SEXUAL MEDICINE REVIEWS

Understanding Women's Subjective Sexual Arousal Within the Laboratory: Definition, Measurement, and Manipulation

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ABSTRACT

Introduction: Subjective sexual arousal (SSA) is positive, cognitive engagement in sexual activity. SSA is considered an important aspect of the sexual experience, as it has been found to facilitate sexual activity and, in situations of chronically low or absent arousal, potentially cause distress. Despite the clinical implications of SSA, a thorough review of how to manipulate SSA has yet to be conducted.

Aim: To review the state of knowledge about SSA in women, including its definition, measurement, and the outcomes of studies attempting to manipulate SSA within a laboratory setting.

Method: A comprehensive search of the electronic databases of PubMed and PsycINFO was conducted. The generated list of articles was reviewed and duplicates were removed. Individual articles were assessed for inclusion and, when appropriate, relevant content was extracted.

Main Outcome Measure: The potential effects of various manipulations of SSA in a laboratory setting was the main outcome.

Results: 44 studies were included in this review. Manipulations were grouped into 3 primary categories: pharmacological (n = 16), cognitive (n = 22), and those based on changes to the autonomic nervous system (n = 6). Results suggest that cognitive manipulation is the most effective method of increasing SSA. Altering the relative balance of the 2 branches of the autonomic nervous system (the sympathetic nervous system and the parasympathetic nervous system) also appears to be a promising avenue for increasing SSA.

Conclusion: This review supports the use of cognitive manipulation for increasing women's SSA in a laboratory setting. Avenues for future research and recommendations for clinicians are discussed. **Handy AB, Stanton AM, Meston CM. Understanding Women's Subjective Sexual Arousal Within the Laboratory: Definition, Measurement, and Manipulation. Sex Med Rev 2018;XX:XXX–XXX.**

Key Words: Subjective Sexual Arousal; Sexual Arousal; Female Sexual Function

DEFINING SUBJECTIVE SEXUAL AROUSAL

Subjective sexual arousal (SSA) has been defined as positive cognitive engagement in response to a sexual stimulus,[1] suggesting that one must be implicitly or explicitly aware of a sexual stimulus, which could be internal (eg, sexual thoughts) or external (eg, a partner), in order to experience SSA. SSA has also been defined as the "emotional"[2,3] or "cognitive"[4,5] state of sexual arousal. These terms, as well as "psychological" or "mental" arousal, are used interchangeably in the literature and are thought to represent a feeling of being "turned on" in one's mind.

Feeling aroused, both in the body and the mind, is an integral component of the sexual experience. Sexual arousal decreases sexual self-restraint[6] and motivates individuals to engage in sexual activity.[7] In fact, feeling sexually aroused is one of the most common reasons why men and women have sex. In a study of over 1,500 undergraduate students, Meston and Buss[7] identified 237 unique reasons why men and women engage in sexual activity; experiencing SSA ("I was horny") was one of the top-10 most frequently cited reasons. It is also thought that increased SSA may enhance pleasure and satisfaction during sexual activity, both of which are linked with engagement in future sexual activity.[8–10] Conversely, chronically low or absent SSA may lead to clinically meaningful distress. Given that sexual arousal can act as both a motivation for sexual activity and a potential cause of distress, understanding how SSA has been manipulated in a laboratory setting has important clinical implications. Thus, this review aims to examine laboratory-based measurement, analysis, and manipulation of SSA.

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MODELS OF SEXUAL AROUSAL AND RESPONSE

Masters and Johnson[11] proposed the first highly cited model of sexual response in 1966. In their model, sexual response is divided into 4 linear phases: excitement, plateau, orgasm, and resolution. Recognizing that these stages only addressed physiological sexual arousal, Kaplan[12] expanded this framework to include sexual desire as a prelude to excitement, maintaining the original model's linear structure. With the expansion of sexuality research in the late 20th century, researchers began to theorize that the female sexual response cycle may not be limited to the specific phases outlined in the Kaplan[12] and Masters and Johnson[11] models. Basson[8] deviated from the linear models to establish a circular model of sexual response, which incorporates both physiological (eg, genital arousal) and subjective (eg, SSA, satisfaction) components, as well as several additional factors, such as the need for intimacy. It has been suggested that women with different levels of sexual function identify with different models of the sexual response cycle. In a study by Sand and Fisher,[13] women were provided with descriptions of 3 models of sexual response (those of Masters and Johnson,[11] Kaplan,[12] and Basson[8]), and they were instructed to endorse the model that they felt best described their own sexual experiences. Though all 3 models were endorsed with equal frequency, the women who endorsed the Basson[8] model had significantly lower levels of sexual function than the women who endorsed either the Masters and Johnson[11] or the Kaplan[12] models. Therefore, it is possible that sexual function plays a role in women's conceptualizations of the sexual response cycle.

Several additional models expanding the understanding of women's sexual response have been proposed. One such model is the Incentive Motivation Model (IMM),[14] which outlines the interconnectedness of subjective, affective, and physiological aspects of sexual arousal. The IMM also describes how the relationships among these components may lead to sexual desire. One aspect of the IMM that may be particularly important to the experience of SSA is the inclusion of perceived genital arousal; recognizing that one is physiologically aroused may influence SSA.[15]

A second theoretical model that has expanded our conceptualization of sexual response and sexual arousal specifically is the Information Processing Model (IPM).[4] The IPM suggests that, in order to experience sexual arousal, one must attend to a stimulus and appraise it as sexual. Sexual information can be processed both implicitly and explicitly. The implicit pathway is thought to be an unconscious detection of a sexual stimulus that triggers physiological changes (eg, lubrication), whereas the explicit pathway represents a conscious application of a sexual meaning to a stimulus that can trigger SSA. Within this framework, individuals learn to associate a sexual meaning with a sexual or non-sexual experience. The IPM is particularly relevant to the present review, as it emphasizes cognitive processes and the experience of SSA.

THE OVERLAP OF SSA AND SEXUAL DESIRE

Researchers have debated the distinction between SSA and sexual desire. Though desire (also referred to as sexual interest or libido) is primarily conceptualized as the *motivation* to engage in a sexual activity,[1] as opposed to the act of being engaged itself, there is evidence to suggest that desire and SSA may be 2 names for the same construct. After conducting a series of focus groups aimed at exploring women's qualitative experience of sexual arousal, Graham et al[16] reported that women frequently used the terms "arousal" and "desire" interchangeably; women were also found to use the term "arousal" to describe both SSA and genital arousal. Furthermore, participants described arousal and desire as being difficult to separate from one another, leading Graham et al[16] to suggest that women may not differentiate between desire and arousal in the same manner as do researchers. It is unclear, however, whether all women in the sample were sexually healthy or had any diagnosed sexual dysfunction; it is possible that a distinction between desire and arousal may be better recognized by women based on their level of sexual function.

Parsing apart these 2 constructs is also complicated by the high rates of comorbidity of desire and arousal dysfunction in women. In 1 study of women diagnosed with hypoactive sexual desire disorder (HSDD), 41% of women in the sample also met criteria for either an arousal (female sexual arousal disorder [FSAD]) or orgasm dysfunction, and 18% met criteria for all three.[17] Sarin and colleagues[18] reported similarly high rates of comorbidity; 53% of women (25 out of 47) in the sample with HSDD also met diagnostic criteria for FSAD. Twenty-two women met diagnostic criteria for HSDD alone and 18 met criteria for FSAD alone. It is important to note that women in the studies noted above were not grouped into the theoretical subtypes of FSAD (ie, genital, subjective, and combined genital and subjective arousal dysfunction[19]). Previous research has indicated that examining women with heterogeneous FSAD masks potential differences in sexual responding that become detectable when grouping women by sybtype.[20,21] Thus, it is possible that the overlap between desire and arousal disorders may have been driven by a single subtype of arousal dysfunction. Also, the high comorbidity of low desire with low arousal does not necessarily mean that desire and arousal dysfunction are one and the same. Many disorders co-occur yet are distinct. For example, the estimated comorbidity of depression and anxiety is 50%,[22] yet there is little disagreement that depression and anxiety are different constructs.

Recently, Althof and colleagues[1] proposed additional lines of evidence suggesting that SSA and desire are indeed distinct. In this review, Althof et al[1] discussed correlations between the desire and arousal domains of the Female Sexual Function Index.[23] Specifically, the authors noted that, while the correlation between these 2 domains is high (.76),[23] only 58% of the variance is *shared*. This suggests that, though there is overlap between desire and arousal, they do not represent the same entity. Althof