias to least satisfying body parts

HC group. Results indicated no significant main effects of time, $F(1, 19) = 0.95, p = .34, \eta_p^2 = .05$, and training group, $F(1, 19) = 0.13, p = .72, \eta_p^2 = .01$, on AB score. The hypothesized time and training group interaction proved to be also nonsignificant, $F(1, 19) = 2.23, p = .15, \eta_p^2 = .11$.

SD group. There were no significant main effects for time, $F(1, 20) = 0.19, p = .67, \eta_p^2 = .01$, and training group, $F(1, 20) = 0.28, p = .60, \eta_p^2 = .01$, on AB scores. There was no time by training group interaction, $F(1, 20) = 0.32, p = .58, \eta_p^2 = .02$.

The mean attention bias scores for pre-test and post-test for both training groups are shown separately for HC and SD groups in Figure 7. Please refer to Table 1 for a summary of AB induction conditions.

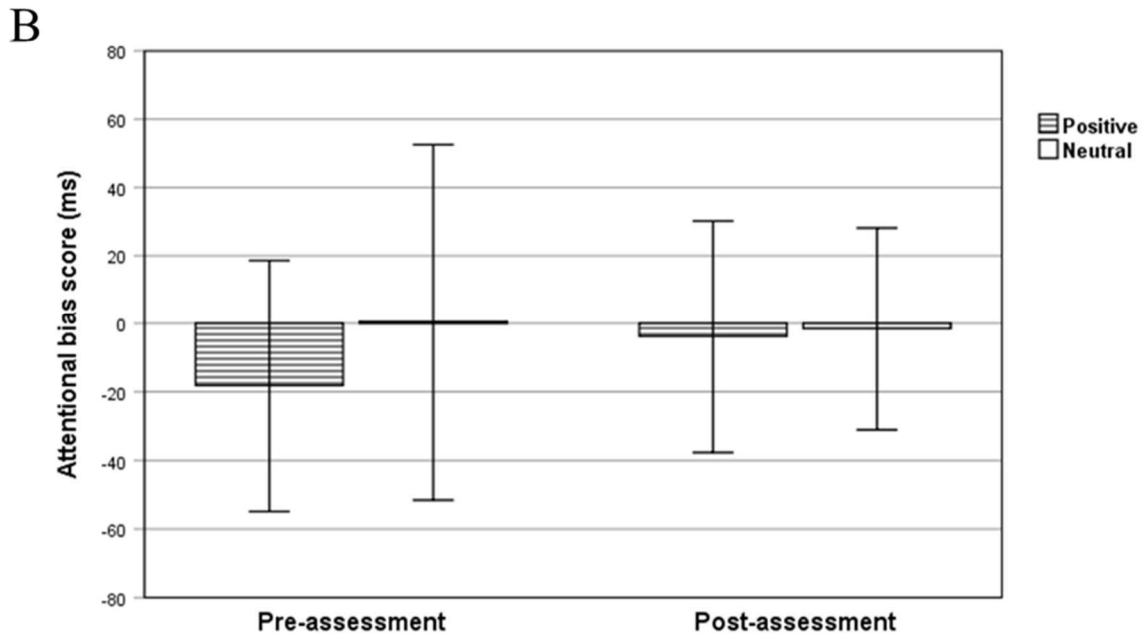
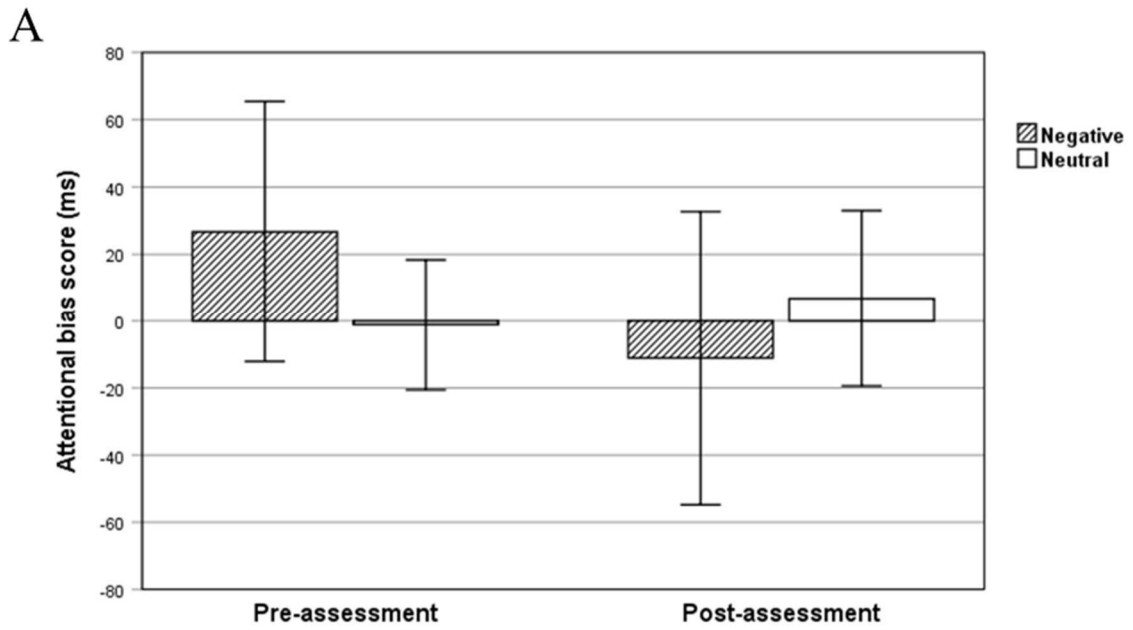


Figure 7. Change in attentional bias scores to least satisfying body parts per training in control group (panel A) and SD group (panel B).

Sexually-explicit video-clips – general arousal (heart rate and skin conductance)

HC group. Results indicated no significant main effects of time, $F(1, 19) = 2.83, p = .11, \eta_p^2 = .13$, and training group, $F(1, 19) = 0.19, p = .67, \eta_p^2 = .01$, and interaction effect of time and training type $F(1, 19) = 0.75, p = .40, \eta_p^2 = .04$, on HR changes after AB training.

However, there was a significant main effect for time, $F(1, 19) = 21.43, p < .001, \eta_p^2 = .53$, on EDA changes, indicating lower SCL during video-clip presentation after AB training. The main effect of training group, $F(1, 19) = 0.06, p = .82, \eta_p^2 = .003$, or interaction effect of time and training type, $F(1, 19) = 0.24, p = .63, \eta_p^2 = .01$, on EDA changes were nonsignificant.

Results of the mean HR and EDA changes for HC group are presented in Table 7.

Table 7

Means and standard deviations for physiological responses during erotic video-clip presentation in HC group

	Negative training ($n = 10$)		Neutral training ($n = 11$)	
	Pre-test	Post-test	Pre-test	Post-test
HR change (bpm)	-2.13 (3.47)	-2.74 (4.20)	-1.97 (2.11)	-3.87 (2.44)
EDA change (μS)	3.73 (3.89)	-1.21 (1.93)	2.83 (6.19)	-1.16 (5.13)

SD group. Results indicated no significant main effects of time, $F(1, 20) = 3.56, p = .07, \eta_p^2 = .15$, and training group, $F(1, 20) = 0.32, p = .58, \eta_p^2 = .02$, and interaction effect of time and training type, $F(1, 20) = 0.56, p = .46, \eta_p^2 = .03$, on HR changes after AB training.

There was a significant main effect for time, $F(1, 20) = 12.26, p = .002, \eta_p^2 = .38$, on EDA changes, indicating lower SCL during video-clip presentation after AB training. The main effect for training group, $F(1, 20) = 0.26, p = .62, \eta_p^2 = .01$, or the interaction of time and training type, $F(1, 20) = 0.27, p = .61, \eta_p^2 = .01$, on EDA changes was not significant.

Results of the mean HR and EDA changes for SD group are presented in Table 8.

Table 8

Means and standard deviations for physiological responses during erotic video-clip presentation in SD group

	Positive training (<i>n</i> = 12)		Neutral training (<i>n</i> = 10)	
	Pre-test	Post-test	Pre-test	Post-test
HR change (bpm)	-2.20 (1.84)	-4.32 (3.35)	-2.31 (3.58)	-3.23 (1.71)
EDA change (μS)	4.47 (5.39)	0.74 (6.78)	2.93 (3.83)	0.16 (4.53)

Note. SD = sexual dysfunction.

Sexually-explicit video-clips – ratings and state sexual arousal

HC group. Results indicated no significant main effect for time, $V = 0.12$, $F(3, 17) = 0.76$, $p = .53$, $\eta_p^2 = .12$, training type, $V = 0.08$, $F(3, 17) = 0.52$, $p = .68$, $\eta_p^2 = .08$, or interaction effect, $V = 0.33$, $F(3, 17) = 2.78$, $p = .072$, $\eta_p^2 = .33$, on ratings of video-clips. Furthermore, results revealed no significant main or interaction effects for each subscale of SADI (all $p > .05$).

The mean erotic video-clips evaluations and state sexual arousal levels for HC group are shown in Table 9.

Table 9

Means and standard deviations for AB multiple outcome measures in control group

	Negative training ($n = 10$)		Neutral training ($n = 11$)	
	Pre-test	Post-test	Pre-test	Post-test
<i>Erotic video-clips</i>				
Valence	7.08 (1.33)	6.34 (1.67)	6.89 (1.25)	6.69 (1.86)
Arousal	6.53 (1.57)	6.33 (1.62)	7.13 (1.47)	6.72 (1.41)
Motivation	5.95 (2.39)	6.47 (1.86)	7.02 (1.38)	5.97 (2.45)
<i>SADI</i>				
Evaluative	60.81 (29.47)	56.73 (32.97)	69.64 (23.90)	71.45 (20.71)
Negative	10.18 (11.40)	9.73 (9.75)	14.00 (8.27)	15.00 (16.98)
Physiological	36.00 (18.30)	35.36 (20.95)	42.27 (14.42)	40.27 (15.60)
Motivational	20.45 (11.23)	18.82 (11.89)	22.27 (9.30)	22.82 (7.99)
Body satisfaction	6.13 (1.68)	5.34 (1.64)	6.50 (1.90)	6.25 (1.89)
Weight satisfaction	6.14 (2.17)	6.02 (2.11)	6.04 (2.19)	5.75 (2.46)
Mood	7.07 (1.39)	6.14 (1.68)	7.36 (1.43)	6.30 (1.75)

Note. AB = attention bias; SADI = State Arousal and Desire Inventory.

SD group. Results indicated no significant main effect of time, $V = 0.7$, $F(3, 18) = 0.44$, $p = .73$, $\eta_p^2 = .07$, training type, $V = 0.13$, $F(3, 18) = 0.9$, $p = .46$, $\eta_p^2 = .13$, or interaction effect of time and training type, $V = 0.27$, $F(3, 18) = 2.26$, $p = .12$, $\eta_p^2 = .27$, on ratings of erotic video-clips. The main or interaction effects for each subscale of SADI were nonsignificant (all $p > .05$).

The mean erotic video-clips evaluations and state sexual arousal levels for SD group are shown in Table 10.

Table 10

Means and standard deviations for AB multiple outcome measures in SD group

	Positive training ($n = 12$)		Neutral training ($n = 10$)	
	Pre-test	Post-test	Pre-test	Post-test
<i>Erotic video-clips</i>				
Valence	6.61 (2.04)	5.50 (2.18)	5.37 (1.82)	5.76 (2.03)
Arousal	6.58 (1.89)	5.59 (2.33)	4.16 (2.45)	5.56 (2.15)
Motivation	6.23 (2.51)	5.76 (2.33)	5.24 (1.81)	5.67 (2.15)
<i>SADI</i>				
Evaluative	59.67 (27.28)	59.83 (32.84)	40.10 (24.93)	45.20 (26.87)
Negative	24.08 (16.81)	27.00 (18.31)	27.00 (14.57)	23.30 (15.17)
Physiological	38.33 (15.14)	38.33 (17.49)	26.80 (17.11)	27.80 (18.24)
Motivational	21.58 (6.95)	21.33 (10.40)	15.50 (7.17)	16.60 (9.38)
Body satisfaction	4.02 (2.13)	3.05 (1.92)	3.26 (1.94)	3.31 (2.06)
Weight satisfaction	3.50 (2.51)	3.20 (2.27)	2.56 (1.46)	2.73 (1.61)
Mood	4.97 (1.92)	4.75 (2.19)	5.06 (2.02)	4.66 (1.70)

Note. AB = attention bias; SD = sexual dysfunction; SADI = State Arousal and Desire Inventory.

Body/weight satisfaction and mood

HC group. We found a significant main effect for time on body satisfaction, $F(1, 19) = 5.11$, $p = .036$, $\eta_p^2 = .21$, and mood, $F(1, 19) = 9.06$, $p = .007$, $\eta_p^2 = .32$. That is, participants reported lower state body satisfaction, and mood levels after the AB task regardless of the training type.

Neither the main effect for training type, $F(1, 19) = 0.73$, $p = .40$, $\eta_p^2 = .04$, nor the interaction of time and training type, $F(1, 19) = 1.38$, $p = .26$, $\eta_p^2 = .07$, on body satisfaction was significant. Furthermore, we found no significant main effect for time, $F(1, 19) = 1.19$, $p = .29$, $\eta_p^2 = .06$, training type, $F(1, 19) = 0.37$, $p = .85$, $\eta_p^2 = .002$, or interaction effect, $F(1, 19) = 0.22$, $p = .64$, $\eta_p^2 = .01$, for weight satisfaction. Regarding mood we did not find significant main effect

of training type, $F(1, 19) = 0.13, p = .72, \eta_p^2 = .007$, or interaction effect of time and training type, $F(1, 19) = 0.037, p = .85, \eta_p^2 = .002$.

The mean body and weight satisfaction and mood for HC group are shown in Table 9.

SD group. We found a significant interaction effect of time and training group for body satisfaction level, $F(1, 20) = 4.68, p = .043, \eta_p^2 = .20$. Simple main effects indicated that participants from positive training group reported lower state body satisfaction after AB task, $F(1, 20) = 9.37, p = .006, \eta_p^2 = .32$, whereas participants from neutral training did not report any change, $F(1, 20) = 0.02, p = .90, \eta_p^2 = .001$.

The main effects for time, $F(1, 20) = 3.86, p = .064, \eta_p^2 = .16$, and training group, $F(1, 20) = 0.90, p = .78, \eta_p^2 = .004$, on body satisfaction were nonsignificant. Furthermore, we found no significant main effect of time, $F(1, 20) = 0.13, p = .719, \eta_p^2 = .007$, training type, $F(1, 20) = 0.67, p = .42, \eta_p^2 = .03$, or interaction effect, $F(1, 20) = 1.98, p = .18, \eta_p^2 = .09$, for weight satisfaction.

Results indicated no significant main effect of time, $F(1, 20) = 1.24, p = .28, \eta_p^2 = .06$, training type, $F(1, 20) = 0.00, p = .996, \eta_p^2 = .00$, or interaction effect of time and training type, $F(1, 20) = 0.10, p = .76, \eta_p^2 = .005$, on mood.

The mean body and weight satisfaction and mood assessments for SD group are shown in Table 10.

DISCUSSION

The presented study aimed at assessing attention distortions towards body- and sexually relevant stimuli and investigating the effectiveness of attentional bias modification on responding to sexually explicit stimuli in healthy women and in a clinical sample of women with sexual dysfunctions.

Free viewing task

Self- and other-body images – gaze data and attractiveness ratings

Gaze data. In contrast to hypothesis (Ia.), we found that participants with SDs showed stronger AB towards self-defined most satisfying body parts, reflected by longer gaze duration and more fixations on these parts of their bodies, while participants from HC group showed evenly distributed gaze pattern. Despite having higher trait and contextual body image dissatisfaction, they avoided looking at areas of their bodies that were chosen as least satisfying. This means that having more concerns about own body might not always associated with focusing on the parts of body that are regarded negatively (Janelle, et al., 2009). As it was shown in research on anxiety disorders, it is possible that individuals may show different types of AB, i.e. avoidance or vigilance towards the relevant stimuli (Price, Tone, & Anderson, 2011). Being dissatisfied with own body can be also reflected by avoidance of negatively evaluated body areas (Lykins, Ferris, & Graham, 2014). Women with SDs may establish a strategy of dealing with low body image satisfaction by avoiding looking at these body parts that produce dissatisfaction. Unlike to individuals with eating disorders, who show an AB to their most dissatisfying body parts and develop preoccupation with own body (Jansen et al., 2005), directing attention away from body parts that are dissatisfying may prevent from developing problematic eating

behaviours but may lead to avoiding situations that require body exposure, i.e. sexual encounters (Cash et al., 2004).

In addition to these results, we found a general pattern of drawing attention to self-body parts rated as unattractive. Participants from both, the HC and the SD group looked longer and fixated more often on the most unattractive body parts when compared to the most attractive ones. This finding partially supports existing knowledge on visual perception of own bodies, which concludes that the preoccupation with own body and high concerns about shape are reflected in attention bias towards the body areas perceived as negative (Jansen et al., 2005; Smeets et al., 2011).

Attractiveness ratings. Women with SDs evaluated the attractiveness of body images generally lower, regardless of their identity. Furthermore, as reflected by higher body image dissatisfaction, own body images of participants in the SD group were rated as less attractive, when compared to the BMI-matched HC body image. The present finding further indicate the relationship between negative body evaluations and sexual problems. Having more weight concerns and a more negative evaluation of sexual attractiveness may interfere with sexual life, reflected by lower levels of experienced sexual desire (Seal, Bradford, & Meston, 2009) and sexual satisfaction (Pujols, Meston, & Seal, 2010).

Differences in gaze pattern (i.e. AB away from least satisfying body parts and AB towards most unattractive body parts) in SD individuals could arise from the different procedure of choosing relevant body parts. Participants were asked to select most and least satisfying body parts based on the computer-generated image of a female's body during the first appointment. The selection and evaluations of most attractive/unattractive body parts were assessed at the end of the second appointment. Participants were given printed copies of the self and control body

images with the opportunity to compare both sets of images. This procedure could influence the choice and evaluative judgments.

Furthermore, the meaning of the two rating dimensions (satisfaction and attractiveness) contain diverse meaning. An adjective *attractive* is used to define a person as “pleasant to look at, especially in a sexual way” (Hornby, 2000, p. 67), and it specifies how appealing and pleasing individual’s physical conditions are. In this meaning it represents the interest that can arouse from the observer’s point of view, i.e. how the body is seen by others. A different aspect is reflected by the *satisfaction* dimension, which is used to define the state of “giving pleasure because it provides something you need or want” (Hornby, 2000, p. 1134). It describes the internal focus, i.e. to what extent the person accepts and is pleased with own body.

Sexually explicit images – gaze data and evaluative judgments

Gaze data. With regard to hypothesis (Ib.), we found no differences between participants and both groups looked longer and showed more fixations on sexual content of an image compared to a background. Even though females in SD group evaluated images with sexual content as less positive, less arousing and expressed less motivation to keep looking at them, it was not reflected in their gaze pattern. Despite the presence of sexual dysfunctions symptoms, like low interest in sexual activity, having issues with reaching orgasm or pain during intercourse, participants directed their attention towards sexual stimuli. The visual attention to the sexual cues did not differentiate women with SD from non-symptomatic HCs but the affective processing of sexual information showed different pattern of appraisal.

Evaluative judgments. As shown by gaze data, the attention of participants in SD group was captured with the same strength as in women from HC group. During conscious pathway of sexual stimuli processing (Janssen et al., 2000) a more negative meaning is attributed, despite the

physiological changes. Consequently, an experience of subjective sexual arousal is lessened and this can result in behaviours that protect from the negative attitudes, like avoidance of sexual situations. Results from the current study revealed that women with SD reported lower ratings of the images with sexual content, which could result in disposing more attention resources for other cues, like focusing on body-related factors.

Attentional bias induction

The AB training did not significantly change participants' level of attention bias to self-defined least satisfying body parts (hypothesis IIa and IIb). HC participants reported lower state body satisfaction, and mood levels after AB task regardless of the training condition, while in the SD group only participants who received positive training reported a decrease in state body satisfaction after AB task. Furthermore, no effect of the training type on ratings of erotic video-clips and or state sexual arousal (as measured by SADI) was reported, and we did not find any significant change in HR response to sexually explicit video-clips after AB training in neither of the group. The AB induction, regardless of the training type, resulted in lower SCL response during the second video-clip presentation in HC and SD group. The effectiveness of the single AB training in modifying body-related attentional processes must therefore be questioned.

First, it might be that the neutral training (i.e. directing attention to average rated body parts) did not serve as a suitable HC training. In a study by Smeets et al. (2011), neutral objects were used in the training procedure (e.g. a golf ball) and a longer exposure (i.e. 4 s) to the dissatisfying body parts was adapted. Another important aspect that may explain the mixed results of the AB induction concerns the individual's initial bias towards the relevant stimuli. Attention bias modification has been shown to be influenced by the direction of the pre-existing distortions (Fox, Zougkou, Ashwin, & Cahill, 2015): a bias towards spider reduction was most successful in

participants who demonstrated an initial vigilance towards fear-relevant stimuli. As body image dissatisfaction is commonly observed at different levels in general and clinical population (e.g. von Lengerke & Mielck, 2012) this might be explained by individual differences in AB towards or away from specific body parts.

Despite the ineffective AB induction, relevant differences between HC and SD participants occurred. Exposure to the sexually explicit video-clip before the AB induction task resulted in an increase of general arousal in both groups, i.e. HR deceleration and increased sweating. The differences between HC and SD group appeared in the aspect of subjective responses, i.e. women with SD evaluated erotic video-clips as less arousing and expressed more negative attitudes towards it, e.g. as being uninterested, anxious, etc. Negative evaluations may be connected with having less positive sexual experiences and result in sexual aversion or inhibition towards sexual stimuli (Toledano & Pfaus, 2006). The positive appraisal of sexual cue play an essential role in assigning sexual relevance to it and the presence of genital or physiological arousal is not the main determinant (Basson, Brotto, Laan, Redmond, & Utian, 2005; Janssen et al., 2000). Improvement in genital arousal was shown to be not followed by an increase in subjective sexual arousal (Laan, van Lunsen, Everaerd, Riley, Scott, & Boolell, 2002), which highlights the importance of cognitive factors in treatments of female's sexual dysfunctions. It is also possible that signs of physiological arousal that occur in the presence of sexual stimuli may be attributed to negative affective states (van den Hout & Barlow, 2000).

Limitations

There are several limitations of the study to be addressed. First, we did not differentiate types of sexual dysfunctions. As it was previously shown specific types of SD problems may result in distinct pattern of responding, e.g. reduced visual attention to sexual vs non-sexual content of

images in women with pain during intercourse compared to women with low sexual desire (Lykins et al., 2011). Furthermore, two experimental tasks were done during one session, which could have an influence of previously free viewing task on performance during AB training.

CONCLUSIONS

Results from the current study support the notion of an association between body image dissatisfaction and cognitive processing of sexual stimuli. Cognitive factors, such as body image concerns, that modify self-report sexual arousal seem important to further understand the mechanisms involved in sexual (dys)function. The reported discordance between evaluative judgments and general arousal may be related to negative sexual experiences and attitudes towards sexuality (Toledano & Pfaus, 2006). Despite the fact the visual attention pattern and physiological changes are not disturbed in response to sexual stimuli, the subjective arousal is inhibited. Future research should focus on the specificity of individual differences of attention bias to body-related stimuli in women with sexual dysfunction.

4. General discussion

4.1. Summary of findings

The presented research project was designed to investigate the relationship between body image and sexual functioning in women, using correlational and experimental approaches to elucidate the significance of body image dissatisfaction for sexual dysfunction.

4.1.1. Evaluative judgements of sexual visual stimuli and level of sexual functioning: the mediating role of contextual body image

The primary aim of Study 1 was to investigate the association of body image dissatisfaction with evaluative judgements of sexually explicit images and sexual functioning level. Body image dissatisfaction in the context of sexual experiences was found to be negatively correlated with female's ratings of sexually explicit pictures on the dimension of valence and motivation. The general body image dissatisfaction was not correlated with evaluative judgements of pictures with sexual content. The mediation effect of contextual body image has been found to be present only in women, i.e. valence ratings of sexually explicit stimuli were associated with sexual functioning level mediated by contextual body image. More precisely women, who rated sexually explicit pictures less positively scored lower on sexual functioning if they reported a more self-conscious focus and avoidance of the body in the context of sexual experiences. In addition, we proved that men tend to appraise visual sexual stimuli more positively and to express more motivation to continue looking at them. Altogether, these results supported a pronounced association between contextual body image (dis)satisfaction and sexual functioning in heterosexual women (Cash et al., 2004; Steer & Tiggemann, 2008; Yamamiya et al., 2006).

4.1.2. Psychophysiological responses to sexually explicit visual stimuli

Study 2 aimed at investigating sex differences in evaluative judgements, psychophysiological indicators of affective arousal (heart rate) and a measure of affective-motivational state of approach or avoidance (startle response modulation) while viewing sexually explicit images. The results indicated that visual sexual stimuli were viewed as more arousing and positive as neutral images, and moreover, they received more 'continue to keep looking' ratings in both men and women (Bradley et al., 2001a; Bradley et al., 2001b). Furthermore, the new set of sexual stimuli was proven to induce emotional arousal, which was reflected by the sustained deceleration of heart rate during presentation. These findings support previous indication of motivational engagement in response to sexual stimuli (Graham & Clinton, 1966; Hamrick, 1974; Palomba et al., 1997). Using an affective startle eye-blink modulation paradigm, we found that viewing images with sexual content is associated with attenuated startle response magnitudes when compared to neutral stimuli (Prause et al., 2008; Giargari et al., 2005; Koukounas & McCabe, 2001). The novel finding of smaller startle magnitudes to images of people in social situations was found in men and may indicate that men tend to perceive interaction of two persons of opposite sex in a more sexual manner than do women (ex. Koukounas & Letch, 2001).

4.1.3. Attentional bias to body- and sexually-relevant stimuli

Study 3 aimed at comparing responses to sexual stimuli and stimuli related to body image dissatisfaction (images of own body) in participants with sexual dysfunctions (SD) and a healthy control group (HC). We found women in the SD group looked significantly longer and more frequently at self-defined most satisfying than dissatisfying body parts when compared to HC participants. There were no significant group differences in gaze duration and frequency of sexually explicit images, but women with SDs rated these stimuli as less positive, less arousing

and expressed less motivation to keep looking at them. Furthermore, through manipulation of state body image satisfaction we found a significant change in skin conductance level in each group in response to sexual stimuli, regardless of the attention bias (AB) training type, but not in the heart rate. Moreover, results indicated that HC participants reported lower state body image satisfaction and mood after the AB induction. Women in SD group who attended to positive training expressed lower state body satisfaction, whereas women who attended to neutral training did not report any difference. Finally, AB induction did not change ratings of sexual stimuli and state sexual arousal in neither of group. Altogether, the findings from Study 3 suggests that in women with SD visual attention and general arousal in response to sexual stimuli is not disturbed but rather the process of evaluation.

4.2. Implications

Our findings replicate and extend those from prior studies in several ways. First, results from Study 1 highlight the higher body image dissatisfaction in women compared to men (Brand et al., 1992; Davison & McCabe, 2005; Fairburn et al., 1991; Garner, 1997; Hoyt & Kogan, 2001; Matthiassdottir et al., 2010; Palladino Green & Pritchard, 2003). This suggests that women are still under social pressure to conform beauty ideals and tend to use social comparisons when evaluating own bodies (Sanderson et al., 2002). Moreover, we confirmed that body image concerns are associated with sexual problems (Nobre & Pinto-Gouveia, 2006; Peplau et al., 2009; Sanchez & Kiefer, 2007; Seal et al., 2009). Furthermore, the evidence from Study 1 extends the knowledge on contextual body image in sexual situations and shows that appraisal and evaluation of one's body and appraisal of visual sexual stimuli plays an important role for sexual functioning. Thus, the inclusion of psychological factors, like body image dissatisfaction, that can be associated with sexual responding (Anderson & Cyranowski, 1995), and the

multifaceted aspects of female's sexual response (Basson, 2000, Both et al., 2010) expands the current knowledge on sexual function and dysfunction in women.

The psychophysiological response to sexually explicit images from Study 2 showed that the new database is a valid measurement of sexual stimuli that can be used in studies on emotional responding in both men and women. The interesting finding of male's attenuated startle response to both arousing and positive sexual stimuli, and to neutral images of people, can be a proof of more acceptance for men to overtly show their sexual interest (Nobre & Pinto-Gouveia, 2006) and to generalize the interpretation of social situation in a more sexual way.

Study 3 showed that women with sexual dysfunctions despite having higher body image dissatisfaction than healthy controls do not spend more time looking at these body parts that are associated with dissatisfaction. It is possible that women with sexual problems develop specific strategies to protect themselves from focusing on negative aspects of one's appearance and not like women with negative body image or with eating disorders symptomatology, who tend to focus on body parts that are rated as dissatisfying or unattractive (Janelle et al., 2009; Jansen et al., 2005, Glashouwer et al., 2016; Roefs et al., 2008; Smeets et al., 2011).

4.3. Limitations

Despite the relevant contributions of the presented studies, several limitations should be addressed. First, the lack of self-report measures of sexual arousal did not allow for the assessment of the effect of sexually explicit stimuli on general sexual arousal. Additionally, distinguishing between specific types of sexual dysfunctions would be of advantage and could reveal further differences or similarities in responding to sexual stimuli and its relationship with body image satisfaction.

Furthermore, adapting attention bias modification according to pre-existing distortions and individual differences in AB towards or away specific body parts. Furthermore, the increase of time in exposure to relevant body parts may contribute for induction of state body image satisfaction. Further studies should focus on exploring other ways of manipulating and improving state body image satisfaction, like mirror exposure (Griffen, Naumann, & Hildebrandt, 2018).

4.4. Final conclusions

The relationship that is established with one's body is relevant in understanding well-being and its role in sexuality of the individual. The connection between body and mind cannot be suspended. Although, female's sexual function can be disturbed by various factors, the individual emotional response to sexual cues plays a relevant role in developing and maintaining sexual concerns (Silvaggi & Tripodi, 2013). The disturbance in subjective disposition and willingness of a person to respond adequately to sexual stimuli may be sufficient for developing sexual dysfunction, as in female's genital response is not always in line with subjective feelings of excitement and pleasure (Laan & Everaerd, 1995). Taking into account the relevance of psychological factors, i.e. appraisal of sexual stimuli and body image dissatisfaction, should be included in the treatment of sexual dysfunctions. Even though body reactions in response to sexual cues are sufficient and not disturbed, it is possible that pleasure and satisfaction from sexual life can be diminished.

5. References

- Abbey, A. (1982). Sex differences in attributions for friendly behavior: do males misperceive females' friendliness? *Journal of Personality and Social Psychology*, *42*, 830–838.
- Abbey, A., & Melby, C. (1986). The effects of nonverbal cues on gender differences in perceptions of sexual intent. *Sex Roles*, *15*, 283–298.
- Ackard, D. M., Kearney-Cooke, A., & Peterson, C. B. (2000). Effect of body image and self-image on women's sexual behaviors. *International Journal of Eating Disorders*, *28*, 422–429.
- Ambwani, S., & Strauss, J. (2007). Love thyself before loving others? A qualitative and quantitative analysis of gender differences in body image and romantic love. *Sex Roles*, *56*, 13–21.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text revision). Washington, DC, American Psychiatric Association.
- American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC, American Psychiatric Association.
- Andersen, B. L., & Cyranowski, J. (1995). Women's sexuality: behaviors, responses and individual differences. *Journal of Consulting and Clinical Psychology*, *63*, 891–906.
- Andersen, B. L., & LeGrand, J. (1991). Body image for women: conceptualization, assessment, and a test of its importance to sexual dysfunction and medical illness. *Journal of Sex Research*, *28*(3), 457–478.
- Armstrong, T., & Olatunji, B. O. (2012). Eye tracking of attention in the affective disorders: a meta-analytic review and synthesis. *Clinical Psychology Review*, *32*(8), 704–723.
- Ayalon, H. (2003). Women and men go to university: mathematical background and gender differences in choice of field in higher education. *Sex Roles*, *48*(5–6), 277–290.
- Bancroft, J. (2009). Sexual arousal and response – the psychosomatic circle. In J. Bancroft (Eds.), *Human Sexuality and Its Problems* (3rd ed., pp. 55–143). Bloomington, Indiana, USA: Churchill Livingstone Elsevier.
- Bancroft, J., Loftus, J., & Long, J. (2003). Distress about sex: a national survey of women in heterosexual relationships. *Archives of Sexual Behavior*, *32*(3), 193–208.
- Barlow, D. H. (1986). Causes of sexual dysfunction: the role of anxiety and cognitive interference. *Journal of Consulting and Clinical Psychology*, *54*, 140–148.
- Basson, R. (2000). The female sexual response: a different model. *Journal of Sex and Marital Therapy*, *26*, 51–65.

- Basson, R. (2002). A model of women's sexual arousal. *Journal of Sex and Marital Therapy*, 28(1), 1–10.
- Basson, R., Brotto, L. A., Laan, E., Redmond, G., & Utian, W. H. (2005). Assessment and management of women's sexual dysfunctions. problematic desire and arousal. *Journal of Sexual Medicine*, 2, 291–300.
- 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(3), 242–273.
- Beard, C., & Amir, N. (2010). Attention bias for sexual words in female sexual dysfunction. *Journal of Sex & Marital Therapy*, 36, 216–226.
- Beck, A. T., Steer, R. A., & Brown, K. (1996). *Beck Depression Inventory-II (BDI-II)*. San Antonio, TX: The Psychological Corporation.
- Beck, A. T., Steer, R. A., & Brown, K. (1998). *Inventaire de Dépression de Beck (BDI-II)*. France: Les Éditions du Centre de Psychologie Appliquée (ECPA).
- Binik, Y. M. (2010a). The DSM diagnostic criteria for dyspareunia. *Archives of Sexual Behavior*, 39, 292–303.
- Binik, Y. M. (2010b). The DSM diagnostic criteria for vaginismus. *Archives of Sexual Behavior*, 39, 278–291.
- Blechert, J., Ansorge, U., & Tuschen-Caffier, B. (2010). A body-related dot-probe task reveals distinct attentional patterns for Bulimia Nervosa and Anorexia Nervosa. *Journal of Abnormal Psychology*, 119(3), 575–585.
- Blumenthal, T. D. (1994). Signal attenuation as a function of integrator time constant and signal duration. *Psychophysiology*, 31, 201–203.
- Both, S., Laan, E., & Schultz, W. W. (2010). Disorders in sexual desire and sexual arousal in women, a 2010 state of the art. *Journal of Psychosomatic Obstetrics and Gynaecology*, 31, 207–218.
- Beauvoir, S. d., Borde, C., & Malovany-Chevallier, S. (2011). *The second sex*. New York: Vintage Books.
- Bozman, W. A., & Beck, J. G. (1991). Covariation of sexual desire and sexual arousal: the effects of anger and anxiety. *Archives of Sexual Behavior*, 20, 47–60.
- Bradford, D. E., Starr, M. J., Shackman, A. J., & Curtin, J. J. (2015). Empirically based comparisons of the reliability and validity of common quantification approaches for eyeblink startle potentiation in humans. *Psychophysiology*, 52(12), 1669–1681.

- Bradley, M. M., Codispoti, M., Cuthbert, B. N., & Lang, P. J. (2001a). Emotion and motivation I: defensive and appetitive reactions in picture processing. *Emotion, 1*(3), 276-298.
- Bradley, M. M., Codispoti, M., Sabatinelli, D., & Lang, P. J. (2001b). Emotion and motivation II: sex differences in picture processing. *Emotion, 1*(3), 300–319.
- Bradley, M. M., Codispoti, M., & Lang, P. J. (2006). A multi-process account of startle modulation during affective perception. *Psychophysiology, 43*(5), 486-497.
- Bradley, B. P., Mogg, K., White, J., Groom, C., & De Bono, J. (1999). Attentional bias for emotional faces in generalized anxiety disorder. *The British Journal of Clinical Psychology, 38*(3), 267-78.
- Brand, P., Rothblum, E., & Solomon, L. (1992). A comparison of lesbians, gay men, and heterosexuals on weight and restricted eating. *International Journal of Eating Disorders, 11*, 253-259.
- Brody, S. (2010). The relative health benefits of different sexual activities. *The Journal of Sexual Medicine, 7*, 1336-1361.
- Brooks, S., Prince, A., Stahl, D., Campbell, I. C., & Treasure, J. (2011). A systematic review and meta-analysis of cognitive bias to food stimuli in people with disordered eating behaviour. *Clinical Psychology Review, 31*, 37-51.
- Brosschot, J. F., & Thayer, J. F. (2003). Heart rate response is longer after negative emotions than after positive emotions. *International Journal of Psychophysiology, 50*, 181-187.
- Brotto, L. (2009). The DSM diagnostic criteria for sexual aversion disorder. *Archives of Sexual Behavior, 39*, 271-277.
- Brytek-Matera, A., & Schiltz, L. (2011). Association between attitudes towards body image, negative emotions about one's own body and self-state representations in a clinical sample of eating disordered women. *Archives of Psychiatry & Psychotherapy, 13*(2), 37-43.
- Buodo, G., Sarlo, M., & Palomba, D. (2002). Attentional resources measured by reaction times highlight differences within pleasant and unpleasant, high arousing stimuli. *Motivation and Emotion, 26*(2), 123–138.
- Burri, A., & Spector, T. (2011). Recent and lifelong sexual dysfunction in a female UK population sample: prevalence and risk factors. *Journal of Sexual Medicine, 8*(9), 2420-2430.
- Bush, S.I. & Geer, J.H. (2001). Implicit and explicit memory of neutral, negative emotional, and sexual information. *Archives of Sexual Behavior, 30*(6), 615-631.

- Cash, T. F. (2002). The situational inventory of body-image dysphoria: psychometric evidence and development of a short form. *International Journal of Eating Disorders*, *32*(3), 362-366.
- Cash, T. F. (2011). Crucial considerations in the assessment of body image. In: T. F. Cash & L. Smolak (Eds.), *Body image: a handbook of science, practice, and prevention* (2nd ed., pp. 129-137). New York, NY US: Guilford Press.
- Cash, T. F., Fleming, E. C., Alindogan, J., Steadman, L., & Whitehead, A. (2002). Beyond body image as a trait: the development and validation of the body image states scale. *Eating Disorders*, *10*(2), 103-113.
- Cash, T. F., Maikkula, C. L., & Yamamiya, Y. (2004, June 29). "Baring the body in the bedroom": body image, sexual self-schemas, and sexual functioning among college women and men. *Electronic Journal of Human Sexuality*, *7*, <http://www.ejhs.org/volume7/bodyimage.html>
- Cattarin, J. A., Thompson, J. K., Thomas, C., & Williams, R. (2000). Body image, mood, and televised images of attractiveness: the role of social comparison. *Journal of Social and Clinical Psychology*, *19*(2), 220-239.
- Chivers, M. L. & Bailey, M. (2005). A sex difference in features that elicit genital response. *Biological Psychology*, *70*(2), 115-120.
- Chivers, M. L., Reiger, G., Latty, E., & Bailey, J. M. (2004). A sex difference in the specificity of sexual arousal. *Psychological Science*, *15*, 736-744.
- Chivers, M. L., Seto, M. C., Lalumière, M. L., Laan, E., & Grimbos, T. (2010). Agreement of self-reported and genital measures of sexual arousal in men and women: a meta-analysis. *Archives of Sexual Behavior*, *39*(1), 5-56.
- Christensen, B., Grønbaek, M., Osler, M., Pedersen, B., Graugaard, C., & Frisch, M. (2011). Sexual dysfunctions and difficulties in Denmark: prevalence and associated sociodemographic factors. *Archives of Sexual Behavior*, *40*(1), 121-132.
- Clayton, A. H., McGarvey, E. L., & Clavet, G. J. (1997). The Changes in Sexual Functioning Questionnaire (CSFQ): development, reliability, and validity. *Psychopharmacology Bulletin*, *33*(4), 731-745.
- Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C.G. (1987). The development and validation of the Body Shape Questionnaire. *International Journal of Eating Disorders*, *6*, 485-494.
- Conaglen, H. M. (2004). Sexual content induced delay: A reexamination investigating relation to sexual desire. *Archives of Sexual Behavior*, *33*(4), 359-367.
- 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.

- Crowther, J. H., & Williams, N. M. (2011). Body image and bulimia nervosa. In T. F. Cash & L. Smolak (Eds.), *Body image: a handbook of science, practice, and prevention* (2nd ed., pp. 288-295). New York: Guilford Press.
- Cuthbert, B. N., Bradley, M. M. & Lang, P. J. (1996). Probing picture perception: activation and emotion. *Psychophysiology*, *33*, 103-111.
- Davis, M. (2006). Neural systems involved in fear and anxiety measured with fear-potentiated startle. *American Psychologist*, *61*(8), 741-756.
- Davison, S. L., Bell, R. J., LaChina, M., Holden, S. L., & Davis, S. R. (2008). Sexual function in well women: Stratification by sexual satisfaction, hormone use, and menopause status. *Journal of Sexual Medicine*, *5*(5), 1214-1222.
- Davison, S. L., Bell, R. J., LaChina, M., Holden, S. L., & Davis, S. R. (2009). The relationship between self-reported sexual satisfaction and general well-being in women. *Journal of Sexual Medicine*, *6*(10), 2690-2697.
- Davison, T. E., & McCabe, M. P. (2005). Relationships between men's and women's body image and their psychological, social, and sexual functioning. *Sex Roles*, *52*(7-8), 463-475.
- de Jong, D. C. (2009). The role of attention in sexual arousal: implications for treatment of sexual dysfunction. *Journal of Sex Research*, *46*(2-3), 237-248.
- Derogatis, L. R. (1997). The Derogatis Interview for Sexual Functioning (DISF/DISF-SR): an introductory report. *Journal of Sex and Marital Therapy*, *23*, 291-304.
- Derogatis, L. R., Clayton, A., Lewis-D'Agostino, D., Wunderlich, G., & Fu, Y. (2008). Validation of the female sexual distress scale revised for assessing distress in women with hypoactive sexual desire disorder. *Journal of Sex and Marital Therapy*, *5*, 357-364.
- Derogatis, L. R., & Melisaratos, N. (1979). The DSFI: a multidimensional measure of sexual functioning. *Journal of Sex and Marital Therapy*, *5*, 244-280.
- Dewitte, M. (2016). Gender differences in implicit processing of sexual stimuli. *European Journal of Personality*, *30*, 107-124.
- Dickinson, E. R., Adelson, J. L., & Owen, J. (2012). Gender balance, representativeness, and statistical power in sexuality research using undergraduate student samples. *Archives of Sexual Behavior*, *41*(2), 325-327.
- Dondzilo, L., Rieger, E., Palermo, R., Byrne, S., & Bell, J. (2017). The mediating role of rumination in the relation between attentional bias towards thin female bodies and eating disorder symptomatology. *PLoS ONE*, *12*(5), E0177870.
- Dove, N., & Wiederman, M. (2000). Cognitive distraction and women's sexual functioning. *Journal of Sex & Marital Therapy*, *26*(1), 67-78.

- Evans, C., & Dolan, B. (1993). Body Shape Questionnaire: derivation of shortened “alternate forms”. *International Journal of Eating Disorders*, *13*, 315–321.
- Evans, L., & Stukas, A. A. (2007). Self-verification by women and responses of their partners around issues of appearance and weight: “Do I look fat in this”. *Journal of Social and Clinical Psychology*, *26*, 1163–1188.
- Everaerd, W. (1988). Commentary on sex research: sex as an emotion. *Journal of Psychology and Human Sexuality*, *1*, 3–15.
- Fairburn, C. G., Cooper, P. J., Cooper, M. J., McKenna, F. P., & Anastasiades, P. (1991). Selective information processing in bulimia nervosa. *International Journal of Eating Disorders*, *10*(4), 415-422.
- Faith, M. S., & Schare, M. L. (1993). The role of body image in sexually avoidant behavior. *Archives of Sexual Behavior*, *22*, 345-356.
- Ferenidou, F., Kapoteli, V., Moisisdis, K., Koutsogiannis, I., Giakoumelos, A., & Hatzichristou, D. (2008). Presence of a sexual problem may not affect women's satisfaction from their sexual function. *Journal of Sexual Medicine*, *5*(3), 631-639.
- Finke, J. B., Deuter, C. E., Hengesch, X., & Schächinger, H. (2017). The time course of pupil dilation evoked by visual sexual stimuli: exploring the underlying ANS mechanisms. *Psychophysiology*, *54*(10), 1444-1458.
- First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2002). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, research version, patient edition (SCID-I/P)*. New York: Biometrics Research, New York State Psychiatric Institute.
- Fisher, T. D. (2007). Sex of experimenter and social norm effects on reports of sexual behavior in young men and women. *Archives of Sexual Behavior*, *36*, 89–100.
- Fromberger, P., Jordan, K., Herder, J., Steinkrauss, H., Nemetschek, R., Stolpmann, G., & Müller, J. (2012). Initial orienting towards sexually relevant stimuli: preliminary evidence from eye movement measures. *Archives of Sexual Behavior*, *41*(4), 919-928.
- Forbes, G. B., Adams-Curtis, L. E., Rade, B., & Jaberg, P. (2001). Body dissatisfaction in women and men: the role of gender-typing and self-esteem. *Sex Roles*, *44*(7-8), 461-484.
- Fox, E., Zougkou, K., Ashwin, C., & Cahill, S. (2015). Investigating the efficacy of attention bias modification in reducing high spider fear: the role of individual differences in initial bias. *Journal of Behavior Therapy and Experimental Psychiatry*, *49*, 84-93.
- Fugl-Meyer, K. S., Lewis, R.W., Corona, G., Hayes, R. D., Laumann, E. O., Moreira, E. D., ... Segraves, T. (2010). Definitions, classification, and epidemiology of sexual dysfunction. In F. Montorsi, R. Basson, G. Adaikan, E. Becher, A. Clayton, F. Giuliano, S. Khoury, & F. Sharlip (Eds.), *Sexual medicine: sexual dysfunctions in men and women* (pp. 41–117). Paris, France: Health Publications.

- Frijda, N. H. (1986). *The emotions*. Cambridge, England: Cambridge University Press.
- Garner, D. M. (1997). The 1997 Body Image Survey results. *Psychology Today*, 30, 30-84.
- Geer, J. H., & Bellard, H. S. (1996). Sexual content induced delays in unprimed lexical decisions: gender and context effects. *Archives of Sexual Behavior*, 25(4), 379-395.
- Geer, J. H., Lapour, K. J., & Jackson, S. R. (1993). The information processing approach to human sexuality. In N. Birbaumer & A. Öhman (Eds.), *The structure of emotion: psychophysiological, cognitive, and clinical aspects* (pp. 139–155). Toronto: Hogrefe-Huber.
- Geer, J. H., & Melton, J. S. (1997). Sexual content-induced delay with double-entendre words. *Archives of Sexual Behavior*, 26(3), 295-316.
- Giargari, T., Mahaffey, A., Craighead, W., & Hutchison, K. (2005). Appetitive responses to sexual stimuli are attenuated in individuals with low levels of sexual desire. *Archives of Sexual Behavior*, 34(5), 547-556.
- Giles, K. R., & McCabe, M. P. (2009). Conceptualizing women's sexual function: linear vs. circular models of sexual response. *Journal of Sexual Medicine*, 6, 2761-2771.
- Gillen, M. M., Lefkowitz, E. S., & Shearer, C. L. (2006). Does body image play a role in risky sexual behavior and attitudes? *Journal of Youth and Adolescence*, 35(2), 243-255.
- Glashouwer, K. A., Jonker, N. C., Thomassen, K., & de Jong, P. J. (2016). Take a look at the bright side: Effects of positive body exposure on selective visual attention in women with high body dissatisfaction. *Behaviour Research and Therapy*, 83, 19–25.
- Glauert, R., Rhodes, G., Fink, B., & Grammer, K. (2010). Body dissatisfaction and attentional bias to thin bodies. *International Journal of Eating Disorders*, 43, 42-49.
- Glasser, C. L., Robnett, B. & Feliciano, C. (2009). Internet daters' body type preferences: race–ethnic and gender differences. *Sex Roles*, 61(1-2), 14-33.
- Graham, C. A., Sanders, S. A., Milhausen, R. R., & McBride, K. R. (2004). Turning on and turning off: A focus group study of the factors that affect women's sexual arousal. *Archives of Sexual Behavior*, 33, 527-538.
- Griffen, T. C., Naumann, E., & Hildebrandt, T. (2018). Mirror exposure therapy for body image disturbances and eating disorders: a review. *Clinical Psychology Review*, 65, 163-174.
- Hallion, L. S., & Ruscio, A. M. (2011). A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychological Bulletin*, 137, 940–958.
- Hamrick, N. D. (1974). Physiological and verbal responses to erotic visual stimuli in a female population. *Behavioral Engineering*, 2, 9-16.

- Harnish, R. J., Abbey, A., & DeBono, K. G. (1990). Toward an understanding of “the sex game”: the effects of gender and self-monitoring on perceptions of sexuality and likability in initial interactions. *Journal of Applied Social Psychology, 20*, 1333–1344.
- Hautzinger, M., Keller, F., & Kühner, C. (2006). *BDI II - Beck Depressions-Inventar - Manual*. Frankfurt am Main, Germany: Harcourt Test Services.
- Hayes, A. F. (2013). *Methodology in the social sciences. Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*. New York: Guilford Press.
- Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate Behavioral Research, 50*(1), 1-22.
- Hayes, R. D. (2011). Circular and linear modelling of female sexual desire and arousal. *Journal of Sex Research, 48*, 130-141.
- Heider, N., Spruyt, A., & De Houwer, J. (2015). Implicit beliefs about ideal body image predict body image dissatisfaction. *Frontiers in Psychology, 6*, 1402.
- Heiman, J. R. (1980). Female sexual response patterns. Interactions of physiological, affective, and contextual cues. *Archives of General Psychiatry, 37*, 1311-1316.
- Hewig, J., Cooper, S., Trippe, R. H., Hecht, H., Straube, T., & Miltner, W. H. R. (2008). Drive for thinness and attention toward specific body parts in a nonclinical sample. *Psychosomatic Medicine, 70*, 729-736.
- Hornby, A. S. (1995). *Oxford advanced learner's dictionary of current English*. Oxford, England: Oxford University Press.
- Hoyt, W. D., & Kogan, L. R. (2001). Satisfaction with body image and peer relationship for males and females in college environment. *Sex Roles, 45*, 199-215.
- Janelle, C. M., Hausenblas, H. A., Ellis, R., Coombes, S. A., & Duley, A. R. (2009). The time course of attentional allocation while women high and low in body dissatisfaction view self and model physiques. *Psychology and Health, 24*(3), 351-366.
- Janssen, E., Everaerd, W., Spiering, M., & Janssen, J. (2000). Automatic processes and the appraisal of sexual stimuli: toward an information processing model of sexual arousal. *The Journal of Sex Research, 37*, 8-23.
- Jansen, A., Nederkoorn, C., & Mulkens, S. (2005). Selective visual attention for ugly and beautiful body parts in eating disorders. *Behaviour Research and Therapy, 43*, 183-196.
- Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: a prospective analysis. *Journal of Abnormal Psychology, 114*(1), 119–125.

- Johnson, C. B., Stockdale, M. S., & Saal, F. E. (1991). Persistence of men's misperceptions of friendly cues across a variety of interpersonal encounters. *Psychology of Women Quarterly, 5*, 758–766.
- Joseph, C., LoBue, V., Rivera, L. M., Irving, J., Savoy, S., & Shiffrar, M. (2016). An attentional bias for thin bodies and its relation to body dissatisfaction. *Body Image, 19*, 216–223.
- Kaplan, H. S. (1974). *The New Sex Therapy*. New York: Bruno Mazel.
- Katz, R. C., Gipson, M. T., Kearn, A., & Kriskovich, M. (1989). Assessing sexual aversion in college students: The Sexual Aversion Scale. *Journal of Sex & Marital Therapy, 15*(2), 135-140.
- Keller, A., McGarvey, E. L., & Clayton, A. H. (2006). Reliability and construct validity of the Changes in Sexual Functioning Questionnaire short-form (CSFQ-14). *Journal of Sex & Marital Therapy, 32*(1), 43-52.
- Koch, M. (1999). The neurobiology of startle. *Progress in Neurobiology, 59*, 107-128.
- Koch, P., Mansfield, P., Thureau, D., & Carey, M. (2005). 'Feeling frumpy': the relationships between body image and sexual response changes in midlife women. *Journal of Sex Research, 42*(3), 215-223.
- Koukounas, E., & Letch, N. M. (2001). Psychological correlates of perception of sexual intent in women. *The Journal of Social Psychology, 141*, 443-456.
- Koukounas, E., & McCabe, M. (2001). Emotional responses to filmed violence and the eye blink startle response: a preliminary investigation. *Journal of Interpersonal Violence, 16*(5), 476-488.
- La Rocque, C. I., & Cioe, J. (2011). An evaluation of the relationship between body image and sexual avoidance. *Journal of Sex Research, 47*, 1-12.
- Laan, E., & Everaerd, W. (1995). Determinants of female sexual arousal: psychophysiological theory and data. *Annual Review of Sex Research, 6*, 32–76.
- Laan, E., Everaerd, W., van Bellen, G., & Hanewald, G. (1994). Women's sexual and emotional responses to male- and female- produced erotica. *Archives of Sexual Behavior, 23*, 153–169.
- Laan, E. & Janssen, E. (2007). How do men and women feel? Determinants of subjective experience of sexual arousal. In E. Janssen (Ed.), *The psychophysiology of sex* (pp. 278-290). Bloomington, IN: Indiana University Press.
- Laan, E., van Lunsen, R. H., Everaerd, W., Riley, A., Scott, E., & Boolell, M. (2002). The enhancement of vaginal vasocongestion by sildenafil in healthy premenopausal women. *Journal of Women's Health & Gender-Based Medicine, 11*, 357–65.

- Lang, P., Bradley, M. & Cuthbert, B. (1990). Emotion, attention, and the startle reflex. *Psychology Review*, 97, 377-395.
- Lang, P., Bradley, M., & Cuthbert, B. (1992). A motivational analysis of emotion: reflex-cortex connections. *Psychological Science*, 3(1), 44-49.
- Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1999). *International affective picture system (IAPS): Instruction manual and affective ratings* (Tech. Rep. No. A-4). Gainesville, FL: University of Florida, The Center for Research in Psychophysiology.
- Levin, R. J. (2007). Sexual activity, health and well-being - the beneficial roles of coitus and masturbation. *Sexual and Relationship Therapy*, 22, 135-148.
- Lewis, R. W., Fugi-Meyer, K. S., Bosch, R., Fugi-Meyer, A. R., Laumann, E. O., Lizza, E., & Martin-Morales, A. (2004). Epidemiology/risk factors of sexual dysfunction. *Journal of Sexual Medicine*, 1(1), 35-39.
- Lippa, R. A. (2009). Sex differences in sex drive, sociosexuality, and height across 53 nations: testing evolutionary and social structural theories. *Archives of Sexual Behavior*, 38(5), 631-651.
- Lippa, R. A. (2012). Effects of sex and sexual orientation on self-reported attraction and viewing times to images of men and women: testing for category specificity. *Archives of Sexual Behavior*, 41(1), 149-160.
- Lykins, A. D., Meana, M., & Kambe, G. (2006). Detection of differential viewing patterns to erotic and non-erotic stimuli using eye-tracking methodology. *Archives of Sexual Behavior*, 35, 569-75.
- Lykins, A. D. & Meana, M., & Minimi, J. (2011). Visual Attention to Erotic Images in Women Reporting Pain with Intercourse. *Journal of Sex Research*, 48, 43-52.
- MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95(1), 15-20.
- Mathews, A. & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology*, 1, 167-95.
- Markey, C. N., & Markey, P. M. (2005). Relations between body image and dieting behaviors: an examination of gender differences. *Sex Roles*, 53(7-8), 519-530.
- Masters, W. H., & Johnson, V. E. (1966). *Human sexual response*. Boston, MA: Little Brown and Company.
- Masters, W. H., & Johnson, V. E. (1970). *Human sexual inadequacy*. Boston, MA: Little Brown and Company.

- Masters, W. H., Johnson, V. E., Kolodny, R. C., & Masters, W. H. (1986). Perspectives of Sexuality. In W. H. Masters, V. E. Johnson, R. C. Kolodny, & W. H. Masters, *Masters and Johnson on sex and human loving* (pp. 3-26). Boston, MA: Little Brown and Company.
- Matthiasdottir, E., Jonsson, S., H., & Kristjansson, A., L. (2010). Body weight dissatisfaction in the Icelandic adult population: a normative discontent? *European Journal of Public Health, 22*(1), 116–121.
- McMahon, E. M., & Campbell, P. A. (1969). *Please touch* (pp. 9-12). New York: Sheed and Ward.
- Meana, M. (2012). *Sexual dysfunction in women*. Cambridge, MA US: Hogrefe Publishing.
- Meana, M., & Nunnink, S. E. (2006). Gender differences in the content of cognitive distraction during sex. *The Journal of Sex Research, 43*, 59 – 67.
- Menzel, J. E., Krawczyk, R., & Thompson, J. K. (2011). Attitudinal assessment of body image for adolescents and adults. In: T. F. Cash & L. Smolak (Eds.), *Body image: a handbook of science, practice, and prevention* (2nd ed., pp. 154-169). New York, NY US: Guilford Press.
- Mogg, K., & Bradley, B. P. (1998). A cognitive–motivational analysis of anxiety. *Behaviour Research and Therapy, 36*, 809–848.
- Morgan, J. F., & Arcelus, J. (2009). Body image in gay and straight men: a qualitative study. *European Eating Disorders Review, 17*, 435-443.
- Mulhall, J., King, R., Glina, S., & Hvidsten, K. (2008). Importance of and satisfaction with sex among men and women worldwide: results of the Global Better Sex Survey. *Journal of Sexual Medicine, 5*(4), 788-795.
- Murnen, S. K. (2011). Gender and body images. In: T. F. Cash & L. Smolak (Eds.), *Body image: a handbook of science, practice, and prevention* (2nd ed., pp. 173-179). New York, NY US: Guilford Press.
- Murnen, S. K., & Stockton, M. (1997). Gender and self-reported sexual arousal in response to sexual stimuli: a meta-analytic review. *Sex Roles: A Journal of Research, 37*(3-4), 135-153.
- Myers, T. A., & Crowther, J. H. (2009). Social comparison as a predictor of body dissatisfaction: a meta-analytic review. *Journal of Abnormal Psychology, 118*(4), 683-698.
- Neighbors, L. A., & Sobal, J. (2007). Prevalence and magnitude of body weight and shape dissatisfaction among university students. *Eating Behaviors, 8*(4), 429-439.
- Nelson, A. & Purdon, C. (2010). Non-erotic thoughts, attentional focus, and sexual problems in a community sample. *Archives of Sexual Behavior, 40*, 395-406.

- Nobre, P. J., & Pinto-Gouveia, J. (2006). Dysfunctional sexual beliefs as vulnerability factors for sexual dysfunction. *Journal of Sex Research, 43*(1), 68-75.
- Nobre, P. J., & Pinto-Gouveia, J. (2008). Cognitive and emotional predictors of female sexual dysfunctions: Preliminary findings. *Journal of Sex & Marital Therapy, 34*(4), 325-342.
- Palace, E. M., & Gorzalka, B. B. (1992). Differential patterns of arousal in sexually functional and dysfunctional women: physiological and subjective components of sexual response. *Archives of Sexual Behavior, 21*(2), 135-159.
- Palacios, S., Castaño, R., & Grazziotin, A. (2009). Epidemiology of female sexual dysfunction. *Maturitas, 63*(2), 119-123.
- Palladino Green, S., & Pritchard, M. E. (2003). Predictors of body image dissatisfaction in adult men and women. *Social Behavior and Personality, 31*(3), 215-222.
- Pascoal, P., Narciso, I., & Pereira, N. (2012). Predictors of body appearance cognitive distraction during sexual activity in men and women. *The Journal of Sexual Medicine, 9*(11), 2849-2860.
- Peplau, L., Frederick, D. A., Yee, C., Maisel, N., Lever, J., & Ghavami, N. (2009). Body image satisfaction in heterosexual, gay, and lesbian adults. *Archives of Sexual Behavior, 38*(5), 713-725.
- Phillips, N., & de Man, A. F. (2010). Weight status and body image satisfaction in adult men and women. *North American Journal of Psychology, 12*(1), 171-184.
- Palomba, D., Angrilli, A., & Mini, A. (1997). Visual evoked potentials, heart rate responses and memory to emotional pictorial stimuli. *International Journal of Psychophysiology 27*(1), 55-67.
- Peplau, L., Frederick, D. A., Yee, C., Maisel, N., Lever, J., & Ghavami, N. (2009). Body image satisfaction in heterosexual, gay, and lesbian adults. *Archives of Sexual Behavior, 38*(5), 713-725.
- Peterson, Z. & Janssen, E. (2008). Ambivalent affect and sexual response: the impact of co-occurring positive and negative emotions on subjective and physiological sexual responses to erotic stimuli. *Archives of Sexual Behavior, 36*, 793-807.
- Pollatos, O., Herbert, B.M., Matthias, E. & Schandry, R. (2007). Heart rate response after emotional picture presentation is modulated by interoceptive awareness. *International Journal of Psychophysiology, 63*, 117-124.
- Pook, M., Tuschen-Caffier, B., & Stich, N. (2002). Evaluation des Fragebogens zum Figurbewusstsein (FFB, deutsche Version des Body Shape Questionnaire). *Verhaltenstherapie, 12*(2), 116-124.

- Prause, N., Janssen, E., & Hetrick, W. P. (2008). Attention and emotional responses to sexual stimuli and their relationship to sexual desire. *Archives of Sexual Behavior, 37*(6), 934-949.
- Price, M., Tone, E. B., & Anderson, P. L. (2011). Vigilant and avoidant attention biases as predictors of response to cognitive behavioral therapy for social phobia. *Depression and anxiety, 28*(4), 349–353.
- Pruis, T. A., & Janowsky, J. S. (2010). Assessment of body image in younger and older women. *Journal of General Psychology, 137*(3), 225-238.
- Ponholzer, A., Temml, C., Mock, K., Marszalek, M., Obermayr, R., & Madersbacher, S. (2005). Prevalence and risk factors for erectile dysfunction in 2869 men using a validated questionnaire. *European Urology, 47*(1), 80-86.
- Pujols, Y., Meston, C. M., & Seal, B. N. (2010). The association between sexual satisfaction and body image in women. *Journal of Sexual Medicine, 7*(2), 905-916.
- Radwan, H., Hasan, H. A., Ismat, H., Hakim, H., Khalid, H., Al-Fityani, L., Mohammed, R., & Ayman, A. (2019). Body mass index perception, body image dissatisfaction and their relations with weight-related behaviors among university students. *International Journal of Environmental Research and Public Health, 16*(9), 1541.
- Reissing, E. D., Laliberté, G. M., & Davis, H. J. (2005). Young women's sexual adjustment: The role of sexual self-schema, sexual self-efficacy, sexual aversion and body attitudes. *Canadian Journal of Human Sexuality, 14*(3-4), 77-85.
- Roefs, A., Jansen, A., Moresi, S., Willems, P., van Grootel, S., & van der Borgh, A. (2008). Looking good: BMI, attractiveness bias and visual attention. *Appetite, 51*, 552–555.
- Rosen, R. C., Fisher, W. A., Eardley, I., Niederberger, C., Nadel, A., & Sand, M. (2004). The multinational Men's Attitudes to Life Events and Sexuality (MALES) Study I: prevalence of erectile dysfunction and related health concerns in the general population. *Current Medical Research and Opinion, 20*(5), 607-617.
- Rosen, J. C., Srebnik, D., Saltzberg, E., & Wendt, S. (1991). Development of a body image avoidance questionnaire. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 3*(1), 32-37.
- Rousseau, A., Knotter, A., Barbe, P., Raich, R. M., & Chabrol, H. (2005). Étude de validation de la version française du Body Shape Questionnaire. *L'Encéphale, 31*(2), 162-173.
- Rowland, D. L. (2010). Genital and heart rate response to erotic stimulation in men with and without premature ejaculation. *International Journal of Impotence Research, 22*(5), 318-24.

- Roy, M., & Forest, F. F. (2007). Assessment of body image distortion in eating and weight disorders: the validation of a computer-based tool (Q-BID). *Eating and Weight Disorders, 12*(1), 1-11.
- Rupp, H. A., & Wallen, K. (2007). Sex differences in viewing sexual stimuli: an eye-tracking study in men and women. *Hormones and Behavior, 51*(4), 524-533.
- Rupp, H. A., & Wallen, K. (2008). Sex differences in response to visual sexual stimuli: a review. *Archives of Sexual Behavior, 37*(2), 206-18.
- Saal, F. E., Johnson, C. B., & Weber, N. (1989). Friendly or sexy? It may depend on whom you ask. *Psychology of Women Quarterly, 13*, 263-276.
- Sanchez, D. T., & Kiefer, A. K. (2007). Body concerns in and out of the bedroom: implication for sexual pleasure and problems. *Archives of Sexual Behavior, 36*(6), 808-820.
- Sanders, S., Graham, C., & Milhausen, R. (2008). Predicting sexual problems in women: the relevance of sexual excitation and sexual inhibition. *Archives of Sexual Behavior, 37*, 241-251.
- Sanderson, C. A., Darley, J. M., & Messinger, C. S. (2002). "I'm not as thin as you think I am": the development and consequences of feeling discrepant from the thinness norm. *Personality and Social Psychology Bulletin, 28*(2), 172-183.
- Santtila, P., Mokros, A., Viljanen, K., Koivisto, M., Sandnabba, N. K., Zappalà, A., & Osterheider, M. (2009). Assessment of sexual interest using a choice reaction time task and priming: A feasibility study. *Legal and Criminological Psychology, 14*, 65-82.
- Schooler, D., Ward, L. M., Merriwether, A., & Caruthers, A. (2005). Cycles of shame: menstrual shame, body shame, and sexual decision-making. *Journal of Sex Research, 42*, 324-334.
- Seal, B. N., Bradford, A., & Meston, C. M. (2009). The association between body esteem and sexual desire among college women. *Archives of Sexual Behavior, 38*(5), 866-872.
- Shifren, J. L., Monz, B. U., Russo, P. A., Segreti, A., & Johannes, C. B. (2008). Sexual problems and distress in United States women: prevalence and correlates. *Obstetrics & Gynecology, 112*(5), 970-978.
- Siegel, J. M. (2002). Body image change and adolescent depressive symptoms. *Journal of Adolescent Research, 17*(1), 27-41.
- Silvaggi, C., & Tripodi, F. (2013). Psychological barriers to sexual functioning. In: P. Kirana, F. Tripodi, Y. Reisman, & H. Porst (Eds.), *The EFS and ESSM syllabus of clinical sexology* (pp. 354-376). Amsterdam, Netherlands: Medix Publishers.
- Simons, R. F., & Zelson, M. F. (1985). Engaging visual stimuli and reflex blink modification. *Psychophysiology, 22*(1), 44-49.

- Smeets, E., Jansen, A., & Roefs, A. (2011). Bias for the (un)attractive self: on the role of attention in causing body dis(satisfaction). *Health Psychology, 30*(3), 360-367.
- Smeets, E., Roefs, A., van Furth, E., & Jansen, A. (2008). Attentional bias for body and food in eating disorders: Increased distraction, speeded detection, or both? *Behaviour Research and Therapy, 46*, 229-238.
- Smith, E., & Rieger, E. (2006). The effect of attentional bias toward shape- and weight-related information on body dissatisfaction. *International Journal of Eating Disorders, 39*, 509-515.
- Spiering, M., Everaerd, W., & Laan, E. (2004). Conscious processing of sexual information: mechanism of appraisal. *Archives of Sexual Behavior, 33*(4), 369-380.
- Steer, A., & Tiggemann, M. (2008). The role of self-objectification in women's sexual functioning. *Journal of Social and Clinical Psychology, 27*(3), 205-225.
- Stice, E., Hayward, C., Cameron, R., Killen, J. D., & Taylor, C. B. (2000). Body image and eating related factors predict onset of depression in female adolescents: a longitudinal study. *Journal of Abnormal Psychology, 109*, 438-444.
- Suschinsky, K. D., Lalumière, M. L., & Chivers, M. L. (2009). Sex differences in patterns of genital sexual arousal: measurement artifacts or true phenomena? *Archives of Sexual Behavior, 38*(4), 559-73.
- Swami, V., Frederick, D. A., Aavik, T., Alcalay, L., Allik, J., Anderson, D., & ... Zivcic-Becirevic, I. (2010). The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: results of the international body project I. *Personality and Social Psychology Bulletin, 36*(3), 309-325.
- Szymanski, M. L., & Cash, T. F. (1995). Body-image disturbances and self-discrepancy theory: expansion of the Body-Image Ideals Questionnaire. *Journal of Social and Clinical Psychology, 14*, 134-146.
- Tiggemann, M. (2002). Media influences on body image development. In T. F. Cash & T. Pruzinsky (Eds.), *Body image: a handbook of theory, research, and clinical practice* (pp. 91-98). New York: Guilford Press.
- Toates, F. (2009). An integrative theoretical framework for understanding sexual motivation, arousal and behavior. *Journal of Sex Research, 46*, 168-193.
- Toledano, R. (2006). *Development of the sexual arousal and desire inventory (SADI): a multidimensional scale of subjective sexual arousal and desire in men and women*. PhD thesis, Concordia University.
- Toledano, R., & Pfaus, J. (2006). The sexual arousal and desire inventory (SADI): a multidimensional scale to assess subjective sexual arousal and desire. *The Journal of Sexual Medicine, 3*(5), 853-877.

- Træen, B., Markovic, A., & Kvalem, I. L. (2016). Sexual satisfaction and body image: a cross-sectional study among Norwegian young adults. *Sexual and Relationship Therapy, 31*(2), 123-137.
- Trapnell, P. D., Meston, C. M., & Gorzalka, B. B. (1997). Spectatoring and the relationship between body image and sexual experience: self-focus or self-valence? *Journal of Sex Research, 34*(3), 267-278.
- Tripodi, F., & Silvaggi, C. (2013). Sexual response: motivation and models. In: P. Kirana, F. Tripodi, Y. Reisman, & H. Porst (Eds.), *The EFS and ESSM syllabus of clinical sexology* (pp. 232-276). Amsterdam, Netherlands: Medix Publishers.
- van Boxtel, A., Boelhouwer, A. J., & Bos, A. R. (1998). Optimal EMG signal bandwidth and interelectrode distance for the recording of acoustic, electrocutaneous, and photic blink reflexes. *Psychophysiology, 35*, 690-697.
- van den Hout, M., & Barlow, D. (2000). Attention, arousal, and expectancies in anxiety and sexual disorders. *Journal of Affective Disorders, 61*, 24-56.
- van Strien, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders, 5*, 295-315.
- von Lengerke, T., & Mielck, A. (2012). Body weight dissatisfaction by socioeconomic status among obese, preobese and normal weight women and men: results of the cross-sectional KORA Augsburg S4 population survey. *BMC Public Health, 12*(1), 1-12.
- Vrana, S. R., & Lang, P. J. (1990). Fear imagery and the startle-probe reflex. *Journal of Abnormal Psychology, 99*(2), 189-197.
- Vrana, S. R., Spence, E. L., & Lang, P. J. (1988). The startle probe response: a new measure of emotion? *Journal of Abnormal Psychology, 97*(4), 487-491.
- Weaver, A. D., & Byers, E. (2006). The relationships among body image, body mass index, exercise, and sexual functioning in heterosexual women. *Psychology of Women Quarterly, 30*(4), 333-339.
- Weierich, M. R., Treat, T. A., & Hollingworth, A. (2008). Theories and measurement of visual attentional processing in anxiety. *Cognition and Emotion, 2*, 985-1018.
- Wells, T. T., & Beevers, C. G. (2010). Biased attention and dysphoria: manipulating selective attention reduces subsequent depressive symptoms. *Cognition and Emotion, 24*, 719-728.
- Wentland, J. J., Herold, E. S., Desmarais, S., & Milhausen, R. R. (2009). Differentiating highly sexual women from less sexual women. *Canadian Journal of Human Sexuality, 18*(4), 169-182.

- Werlinger, K., King, T. K., Clark, M. M., Pera, V., & Wincze, J. P. (1997). Perceived changes in sexual functioning and body image following weight loss in obese female population: a pilot study. *Journal of Sex & Marital Therapy, 23*(1), 74-78.
- Wiederman, M. (2000). Women's body image self-consciousness during physical intimacy with a partner. *Journal of Sex Research, 37*(1), 60-68.
- Wiederman, M. (2011). Body image and sexual functioning. In T. F. Cash, & L. Smolak (Ed.), *Body image: A handbook of theory, research, and clinical practice* (2nd ed., pp. 271-278). New York, NY: The Guilford Press.
- Wiederman, M. W., & Hurst, S. R. (1998). Body size, physical attractiveness, and body image among young adult women: relationships to sexual experience and sexual esteem. *Journal of Sex Research, 35*(3), 272-281.
- Wierzba, M., Riegel, M., Pucz, A., Leśniewska, Z., Dragan, W. Ł., Gola, M., Jednoróg, K., & Marchewka, A. (2015). Erotic subset for the Nencki Affective Picture System (NAPS ERO): cross-sexual comparison study. *Frontiers in Psychology, 6*, 1336.
- Winton, W.M., Putnam, L.E., & Krauss, R.M. (1984). Facial and autonomic manifestations of the dimensional structure of emotion. *Journal of Experimental Social Psychology, 20*, 195-216.
- Wittchen, H. U., Zaudig, M., & Fydrich, T. (1997). *Strukturiertes klinisches Interview für DSM-IV: Achse I*. Göttingen: Hogrefe.
- Woertman, L., & van den Brink, F. (2012). Body image and female sexual functioning and behavior: A review. *The Journal of Sex Research, 49*(2-3), 184-211.
- Wood, D. M. & Obrist, P. A. (1968). Minimal and maximal sensory intake and exercise as unconditioned stimuli in human heart-rate conditioning. *Journal of Experimental Psychology, 76*, 254-262.
- World Health Organization. (2017). *Sexual health and its linkages to reproductive health: an operational approach*. Switzerland: Geneva.
- Wright, L. W., & Adams, H. E. (1999). The effects of stimuli that vary in erotic content on cognitive processes. *The Journal of Sex Research, 36*(2), 145-151.
- Yamamiya, Y., Cash, T. F., & Thompson, J. K. (2006). Sexual experiences among college women: the differential effects of general versus contextual body images on sexuality. *Sex Roles, 55*, 421-427.
- Yates, A., Edman, J., & Aruguete, M. (2004). Ethnic differences in BMI and body/self-dissatisfaction among Whites, Asian subgroups, Pacific Islanders, and African-Americans. *Journal of Adolescent Health, 34*(4), 300-307.

Zaccagni, L., Masotti, S., Donati, R., Mazzoni, G., & Gualdi-Russo, E. (2014). Body image and weight perceptions in relation to actual measurements by means of a new index and level of physical activity in Italian university students. *Journal of Translational Medicine*, 12, 42.

6. Appendices

Appendix A	Exemplary sexually-explicit images used in Study 1-3
Appendix B	Exemplary neutral images used in Study 2
Appendix C	Information brochures used in Study 1-3

Appendix A

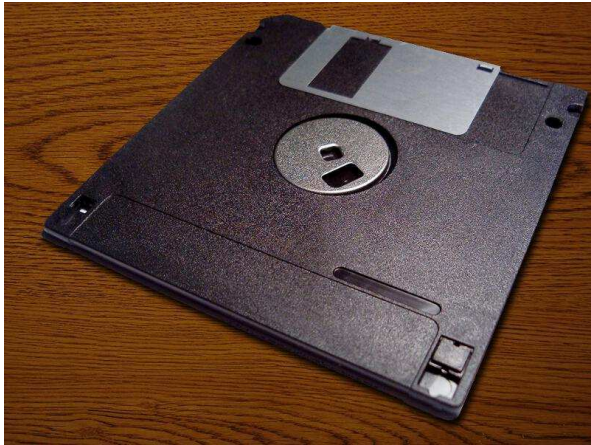
Exemplary sexually-explicit images used in Study 1-3



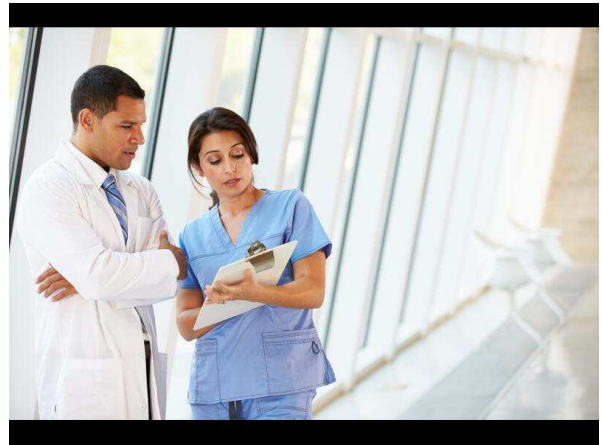
Appendix B

Exemplary neutral images used in Study 2

Neutral: households



Neutral: people



Appendix C
Information brochures used in Study 1-3

- Information brochure for participants -

Study on perception of erotic images

PhD project by

M.Sc. Agnieszka Czeluscinska-Peczowska,

University of Luxembourg

Supported by Fonds National de la Recherche
Luxembourg



UNIVERSITÉ DU
LUXEMBOURG

UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



aides à la
formation
recherche



Fonds National de la
Recherche Luxembourg



French and German versions are also available. Please contact the principal investigator for further information. Contact information can be found on the last page of this booklet.

Dear participant,

Nowadays, people seem to be constantly surrounded by sexual stimuli, which can be more or less explicit. Erotic images are present in magazines, on the Internet, and on TV, on the way to work/University or at home.

Being aroused when viewing pictures with erotic content is a typical reaction of men and women, but there are also differences between individuals. For example, some people are easily turned on by sexual stimuli whereas others need more time and specific conditions to get sexually excited. Previously it has been thought that sexual responding is mainly biologically determined, but more and more research shows that human sexuality is more complex and diverse.

Objectives of the study

In the present study we would like to investigate the **evaluation** of sexually explicit pictures. The aim of this study is to build a **database of a wide-range of erotic images** with standardized ratings, which will form the basis for future research.

We are also interested in gender and interpersonal differences, e.g. how the way people feels about their bodies and how satisfied they are with their sex life affect responding to these pictures.

Advantages of the study

The picture set will form the basis for **future studies in different psychological fields**, e.g., cognitive psychology (how people think, perceive, remember and learn), health psychology (promotion and maintenance of good health and the prevention and treatment of illness), clinical psychology (mental problems), and others.

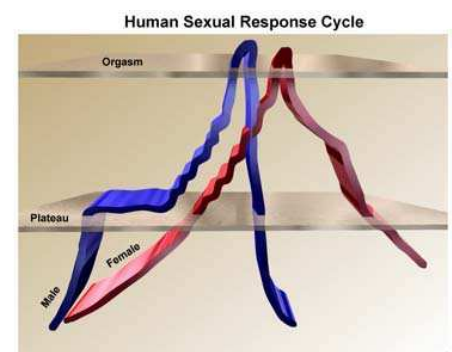
Traditional model of sexual response

Men

- **arousal** - penis erection
- **plateau**
- **orgasm** - ejaculation
- **resolution** - body slowly returns to its normal level of functioning

Women

- **arousal** - genital and clitoris engorgement and vaginal lubrication
- **plateau**
- **orgasm** - spasmodic contractions of the pelvic floor muscles and an intense subjective feeling of pleasure
- **resolution** - body slowly returns to its normal level of functioning



Sexual arousal

Sexual arousal is described as an unconscious appraisal in response to erotic stimuli that can result in motivational states of desire (i.e. **subjective** arousal), and furthermore may lead to increases in **general** arousal, including a faster heart beat and sweating, and a genital response (**genital** arousal).

Study description

Participation in this study comprises **3 parts**.

1) During the **first appointment** a socio-demographic interview (approximately **20 min**) will be carried out in which you will be asked questions about your background, education, health, sexuality etc. If eligible for inclusion in the study, you will then receive a special code, which will give you access to a webpage with erotic pictures.

2) The **evaluation** part of the study will be carried out by you in your own home. You will visit a webpage: www.soscisurvey.de, in order fill in the questionnaires and evaluate pictures. You will be asked to view 51 erotic pictures, as well as 10 positive, 10 negative, and 10 neutral pictures, and to rate them according to how positive or negative you feel they are, and how attractive you find them. This part of the study will last approx. **80 min**. Your data will be assigned with a code, so that no identifying information will be stored. Afterwards, you will be contacted by the investigator of the study in order to fix an appointment.

3) After having finished the evaluation part you will be asked to attend a **second appointment** (approximately **10 min**), during which you will have the opportunity to express your feelings about the study, ask any questions etc., and receive your reimbursement.

Participation in the study involves the following task:

	What do you need to do?	What do we measure?	How does it work? What is the purpose?
Evaluation of erotic pictures	You will need to view pictures on your computer screen and rate the pictures.	Ratings of each picture according to three dimensions: - positive / negative - arousing / relaxing - approach / avoidance	Your ratings will help us understand how erotic images are evaluated.

Erotic pictures

Erotic images show scenes that you may have experienced in everyday life or you may have seen in the media, for example in erotic magazines or movies.

Each picture contains sexually explicit content, i.e. nude bodies of an adult man and an adult woman engaged in a sexual pose/act or sexual intercourse with uncovered genitalia.

The pictures were evaluated by psychologists and approved by the local ethic committee. You will be asked to view 51 erotic pictures.



Other pictures

Additionally, you will be shown other pictures (see examples):

Neutral



Positive



Negative



Practical information

Study languages

You have the option to choose the language in which you would like to participate. This concerns both the interviews and questionnaires, as well as the instructions for tasks. We can offer you the following languages: **German, French or English**. Please let us know in advance which language you prefer.

Participation

For participation, your main contact person will be the responsible researcher who is a qualified psychologist and doctoral student (Agnieszka Czeluscinska Peczkowska, M.Sc.). If you have any other concerns or questions you may also contact the researcher's supervisor (Professor Claus Vögele) who is a qualified Clinical Psychologist and Psychotherapist.

Reimbursement

As a compensation for travel expenses, etc., you will receive 20 €, which will be given out for participants from Luxembourg as Sodexo Gift vouchers. In addition, you will receive a certificate of participation.

Place of the study

Both appointments will be held at the University of Luxembourg in the offices of the Research Unit INSIDE, which are located on **Campus Belval**. Upon your arrival please proceed to reception of **Maison des Sciences Humaines**, where you will be welcomed by the responsible researcher of the study. If you arrive by **car**, you can use outdoor parking areas and underground car parks available throughout the campus, particularly P+R Belval Université. There is also available free less-than-three-hours parking at Belval Plaza. Furthermore, you can reach the campus by **train** from Luxembourg Central Station direction "Belval-Université". A campus map can be found on the last site of the brochure.



Study team

The study will take place at the University of Luxembourg, as part of the doctoral thesis by Agnieszka Czeluscinska-Peczkowska, M.Sc. The project is organized by the research group 'Self- Regulation and Health' (Head: Prof. Dr. Claus Vögele), which is part of the Institute for Health and Behaviour (Head: Prof. Dr. Claus Vögele) at the Integrative Research Unit on Social and Individual Development (INSIDE) of the Humanities Faculty (FLSHASE), University of Luxembourg.

The following members of the University of Luxembourg and the other universities are involved in the study :

Agnieszka Czeluscinska-Peczkowska, M.Sc. (University of Luxembourg): Researcher

Prof. Dr. Claus Vögele (University of Luxembourg): Supervisor

Dr. André Schulz (University of Luxembourg): Scientific advisor

Assistant Prof. Dr. Jens Blechert (University of Salzburg): Scientific advisor

Voluntary nature of participation

Participation in the study is completely voluntary and the consent of the participant may at any time be revoked without notice for any reason and without drawbacks. All data collected in the study will be treated with the strictest confidentiality and stored in anonymized form only.



Contact

Agnieszka CZELUSCINSKA-PECZKOWSKA, M.Sc.

University of Luxembourg

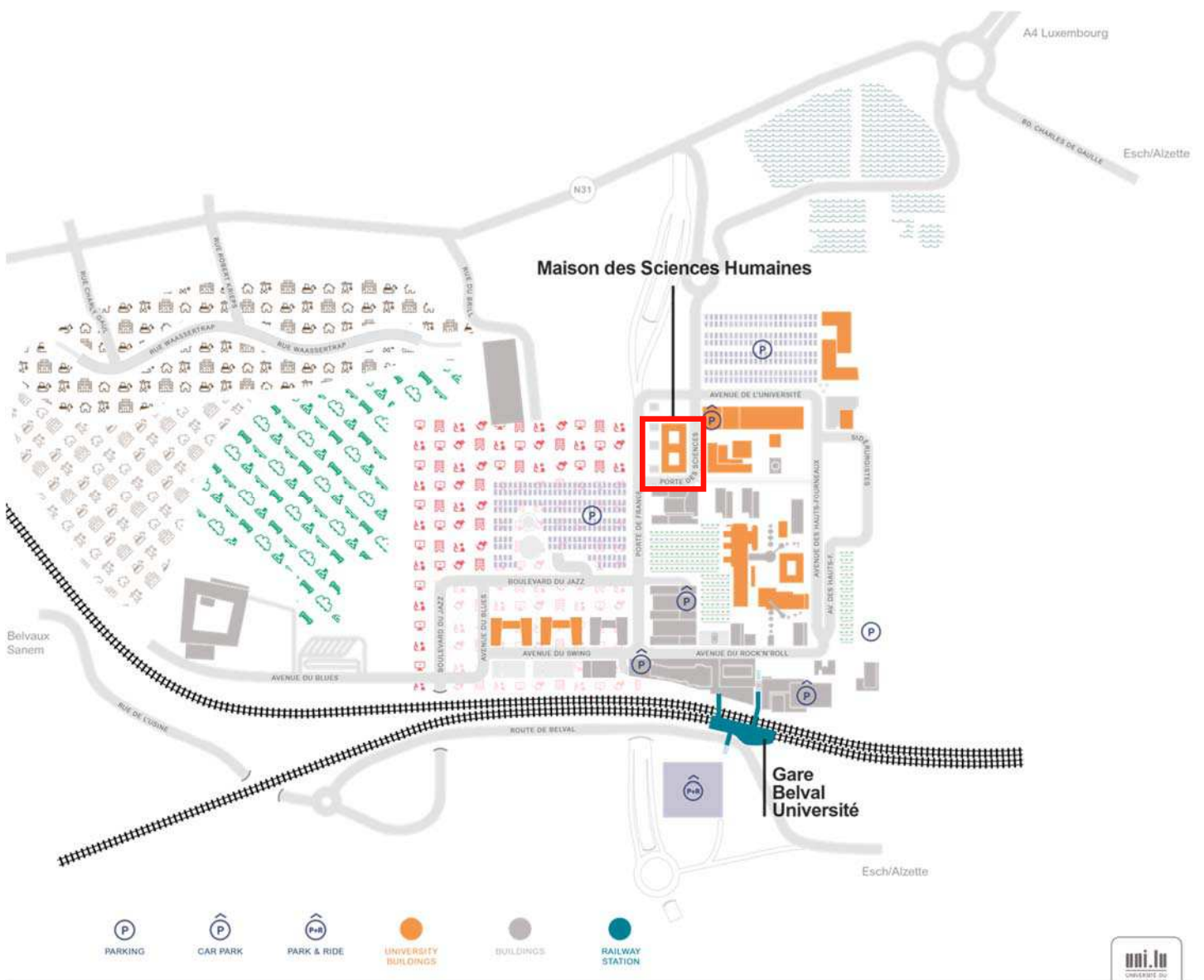
Campus Belval
Maison des Sciences Humaines
11, Porte des Sciences
L-4366 Esch-sur-Alzette

Tel.: (+352) 46 66 44 9365

Fax: (+352) 46 66 44 39365

E-Mail: agnieszka.czeluscinska@uni.lu

Map



UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



- Information brochure for participants -

Study on perception of erotic images

PhD project by

M.Sc. Agnieszka Czeluscinska-Peczowska,

University of Luxembourg

Supported by Fonds National de la Recherche
Luxembourg



UNIVERSITÉ DU
LUXEMBOURG

UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



aides à la
formation
recherche



Fonds National de la
Recherche Luxembourg



French and German versions are also available. Please contact the principal investigator for further information. Contact information can be found on the last page of this booklet.

Dear participant,

Nowadays, people seem to be constantly surrounded by sexual stimuli, which can be more or less explicit. Erotic images are present in magazines, on the Internet, and on TV, on the way to work/University or at home.

Being aroused when viewing pictures with erotic content is a typical reaction of men and women, but there are also differences between individuals. For example, some people are easily turned on by sexual stimuli whereas others need more time and specific conditions to get sexually excited. Previously it has been thought that sexual responding is mainly biologically determined, but more and more research shows that human sexuality is more complex and diverse.

Objectives of the study

In the present study we would like to investigate the **evaluation** of sexually explicit pictures. The aim of this study is to build a **database of a wide-range of erotic images** with standardized ratings, which will form the basis for future research.

We are also interested in gender and interpersonal differences, e.g. how the way people feels about their bodies and how satisfied they are with their sex life, affect responding to these pictures.

Advantages of the study

The picture set will form the basis for **future studies in different psychological fields**, e.g., cognitive psychology (how people think, perceive, remember and learn), health psychology (promotion and maintenance of good health and the prevention and treatment of illness), clinical psychology (mental problems), and others.

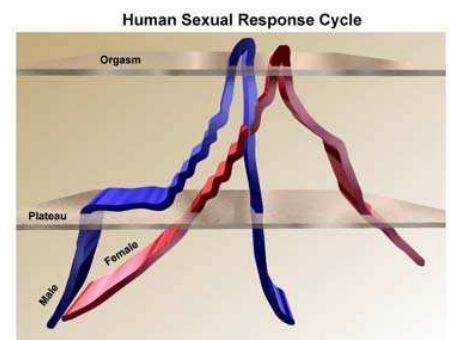
Traditional model of sexual response

Men

- **arousal** - penis erection
- **plateau**
- **orgasm** - ejaculation
- **resolution** - body slowly returns to its normal level of functioning

Women

- **arousal** - genital and clitoris engorgement and vaginal lubrication
- **plateau**
- **orgasm** - spasmodic contractions of the pelvic floor muscles and an intense subjective feeling of pleasure
- **resolution** - body slowly returns to its normal level of functioning



Sexual arousal

Sexual arousal is described as an unconscious appraisal in response to erotic stimuli that can result in motivational states of desire (i.e. **subjective** arousal), and furthermore may lead to increases in **general** arousal, including a faster heart beat and sweating, and a genital response (**genital** arousal).

Study description

Participation in this study comprises **one appointment**:

During **the appointment** a socio-demographic interview will be carried out as well as you will be asked to fill in the questionnaires in which you will be asked questions about your background, education, health, sexuality etc. If eligible for inclusion in the study, you will then be asked to view erotic and neutral pictures while psycho-physiological measures of your general arousal (heart rate, sweating on your palm and eye blink response) will be recorded. Your data will be assigned with a code, so that no identifying information will be stored. The appointment will take approx. **2,5 hours** in total.

Participation in the study involves the following task:

	What do you need to do?	What do we measure ?	How does it work? What is the purpose?
General arousal	You will be asked to view erotic and other pictures on a computer screen	General arousal: - heart rate - sweating on your palm - eye blink response	The use of physical measures of arousal will help us to better understand how people respond to erotic pictures.

Erotic pictures

During the task you will look at pictures of erotic couples.

These photos show scenes that you may have experienced in everyday life or you may have seen in the media, for example in erotic magazines or movies.

Each picture contains sexually explicit content, i.e. nude bodies of an adult man and an adult woman engaged in a sexual pose/act or sexual intercourse with uncovered genitalia.

The pictures were evaluated by psychologists and approved by the local ethic committee.

Picture example:



Neutral pictures

Additionally, you will be shown neutral pictures (see examples):



Practical information

Study languages

You have the option to choose the language in which you would like to participate. This concerns both the interviews and questionnaires, as well as the instructions for tasks. We can offer you the following languages: **German, French or English**. Please let us know in advance which language you prefer.

Participation

For participation, your main contact person will be the responsible researcher who is a qualified psychologist and doctoral student (Agnieszka Czeluscinska Peczkowska, M.Sc.). If you have any other concerns or questions you may also contact the researcher's supervisor (Professor Claus Vögele) who is a qualified Clinical Psychologist and Psychotherapist.

Reimbursement

As a compensation for travel expenses, etc., you will receive 20 €, which will be distributed for participants from Luxembourg as Sodexo Gift vouchers. In addition, you will receive a certificate of participation.

Place of the study

Appointment will be held at the University of Luxembourg in the offices of the Research Unit INSIDE, which are located on **Campus Belval**. Upon your arrival please proceed to reception of **Maison des Sciences Humaines**, where you will be welcomed by the responsible researcher of the study. If you arrive by **car**, you can use outdoor parking areas and underground car parks available throughout the campus, particularly P+R Belval Université. There is also available free less-than-three-hours parking at Belval Plaza. Furthermore, you can reach the campus by **train** from Luxembourg Central Station direction "Belval-Université". A campus map can be found on the last site of the brochure.



Study team

The study will take place at the University of Luxembourg, as part of the doctoral thesis of Agnieszka Czeluscinska-Peczkowska, M.Sc. The project is organized by the research group 'Self-Regulation and Health' (Head: Prof. Dr. Claus Vögele) at the Integrative Research Unit on Social and Individual Development (INSIDE) of the Humanities Faculty (FLSHASE).

The following members of the University of Luxembourg and the other universities are involved in the study :

Agnieszka Czeluscinska-Peczkowska, M.Sc. (University of Luxembourg): Researcher

Prof. Dr. Claus Vögele (University of Luxembourg): Supervisor

Dr. André Schulz (University of Luxembourg): Scientific advisor

Assistant Prof. Dr. Jens Blechert (University of Salzburg): Scientific advisor

Voluntary nature of participation

Participation in the study is completely voluntary and the consent of the participant may at any time be revoked without notice for any reason and without drawbacks. All data collected in the study maintain confidentiality and will be stored anonymously and strictly confidential.



UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



Fonds National de la
Recherche Luxembourg

Contact

Agnieszka CZELUSCINSKA-PECZKOWSKA, M.Sc.

University of Luxembourg

Campus Belval

Maison des Sciences Humaines

11, Porte des Sciences

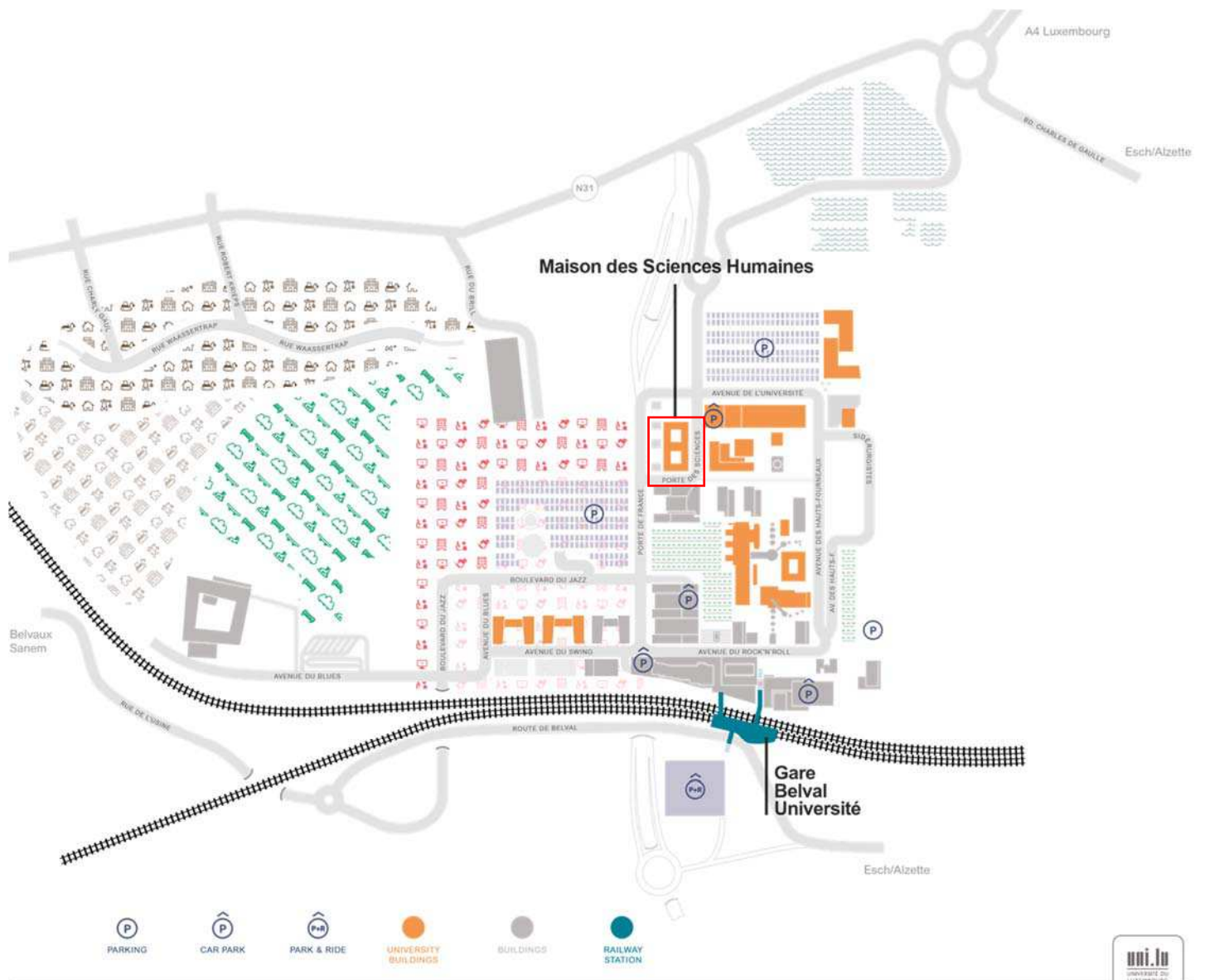
L-4366 Esch-sur-Alzette

Tel.: (+352) 46 66 44 9365

Fax: (+352) 46 66 44 39365

E-Mail: agnieszka.czeluscinska@uni.lu

Map



UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



Fonds National de la
Recherche Luxembourg

- Information brochure for participants -

Body image and sexual functioning

PhD project by

M.Sc. Agnieszka Czeluscinska-Peczowska,

University of Luxembourg

Supported by the Fonds National de la Recherche
Luxembourg (FNR)



UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



Fonds National de la
Recherche Luxembourg



French and German versions are also available. Please contact the principal investigator for further information. Contact information can be found on the last page of this booklet.

Dear participant,

Nowadays, many women may feel under societal pressure to have an ideal and sexually attractive body. The trend of being thin and slender is omnipresent and can be encountered in everyday life and in the mass media, e.g. in movies or magazines. Negative attitudes toward one's body may lead to feelings of shame and embarrassment when the **body is exposed during sexual activities**. As a consequence many women avoid sexual contacts and become dissatisfied with their sex life.

In the present study, we would like to investigate the **relationship between body image and sexual functioning in women**, in particular how body– and sexually–relevant stimuli are perceived and valued. The expected results will be important to help us understand better the role of body image and sexual functioning in the development and /or maintenance of body dissatisfaction and sexual dysfunction, and their potential interaction.

Objectives of the study

In this study we investigate why some women seem to focus on their perceived most dissatisfying body parts and the effects on experiencing sexual arousal.

Advantages of the study

With the results of this study we hope to gain a better understanding of the links between a negative body image and sexual dysfunction. The results will help to improve existing **treatments** for women who are dissatisfied with their bodies and, therefore, have problems with their sex life.

Sexual dysfunctions and body image dissatisfaction in women are increasing, with prevalence rates being currently estimated at **50%** and **38%**, respectively. The potential **societal and health costs** are considerable, as a negative body image is considered an important risk factor for the development and maintenance of eating disorders, and sexual dysfunctions can negatively impact overall well-being.

Previous research has examined body image dissatisfaction and sexual functioning separately, but research linking these two areas is missing. The present project fills this gap by contrasting responses to pictures related to body image dissatisfaction (images of one's own body) with erotic pictures in women with various levels of body and sexual dissatisfaction.

Body image dissatisfaction

Body weight dissatisfaction is the discrepancy between ideal and current body weight, while **body shape dissatisfaction** is the discrepancy between ideal and current body shape. Both are common in women of all ages.

Women who are constantly dissatisfied with their body, concerned about their weight and investing more into their appearance, have been found to be also more anxiously focused on their body.

Sexual dysfunction

Generally, female's sexual functioning can be disturbed in four major areas:

- **sexual desire**
- **sexual arousal**
- **orgasm**
- **sexual pain**



Study description

If you agree to take part in the study, you will be asked to keep two appointments on two different days:



During the **first appointment** a detailed personal assessment will be carried out. This includes some questionnaires (e.g. about body image and sexual functioning) and two interviews concerning mental health and well being, and socio-demographic details (approximately **3 hours**). If any sexual dysfunction symptoms are present, we will carry out a more comprehensive assessment to ascertain a diagnosis. Should we identify any additional mental health problems, we will advise you of the best possible way forward (e.g. consultation etc.). During this first appointment we will also take a photo of your whole body from ankles to the neck (without head) while you are wearing skin-coloured underwear. We will also measure your height, weight, and waist- and hip-circumference. This is important so that we can take into account the actual dimensions of your body when interpreting the results on body perception.

The interviews will be recorded on a tape. The tape recordings will be assigned to a code, so that no identifying information will be stored. The recording will ensure the quality of the interview's administration, i.e. the interviewer will be supervised by an independent researcher so that the interview's guidelines are respected.

During the **second appointment**, which lasts approx.. **2 hours**, you will be asked to participate in two sessions: a free viewing task and an attentional bias induction. These tasks will allow us to investigate how women's responses to sexually-relevant stimuli relate to levels of body image dissatisfaction and sexual functioning.

At the second appointment following task will be carried out:

	What do you need to do?	What do we measure?	How does it work? What is the purpose?
Phase 1: Free viewing task	You will be asked to passively view photos of your own body and those of others, and also erotic pictures on a computer screen.	We will monitor your eye movements while viewing these pictures.	The direction of eye gaze will help us to understand better how images are perceived and processed.
Phase 2: Attentional bias induction	You will be asked to watch an erotic video clip.	We will measure your general arousal: - heart rate - sweating on your palm	The use of physical measures of arousal will help us to better understand how women with different level of body image dissatisfaction respond to sexual stimuli.

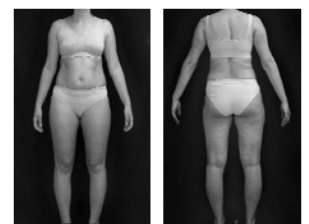
Body photos

During the task you will be asked to look at pictures of yourself.

To avoid differences resulting from clothing, and to make the body shape more visible, we will ask you to wear skin-coloured underwear (bras and panties will be provided in different sizes).

To distinguish the perception of one's own body of that of another person, we will also show you pictures of another woman. All photos are digitally processed so that the head (i.e. the face) is not visible, to ensure your anonymity.

Photo example:



Erotic pictures

During the task you will be asked to look at pictures of erotic couples.

These photos show scenes that you may have experienced in your life or you may have seen similar scenes in the media, for example in erotic magazines or movies.

Each picture contains sexually explicit content, i.e. nude bodies of an adult man and an adult woman engaged in a sexual pose/act or sexual intercourse with uncovered genitalia.

The pictures were evaluated by psychologists and approved by the local ethic committee.

Picture example:



UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)



Fonds National de la
Recherche Luxembourg

Practical information

Study languages

You can choose the language in which you would like to communicate when taking part in the study. This concerns both the interviews and questionnaires, as well as the instructions for tasks. We can offer you the following languages: **German, French or English**. Please let us know in advance which language you prefer.

Participation

Your participation you will be monitored by the principal investigator Agnieszka Czeluscinska Peczkowska, who is a qualified psychologist, and a doctoral student. All persons responsible for the study speak German, French, English and Luxembourgish and are happy to answer your questions.

Reimbursement

As a compensation for travel expenses, etc., you will receive €50, in the form of a Sodexo gift voucher.

Study location

Both appointments will be held at the University of Luxembourg in the offices of the Research Unit INSIDE, which are located on **Campus Belval**. Upon your arrival please proceed to the reception of the **Maison des Sciences Humaines**, where you will be welcomed by the responsible researcher of the study. If you arrive by **car**, you can use outdoor parking areas and underground car parks available throughout the campus, particularly P+R Belval Université. Furthermore, you can reach the campus by **train** from Luxembourg Central Station direction "Belval-Université". A campus map can be found on the last page of the brochure.



Study team

The study will take place at the University of Luxembourg, as part of the doctoral thesis of Agnieszka Czeluscinska-Peczkowska, M.Sc. The project is organized by the research group 'Self-Regulation and Health' (head: Prof. Dr. Claus Vögele), which is part of the Integrative Research Unit on Social and Individual Development (INSIDE) of the Humanities Faculty (FLSHASE).

The following members of the University of Luxembourg and other universities are involved in the study :

Agnieszka Czeluscinska-Peczkowska, M.Sc. (University of Luxembourg): Principal investigator

Prof. Dr. Claus Vögele (University of Luxembourg): Supervisor

Assistant Prof. Dr. Jens Blechert (University of Salzburg): Scientific advisor

Dr. André Schulz (University of Luxembourg): Scientific advisor

Voluntary nature of participation

Participation in the study is completely voluntary and you may revoke your consent at any time without notice for any reason and without any negative consequences. All data collected in the study will be treated with the strictest confidentiality and will be stored anonymously.



Contact

Agnieszka CZELUSCINSKA-PECZKOWSKA, M.Sc.

University of Luxembourg
Research Unit INSIDE
Campus Belval
Maison des Sciences Humaines

11, Porte des Sciences
L-4366 Esch-sur-Alzette

T +352 46 66 44 9365
F +352 46 66 44 39365

agnieszka.czeluscinska@uni.lu



Map



UNIVERSITY OF LUXEMBOURG
Integrative Research Unit on Social
and Individual Development (INSIDE)

 aides à la
formation
recherche

 Fonds National de la
Recherche Luxembourg