

Testosterone, combined with sildenafil, enhances startles evoked during erotic pictures in sexually dysfunctional women with high sensitivity for sexual cues.

J. Gerritsen^{1,2}, D.M.M. van Ham², J.M.M. Bloemers², K.B.E. Böcker¹, H.P.F. Koppeschaar^{1,2}, W.T.A.M. Everaerd², J.J.A. Tuiten²

¹Alan Turing Institute Almere, The Netherlands

²Emotional Brain BV, Almere, The Netherlands

Introduction

Previous research from our lab has shown that a subgroup of women with Hypoactive Sexual Desire Disorder (HSDD), characterized by low baseline sensitivity for sexual cues, showed an increase in genital and subjective arousal following combined administration of a single dose of sublingual testosterone and a PDE5 inhibitor (administration separated by 2 hours so that the pharmacodynamic effects of both drugs overlap). However, a subgroup showing high sensitivity for sexual cues did not respond to the treatment. It was hypothesized that these subjects suffered from sexual inhibition, due to negative associations with sex. These may have been made more prominent following testosterone administration. The current study is aimed at finding psychophysiological markers for low versus high sensitivity for sexual cues. It was hypothesized that HSDD subjects with high attention for sexual cues would perceive erotic pictures as more negative than HSDD subjects with low attention for sexual cues and thus show larger startle blink amplitudes and more *corrugator supercilii* activity (frowning), both commonly used measures for negative affect.

Methods

Participants

39 women participated in this study, all of whom were diagnosed with HSDD, with or without arousal problems. In a double-blind, randomized, placebo controlled cross-over design, they were administered either A) 0.5 mg testosterone, followed 2 hours later by 50 mg sildenafil, or B) matching placebo. The experiment consisted of a pre-drug session (Stroop task only) and two experimental drug conditions (active drug or placebo).

Measures

- **Masked emotional Stroop task:** neutral and erotic words, 26 ms exposure, vocal response
 - Preconscious attentional bias = $Rt_{\text{erotic words}} - Rt_{\text{neutral words}}$
- **IAPS pictures:** neutral, negative, positive (non-erotic), erotic
 - Eyeblink amplitude, only when accompanied by a startle sound (50%)
 - EMG over *corrugator supercilii* and *zygomaticus major* (other 50%)
 - Subjective rating of valence and arousal

Subjects were divided into subgroups based on their preconscious attentional bias in a Stroop task which was preceded by a 3-minute erotic film clip, as in our previous research.

Results

Subjects were divided on the basis of their attentional bias in the placebo condition:
 Low attention: attentional bias < 0 (N = 17)
 High attention: attentional bias > 0 (N = 22)

For the HSDD subjects, a significant drug × group interaction ($F(1,37) = 18.379, p < .000$) was found for the attentional bias, replicating our earlier studies (figure 1a). Moreover, for the startle eyeblink modulation, a significant drug × picture (erotic vs. negative) × group interaction was found: $F(1,37) = 4.707, p < .037$. As displayed in figure 1b, both groups showed large startles to negative pictures in both drug conditions. The high attention group also showed large startles to erotic pictures, comparable to negative pictures, in the active drug condition.

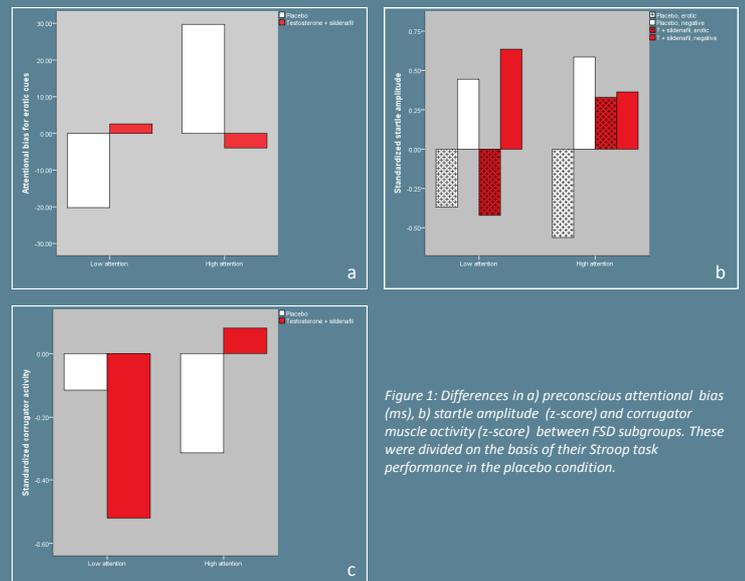


Figure 1: Differences in a) preconscious attentional bias (ms), b) startle amplitude (z-score) and corrugator muscle activity (z-score) between FSD subgroups. These were divided on the basis of their Stroop task performance in the placebo condition.

Corrugator activity showed a drug × group interaction for the erotic pictures: $F(1,37) = 4.229, p < .047$, with the high attention group showing less corrugator activity during the placebo and more during the active drug condition, when compared to the low attention subgroup (figure 1c). This was not found for the zygomaticus.

No significant effects were found for subjective rating of picture valence and arousal.

Discussion

This study provides additional support for the hypothesis that women with HSDD can be subdivided into two groups. More specifically, the group that was assumed to have a negative association with sex did indeed show enhanced startle amplitudes when presented with erotic pictures. This effect was only visible in the active drug condition, which can be attributed to the effects of testosterone, which is thought to have increased the salience of these sexual stimuli and thus their aversive nature for that particular group of women.

This study stresses the importance of differential drug treatment for HSDD. Testosterone and sildenafil have been shown to be highly effective, but only in women with low sensitivity for sexual cues.