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Review

Sexual response models in women

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ABSTRACT

Over the past 40 years or so, a number of models have been proposed to understand the female sexual response. Early, simpler, linear models have evolved to incorporate more sophisticated understanding of the complexity of female sexuality. Updated sexual response models can help therapists in understanding how to help women with various sexual dysfunctions.

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1. Introduction: why sex is important

Quality of life and well being are affected by a number of important variables. These factors inevitably vary between individuals. Overall sense of well being may be influenced by the achievement of life goals and as the life cycle progresses these may become increasingly important. Pleasure or anhedonia from the sexual event can have a considerable impact on overall quality of life. Factors such as comfortableness with one's own body, general body confidence, and self-esteem are important determinants of well being. Adopting the sexual role (as a women within society) and respect of autonomy from a partner may be influenced by the state of interpersonal relationships and these factors can have an impact on a woman's sense of well being. In addition, the extent and maintenance of intimacy may influence quality of life. The concept of satisfaction with sexual interac-

tions has also been recently described by Rosen and Bachmann [1].

Sexual dysfunction in women is, according to many studies, a common experience but prevalence varies according to definition and sampling [35–37]. However, as the definition of problems varies widely, distinguishing between sexual concerns, difficulties, disorders and dysfunctions may be helpful [2]. Such a differentiation may be useful and often important when assessing women and looking at how to help them further. To understand the impact of this and the various female sexual responses to either spontaneous sexual thoughts or sexual advances from her partner, it is important to understand sexual response models in more detail. As such, this review article identified key models which will allow the reader greater understanding of potential sexual responses by women.

2. Female sexual response models

Meaningful descriptions of sexual response over the last four decades are reviewed here. Observations of sexual responses in women by Masters and Johnson brought about description of the

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excitation (E), plateau (P), orgasm (O) and resolution (R)—the EPOR model [3]. However they failed to include a phase that initiated sexual activity. In 1976, Robinson [4] concluded convincingly that the P phase was simply the final phase of the E phase. Helen Kaplan in 1974 proposed that before the E phase there should be a desire phase (D phase) [5]. From clinical experience, Kaplan noticed that many women had no desire to be sexual active even within their usual relationships. However they were clinic patients and not a normal population. This proposal led to the EPOR model being replaced by the DEOR model [6]. However, it has been recognized and well understood for some time that at least one-third of women never experience spontaneous sexual desire [7].

The initiating phase of sexual desire (D) may come about either spontaneously (D1—proceptive desire) or by activation through sexual excitation (D2—responsive desire). The mechanisms of D1 and D2 are not necessarily different but may be initiated at different times. Levin and Riley more accurately described this as the D1D2EOR model. In this model the plateau or P phase is deemed unnecessary as it was actually a phase of increasing sexual excitement i.e. the end of the E phase [8].

3. Description of models in greater detail

The traditional linear model proposed by Masters and Johnson [3] and modified by the introduction of the concept of desire [5] has resulted in an expectation of a sexual response cycle progressing from desire to arousal to orgasm to resolution.

In 1966, Masters and Johnson introduced an early model of female sexual function [3]. They proposed a linear model of sexuality for both women and men which consisted of 4 stages. The first of these is the excitement (arousal) stage with subjective feelings of sexual pleasure and accompanied by psychological and genital changes. The maximal stage of arousal and muscular tension that precedes orgasm is the second stage (the plateau). The peak of sexual pleasure with rhythmic contractions of the genital musculature in women is the third (orgasmic) stage. Multiple orgasms are possible. During the final phase (resolution) a general state of relaxation and well being is experienced.

By the mid-1970s, Kaplan modified the model proposed by Master's and Johnson and characterised the female sexual response cycle of 3 phase model composed of desire, arousal and orgasm [5]. The most notable aspect of her model was that she included sexual desire as a crucial stage. It sometimes seems and is the common misconception that all women experience sexual desire less than men. Some reports suggest that this may vary [35,38]. In many cases, a man may initiate sex and the woman does not notice her arousal nor is there opportunity for triggering sexual desire since the man has expressed his intent.

Whipple and Brash-McGreer proposed the circular sexual response pattern with 4 stages [9]. The first, seduction (encompassing desire); followed by sensations (excitement and pleasure); the third, surrender (orgasm); followed by reflection (resolution). Pleasant and satisfying sexual experiences have a reinforcing effect on a woman, leading to the seduction phase of the next sexual experience. If during reflection the sexual experience did not provide pleasure and satisfaction, the woman may not have a desire to repeat the experience. It is seen, therefore, that the linear models proposed by Masters and Johnson and Kaplan may not fit for all women as some may move from sexual arousal to orgasm and satisfaction without any experience of desire or may have desire, arousal, and satisfaction but without orgasm. This led to the circular model to be followed soon thereafter by the non-linear model developed by Basson [10].

In 1998, Roy Levin discussed the issue of sexual desire focusing particularly on multiple levels of potential genital feedback [11]. He suggested that although a woman's "spontaneous" desire initiates her to undertake sexual activity alone or with a partner, the woman would be able to experience greater desire during the excitation (or arousal) phase. Endogenous desire, implying that the word spontaneous should not be used, was the result of "a galaxy of stimuli". Levin and Riley emphasise the need to identify sexual arousal as a state denoting physiological changes distinct from sexual excitement as the subjective awareness of the arousal [12]. The central mental process creating the subjective awareness of arousal is more difficult with sexual drive, desire, interest, appetite, motivation and libido all described. It is emphasised that sexual drive is the biological drive whilst sexual desire can be thought of as an objective focused drive such as the desire to participate in a particular type of activity or with a particular partner. Hence sexual desire can occur without sexual arousal and sexual arousal without sexual desire.

The International Consensus Committee sponsored by the American Foundation of Urological Disease redefined female sexual dysfunction starting from a state of sexual neutrality [13]. Sexual arousal in women is often more an excitement within the mind with appreciation of the sexual stimuli and less about awareness of genital changes. Expectation of positive rewards regarding intimacy may have significant impact on the seeking of stimuli for none "sexual" reasons. Rosemary Basson constructed a non-linear model of female sexual response [10]. In this model, the woman begins in a state that is desire neutral. If she experiences adequate emotional intimacy from her partner, she may seek or be receptive to sexual stimuli. Receptivity to sexual stimuli allows the woman to move from sexual neutrality to arousal. If the mind continues to process the stimuli on to further arousal, sexual desire will encourage the woman to move forward to sexual satisfaction and orgasm. This positive outcome fosters intimacy and reinforces sexual motivation [14]. In 2002, Basson summarised some criticisms and opinions of the conceptualised traditional human sexual response cycle as follows [15]:

- Sexual motivation is complex.
- To be more emotionally intimate with the partner is a common and enduring motivation.
- When sexual motivation is not primarily associated with a sexual need, sexual stimuli are necessary to experience any response.
- The stimuli is often less important than the context in which the stimuli is experienced.
- The stimuli and content may or may not be processed by the mind to consciousness of subjective sexual arousal (i.e., the concept of ones ability for sexual arouseability is important).
- Arousal can occur before desire.
- Arousal may be enjoyed, or it may be neither enjoyed nor disliked or it may be experienced as dysphoric.
- If arousal is enjoyed, sexual desire may be accessed if the intensity of arousal increases such that there is inherent sexual wanting.
- The experience of desire whether directly accessed or developed from other stimuli can occur is experienced alongside sexual arousal.
- A positive outcome fulfils two motivations—the wish to be emotionally closer to the partner and the accessed need for sexual satisfaction.
- Orgasmic release is not normally required for sexual satisfaction.
- The power behind an intimacy based cycle is not a constant entity.

An inherent argument with the models proposed by Masters and Johnson, Kaplan and Basson is that they were all based on clinic or volunteer samples. A random sample of 580 registered nurses was mailed a 58-item questionnaire that assessed

women's perception of the fit of their sexual experience with the current models of female sexual response [16]. Equal proportions of women endorsed the three models as representing their own sexual experience. Women endorsing the Basson model had significantly lower FSFI scores than those women endorsing the Masters and Johnson or Kaplan models. This finding emphasises the heterogeneity of women's sexual response and highlights the need for ongoing research to guide speciality acceptance and application of particular models of female sexuality in particular situations. The women endorsing the Basson model had significantly lower FSFI scores than the women endorsing the other two and may best reflect women with sexual concerns rather than a single normative response pattern. However, there is also some concern that the FSFI may not identify all cases of sexual dysfunction.

4. Multifactor models

Steven Levine in his work over the last two decades has developed further concepts of sexual drive with sexual desire described as the creation of biological (drive), psychological (motivation) and cultural (values) forces [17].

In 1998, Fischer described the emotion/motivation system whereby basic emotions are seen to arise from distinct circuits or systems of neural activity [18]. She proposed that humans have 3 primary motivation circuits or systems and these brain systems have evolved to direct behaviour. The first involved androgens and influences lust (including sexual drive and libido). The second involves dopamine and influences attraction (romantic). The third involves oxytocin and influences attachment. Oxytocin which is released after stimulation of the nipples has entactogenic effects with a greater response and feeling of pleasure and sensate focus with touch and so indirectly may create greater sexual desire. Incentive behaviour can be seen to consist of both appetitive and consummator responses and is described as proceeding from the appetitive phase to the consummator phase [19]. Incentive motivation theories state that approachable behaviour will be activated by appropriate incentives [20]. The concept is of a central motivational state "a hypothetical set of neural processes that promote goal directed actions in relation to particular classes of incentive stimuli". Certain cues may modulate the internal state such as sexual stimuli. Subsequent activation of reward circuits may result in an increase of attention for incentive stimuli and an increase in subjective and physiological response to such stimuli (i.e., a self-amplifying motivation process). A number of researchers have shown that exposure to sexual stimuli in the laboratory can involve genital response and subjective sexual response in both men and women [21,22].

The "dual control" model of sexual response postulates that within the central nervous system there are separate and relatively independent excitatory and inhibitory systems [23,24]. It is the balance between these two systems that determines whether sexual arousal occurs in any particular situation. The model also postulates that individuals vary in their propensity for both sexual excitement (SE) and sexual inhibition (SI). To inhibit sexual response is seen as adaptive in order to avoid risky situations to personal well being. However, if the propensity for SI is unduly high it can impair capacity for sexual function. Likewise, when the propensity for SI is low, the likelihood of engaging in high risk sexual behaviours increases. The sexual inhibition scale–sexual excitation scale (SIS/SES) has been developed [25]. Three factors are identified—one excitation (SES) and two inhibition factors labelled inhibition due to threat of performance failure (SIS1) and inhibition due to threat of performance consequences (SIS2). Generally women have been found to have lower SE scores and higher SI scores compared

to men [26]. Tiefer has argued that other factors such as concerns about one's reputation and other exclusive female factors such as the menstrual cycle and pregnancy may influence sexual inhibition [27].

A recent study has investigated whether propensity for sexual excitement or sexual inhibition correlated with reporting of sexual problems in a non-clinical sample of women [28]. Using the sexual excitation/sexual inhibition inventory for women (SESII/W) and ratings of current sexual problems, lifetime arousal difficulty, lifetime orgasm difficulty and lifetime problems with low sexual interest, and using multiple progression analyses including variables of whether women were in a sexual relationship brought about a number of important findings. The strongest statistical predictor of both current and lifetime sexual problems was SESII/W inhibition factors of arousal contingency (the potential for arousal to be easily inhibited or disrupted by situational factors) and concerns about sexual function (the tendency for worries about sexual functioning to negatively influence arousal). The authors suggest that if this research is replicated the predicted utility of the SESII/W to identify women more likely to experience sexual difficulties may be of use as prognostic factors in subsequent treatment studies.

The sexual tipping point (STP) is a model created by Perelman in which it is recognised that the mind and body both inhibit and excite sexual response [29]. The sexual tipping point is the characteristic threshold for an expression of a sexual response for any individual. It is recognised that this can vary dynamically within and between any given sexual experiences. The variable expression of the response that may be inhibited or facilitated is due to the combination of both psychological and organic factors. The specific threshold for a sexual response is determined by multiple factors at any given moment or circumstance. Factors may increasingly dominate or recede in importance. Perelman has described this model as a usual heuristic device to describe the variety of vectors impacting both normal and dysfunctional sexual response in men and women.

The STP is applicable to sex which is almost like everything else by normal distribution curves. These normal models assume that many small and independent effects additively contribute to any observation. As such sexual attitude, response and behaviour are described with the same familiar curves as all other human characteristics. Perelman argues that arousal is normally distributed like height and weight whereas orgasmic latency is best described by skewed distribution curves like hair and eye colour. Contextual issues and psychosocial issues may affect responsivity. Psychosocial and cultural influences are complex. As such sexual response not only follows a normal distribution but is also affected by mental and physical factors. As such the aetiology of any dysfunction is typically a combination of both psychogenic and organic factors but the authors argue that psychosocial and organic causes can both excite and/or inhibit the final sexual response (see also Bancroft and Janssen [24]).

Further, Perelman argues that the STP model as depicting the mind/body balance can be used to describe a combination treatment providing the best risk/benefit ratio. The STP model postulates a set point or threshold for the expression of any sexual response for any individual which is dynamic rather than static and may vary with or between any given sexual experiences. Further it refers to any combination of desire, arousal, orgasm or resolution. Positive mental and physical factors therefore increase the likelihood of a response whilst negative mental and physical factors inhibit the sexual response but all factors combine to determine a unique threshold or tipping point [29,30]. The use of sex coaching to integrate sex therapy and psychological techniques optimise treatments for sexual dysfunctions. The use of coaching and psychotherapy alongside pharmaceuticals allows it to become the true "oral therapy" of choice of SD.

5. Other developments

It has long been argued by commentators such as Tiefer [31] and Leiblum [32] that the focus on genital response and traditional indicators to sexual desire including fantasies and the need to self-stimulate ignore major components of women's sexual satisfaction with trust, intimacy, and the ability to be vulnerable and receive, respect, communication, affection and pleasure from sexual touching as important factors [13]. An overlap of sexual dysfunctions especially arousal disorder and hypoactive desire disorder or orgasmic disorder has also meant that the traditional diagnostic criteria of the DSMIV and ICD10 may not be ideal.

The postmodern feminist approach conceptualises sexuality as complex and fluid with rejection of unitary models and so accommodating contradictory representations of experiences and desire. Sexuality is constructed in relation to and interaction with historically and culturally variable social practices such as religion, education and medicine. As such, conceptualising and sexuality are believed to reflect social relations regarding gender, ethnicity, and class and to be culturally managed through the ways women talk, think and practice. By acknowledging within group diversity and considering how the experiences of those whose sexuality has been ignored or misrepresented leads to seeking out more inclusive information and enveloping the voices of marginal groups [33].

A recent development which promotes 'different but equal' frameworks with 12 dimensions has been described and which are associated with 'good enough sex'. This emerging concept could be another way forward by providing a framework which is truly multifactorial and more likely to establish couple intimacy and satisfaction. The model incorporates many of the issues which have been described earlier in this article [34].

6. Conclusions

Sexual response models in women must seek to identify and describe multifactorial factors which collectively may bring about sexual expression and response. To date, a number of models have attempted to describe these, and they continue to be refined. Successful models will be those which establish an understanding of the reasons why a woman may be motivated to be sexual active, starting from a point of sexual neutrality and out of a desire for emotional closeness and intimacy.

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