Cybersex Addiction in Heterosexual Female Users of Internet Pornography Can Be Explained by Gratification Hypothesis

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Abstract

In the context of Internet addiction, cybersex is considered to be an Internet application in which users are at risk for developing addictive usage behavior. Regarding males, experimental research has shown that indicators of sexual arousal and craving in response to Internet pornographic cues are related to severity of cybersex addiction in Internet pornography users (IPU). Since comparable investigations on females do not exist, the aim of this study is to investigate predictors of cybersex addiction in heterosexual women. We examined 51 female IPU and 51 female non-Internet pornography users (NIPU). Using questionnaires, we assessed the severity of cybersex addiction in general, as well as propensity for sexual excitation, general problematic sexual behavior, and severity of psychological symptoms. Additionally, an experimental paradigm, including a subjective arousal rating of 100 pornographic pictures, as well as indicators of craving, was conducted. Results indicated that IPU rated pornographic pictures as more arousing and reported greater craving due to pornographic picture presentation compared with NIPU. Moreover, craving, sexual arousal rating of pictures, sensitivity to sexual excitation, problematic sexual behavior, and severity of psychological symptoms predicted tendencies toward cybersex addiction in IPU. Being in a relationship, number of sexual contacts, satisfaction with sexual contacts, and use of interactive cybersex were not associated with cybersex addiction. These results are in line with those reported for heterosexual males in previous studies. Findings regarding the reinforcing nature of sexual arousal, the mechanisms of learning, and the role of cue reactivity and craving in the development of cybersex addiction in IPU need to be discussed.

Introduction

CYBERSEX ADDICTION IS BEING DISCUSSED with growing interest. While it has been addressed in several studies, research has focused mostly on males;¹ nearly female cybersex users have been ignored in the past. The aim of the present study is to compare female Internet pornography users (IPU) and non–Internet pornography users (NIPU) regarding tendencies toward cybersex addiction.

Cybersex has been described as sexually motivated behaviors on the Internet. These behaviors include watching soft- or hardcore pornographic material; having sex chats or sex via webcam; reading sexually arousing literature online; or using online sex shops, dating sites, forums, or advisors for sexual practices or sexually transmitted diseases (STDs).² It has been postulated that females use several cybersex applications but prefer those that allow social interaction.^{3,4} Studies have demonstrated that women use cybersex less than males and report a clear preference for females using chatrooms for sexual purpose, while males watch pornography more frequently.^{5–7} Regarding interactive cybersex, it was shown that males' interest in interactive cybersex decreases with age but increases with middle age in females.⁸ While the prevalence of female cybersex use remains unclear, it has been reported that some females using cybersex have problems regarding their cybersex use.^{1,9–11}

Most individuals use the Internet without experiencing severe negative consequences, but some report subjective complaints in everyday life due to Internet use, including symptoms comparable to those observed in substance addictions.^{12,13} In the cognitive–behavioral model of pathological Internet use, both a generalized and specific pathological Internet use were distinguished.¹⁴ The first describes a nondirectional problematic use of the Internet. The latter is characterized by the pathological use of specific Internet applications. Cybersex is thought to be an Internet application at risk for developing a specific pathological Internet use.^{15,16} While there is still some discussion regarding the classification of these pathological

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Cybersex addiction has been observed in hetero- and homosexual males and females,¹⁰ but studies on cybersex addiction are limited, particularly in females.¹ Young postulated that anticipating and receiving sexual arousal and gratification should be most important in the development of cybersex addiction.¹⁷ The gratification hypothesis assumes that sexual arousal through cybersex is the main factor in the development of cybersex addiction. Supporting this, it was reported that subjective sexual arousal to Internet pornographic cues predicted tendencies toward cybersex addiction in heterosexual males.¹⁸ The authors assumed learning mechanisms and the development of cue reactivity and craving^{19,20} to be relevant mechanisms for the development of cybersex addiction in IPU. Accordingly, it was shown that problematic cybersex users exhibited greater sexual arousal and craving in response to Internet pornographic cues compared with unproblematic cybersex users, while the number of real-life sexual contacts and the satisfaction with these were not related to cybersex addiction.²¹ Other studies suggest that individual propensity for the reinforcing effects of cybersex may be affected by individual characteristics. Individuals differ into sensitivity particularly sexual excitation and inhibition,²² but, sensitivity to sexual excitation covaries with risky and addictive sexual behaviors.^{23,24} Moreover, it was shown that problematic sexual behavior on- and offline are related,²⁵ that cybersex addiction covaries with a general psychological symptom severity, and that it shares high rates of comorbidities.^{1,18} Most studies have been done with male participants. Comparable data for females are non existant.

Aims and hypotheses of the present study

The aim of the present study is to investigate tendencies toward cybersex addiction by comparing female IPU with NIPU regarding indicators of craving in an experimental cue reactivity paradigm. We formulated the following hypotheses:

H1: IPU and NIPU differ in their severity of cybersex addiction.

H2: IPU and NIPU differ in their subjective sexual arousal to Internet pornographic cues.

H3: In IPU, indicators of sexual arousal to Internet pornographic cues, sensitivity to sexual excitation, problematic sexual behavior, and severity of general symptoms should predict the tendency toward cybersex addiction.

Materials and Methods

Participants

We examined 102 heterosexual female participants ($M_{age}=21.83$ years, SD=2.48 years; range 18–29 years). Participants were recruited by advertisements in public and at the University of Duisburg-Essen (Germany) in 2012. We explicitly requested adult female participants and indicated that during participation they would be confronted with explicit pornographic material of legal sexual practices. All participants gave written informed consent prior to the investigation and were paid an hourly rate (10€) for participation. Mean years of education was 12.82 (SD=0.57). The study was approved by a local ethics committee.

Procedure

The study was done in a computer-based laboratory setting. Each participant was attended by one investigator throughout the procedure. The investigation took approximately 1 hour.

Instruments

Cybersex use and cybersex addiction. According to the definition by Döring,² participants were asked whether they use several cybersex applications on a regular basis (response format: yes/no). Using this information, we separated the sample into the following groups: (a) females watching pornography (hardcore pictures or videos) on the Internet on a regular basis (IPU) and females not watching hardcore pornography on the Internet (NIPU); (b) females using interactive cybersex applications (sexchats, webcam, and/or dating sites) on a regular basis (ICU) and females using noninteractive or no cybersex applications (NICU).

Tendencies toward cybersex addiction were measured by the German short version of the Internet Addiction Test (s-IAT)²⁶ modified for cybersex in general (s-IATsex). The s-IAT consists of 12 items and has a two-factorial structure ("loss of control/time management" and "craving/social problems"). Comparable to other studies,^{18,21} we modified the s-IAT for cybersex by replacing terms such as "Internet" and "online" with the terms "online sexual activity" and "Internet sex sites." Items were answered on a scale from 1="never" to 5="very often," resulting in potential sum scores from 12 to 60 (Cronbach's α =0.91).

Further questionnaires. To assess participants' propensity for sexual excitation, a short form of the sexual excitation and sexual inhibition scale (SES) was applied.²⁷ Six items were answered on a recoded 4-point scale ranging from 1 = "strongly disagree" to 4 = "strongly agree." High values represent high propensity for sexual excitation (Cronbach's α =0.75). Problematic sexual behavior was measured by the hypersexual behavioral inventory (HBI).²⁸ The questionnaire includes three subscales ("control," "coping," and "consequences"), which can be averaged to one mean score. Nineteen items had to be answered from 1="never" to 5="very often" (Cronbach's α =0.91).

To assess subjective complaints due to physiological or psychological symptoms within the last 7 days, the brief symptom inventory $(BSI)^{29}$ was used. Participants rated 53 items on a scale from 0="not at all" to 4="extremely." The global severity index (GSI) was used as an indicator of general psychological disturbance (Cronbach's α =0.96).

Furthermore, participants were asked about the number of sexual contacts within the last 7 days and the last 6 months. In addition, we assessed how satisfied they were with the frequency and quality of sexual contacts (0= "not satisfied" to 3 = "very satisfied").

Experimental paradigm

To assess subjective sexual arousal experience in response to Internet pornographic cues, we presented 100 stimuli of 10 picture categories in a randomized order. Comparable to other studies,^{30,31} participants rated cues on a 5-point scale with respect to subjective sexual arousal (1 = "sexually not

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arousing" to 5 = "sexually very arousing"). The 10 picture categories (10 pictures each) included heterosexual sex between one man and one woman (vaginal intercourse, anal sex, and two oral sex categories), homosexual sex (tribadism and oral sex between two females, anal and oral sex between two males), as well as single masturbating males and females. Before (t1) and after (t2) the experimental paradigm, participants were asked to indicate their current sexual arousal from 0 = "not sexually aroused" to 100 = "very sexually aroused" and their need to masturbate from 0 = "no need to masturbate" to 100="very great need to masturbate." As an indicator of individual reactivity to pornographic content, sexual arousal at t1 was subtracted from sexual arousal at t2, resulting in a delta score (craving Δ). The delta score for the need to masturbate (craving Δ) was calculated in the same manner.

Results

The sample's mean of the s-IATsex was 15.26 (SD = 5.70), range 12-40). The mean number of sexual contacts in the last 7 days was 2.05 (SD = 2.64). The mean number of sexual contacts in the last 6 months was 38.13 (SD=46.60). The satisfaction with the frequency of sexual contacts was 2.06 (SD=0.84), and the satisfaction with the quality of sexual contacts was 2.34 (SD = 0.75).

Half of the participants indicated that they watched hardcore pornographic pictures and/or videos on the Internet on a regular basis (IPU, n=51). Differences between IPU and NIPU regarding age, cybersex use, cybersex addiction, questionnaires, and sexual contacts are shown in Table 1. Differences regarding IPU's and NIPU's use of specific cybersex applications are displayed in Table 2. For IPU, more individuals indicated watching soft- or hardcore pornographic pictures or videos on the Internet, as expected. The number of users of other cybersex applications was not different between IPU and NIPU. For IPU, 30 participants indicated that they were in a relationship. For NIPU, 26 participants reported being in a relationship. The number of participants in a relationship did not differ between the groups $(\chi^2 (1, N=102)=1.44, p=0.23)$. Regarding interactive cybersex, 18 participants (ICU) indicated that they used sexchats, sex via webcam, and/or dating sites, while 84 denied such use (NICU). The s-IATsex score did not differ between the groups ($M_{\rm ICU}$ =17.17, SD=8.28, $M_{\rm NICU}$ = 14.89, SD = 4.98, t = 1.12, p = 0.28). Therefore, the following calculations address IPU and NIPU solely.

The results of the experimental paradigm for IPU and NIPU are illustrated in Figure 1. As demonstrated by t tests for dependent groups, the pornographic picture presentation led to an increase in sexual arousal ($M_{t1} = 14.14$, SD = 21.71, $M_{t2} =$ 27.63, SD = 25.19, t = -5.53, p < 0.001, Cohen's d for dependent samples = 0.56) and the need to masturbate (M_{t1} = 6.13, $SD = 12.01, M_{t2} = 21.06, SD = 26.84, t = -6.85, p < 0.001, Co$ hen's d for dependent samples = 0.86) within the whole sample.

Regarding the sexual arousal ratings of pornographic pictures, repeated measures analysis of variance (ANOVA) with the within-factor (10 pornographic picture categories) and one between-factor (group) was carried out. Results showed a significant effect of the picture category (Wilks's $\Lambda = 0.25, F(9, 91) = 29.95, p < 0.001, partial \eta^2 = 0.75$). This means that there were differences across the sexual arousal ratings of the 10 picture categories. Moreover, the interaction of the within-factor and the between-factor was significant (Wilks's $\Lambda = 0.78$, F(9, 91) = 2.86, p < 0.01, partial $\eta^2 = 0.22$). This means that there were differences between IPU and NIPU regarding the pornographic picture rating. As indicated by t tests for independent groups, the mean sexual arousal rating across the 10 pornographic picture categories was higher in IPU ($M_{\rm IPU} = 2.29$, SD = 0.63, $M_{\rm NIPU} = 1.76$, SD=0.65, t=4.20, p<0.001, Cohen's d for independent samples = 0.83), and that IPU reported a stronger increase in sexual arousal ($M_{\rm IPU} = 20.90$, SD = 33.06, $M_{\rm NIPU} = -1.04$, SD=27.58, t=3.62, p<0.001, Cohen's d for independent

AND SEXUAL CONTACTS REVEALED BY T TESTS FOR INDEPENDENT SAMPLES							
	<i>IPU</i> (n=51)		NIPU (n=51)				
	М	SD	М	SD	t	р	d
Age (years)	22.37	2.94	21.29	1.77	2.24	0.03*	0.44
Cybersex use (min/week) ^a	38.92	81.46	3.63	10.54	3.07	0.003**	0.61
s-IATsex	16.96	6.45	13.57	3.13	3.22	0.002**	0.67
BSI (GSI)	0.67	0.50	0.63	0.51	0.38	0.71	0.08
SES ^b	2.67	0.51	2.46	0.51	2.02	0.04*	0.41
HBI	1.73	0.61	1.59	0.44	1.32	0.19	0.26
Number of sexual contacts (7 days)	2.33	2.98	1.76	2.23	1.09	0.28	0.22
Number of sexual contacts (6 months)	38.38	43.74	37.88	49.74	0.05	0.96	0.01
Satisfaction sexual contacts (frequency)	2.06	0.90	2.06	0.77	-0.01	0.99	0.00
Satisfaction sexual contacts (quality)	2.40	0.82	2.27	0.68	0.86	0.39	0.17

TABLE 1. DIFFERENCES BETWEEN INTERNET PORNOGRAPHY USERS AND NON-INTERNET PORNOGRAPHY USERS REGARDING AGE, CYBERSEX USE, CYBERSEX ADDICTION, QUESTIONNAIRES,

IPU indicated watching Internet pornography (hardcore pictures or videos) on a regular basis. NIPU denied watching Internet pornography

^aWithin IPU, 22 individuals indicated using cybersex in general on a regular basis but less than once a week. Therefore, the range of 'cybersex use (min/week)'' was 0–400 within IPU. Within NIPU, the range of ''cybersex use (min/week)'' was 0–60. ^bItems recoded. High scores represent high propensity for sexual excitation.

 $p \le 0.05; p \le 0.01.$

IPU, Internet pornography users; NIPU, non-Internet pornography users; s-IATsex, German short version of the Internet Addiction Test modified for cybersex; BSI, brief symptom inventory; SES, sexual inhibition scale; HBI, hypersexual behavioral inventory.

	IPU (n=51)		NIPU	(n=51)		
	n	%	n	%	χ^2	р
Softcore pictures	28	54.9	14	27.5	7.93	<0.01
Softcore videos	35	68.6	19	37.3	10.07	<0.01
Hardcore pictures	24	47.1	0	0	31.38	<0.001
Hardcore videos	50	98.0	0	0	98.08	<0.001
Sex chats	9	17.6	8	15.7	0.07	0.79
Sex via Webcam	2	3.9	1	2.0	0.34	0.56
Dating sites	2	3.9	0	0	2.04	0.15
Live sex shows	0	0	1	0	1.01	0.32
Online sex shops	20	39.2	21	41.2	0.04	0.84
Sexually arousing literature	21	41.2	28	54.9	1.92	0.17
Information search (e.g., STDs)	23	45.1	31	60.8	2.52	0.11
Advisors (e.g., sexual practices)	33	64.7	35	68.6	0.18	0.67

TABLE 2. NUMBER AND PERCENTAGE OF IPU AND NIPU PARTICIPANTS WHO INDICATED USING SEVERAL SPECIFIC CYBERSEX APPLICATIONS

Note: Participants were asked whether or not they use several cybersex applications on a regular basis (response format: Yes/No). Using this information, participants were separated into females watching pornography (hardcore pictures or videos) on the Internet on a regular basis (IPU) and females not watching Internet pornography (NIPU).

samples = 0.72) and in the need to masturbate due to pornographic picture presentation ($M_{\rm IPU}$ =19.67, SD=23.51, $M_{\rm NIPU}$ =10.10, SD=19.20, t=2.24, p<0.05, Cohen's d for independent samples = 0.45).

Regarding IPU, the s-IATsex was correlated with variables of the experimental paradigm and questionnaires. Results are demonstrated in Table 3. Time spent on cybersex in general per week neither correlated with the number of sexual contacts in the last 7 days (r=0.04, p=0.77) or the last 6 months (r=-0.05, p=0.71) nor with the satisfaction with the frequency (r=0.20, p=0.16) or the quality (r=0.15, p=0.30) of sexual contacts. The s-IATsex neither correlated with the number of sexual contacts in the last 7 days (r=0.16) or the last 7 days (r=0.16) or the quality (r=0.15, p=0.30) of sexual contacts. The s-IATsex neither correlated with the number of sexual contacts in the last 7 days (r=0.16) or the quality (r=0.15, p=0.30) of sexual contacts.

-0.02, p = 0.90) or the last 6 months (r = -0.14, p = 0.33) nor with the satisfaction with the frequency (r = -0.06, p = 0.69) or the quality (r = 0.01, p = 0.95) of sexual contacts.

Regarding IPU, a hierarchical regression analysis was conducted to predict the s-IATsex. The "rating of pornographic pictures" served as first predictor and explained 9.30% of variance of the s-IATsex, F(1, 49) = 5.03, p = 0.03. Adding the craving1 Δ and the craving2 Δ in the second block led to a significant increase of variance explanation (changes in $R^2 = 0.15$, changes in F(2, 47) = 4.68, p = 0.01). Adding the mean scores of the SES, HBI, and the BSI (GSI) in the third block, s-IATsex's variance explanation increased significantly (changes in $R^2 = 0.14$, changes in F(3,



FIG. 1. Results of the experimental pornographic picture presentation for female Internet pornography users (IPU) and non–Internet pornography users (NIPU). Error bars represent standard deviations.

n = 51	s-IATsex	Sexual arousal rating (10 categories)	Craving1 Δ	Craving2 Δ	SES	HBI	BSI (GSI)
Sexual arousal rating (10 categories) Craving1 Δ Craving2 Δ SES ^a HBI BSI (GSI) Cybersex use (min/week)	0.31* 0.44** 0.47** 0.36** 0.41** 0.34** 0.54**	0.40** 0.47** 0.43** 0.12 0.06 0.20	0.77** 0.44** 0.01 0.26 0 .20	0.39 ** 0.11 0.21 0.18	0.34 * 0.25 0 .28 *	0.46** 0.07	0.25

TABLE 3. PEARSON CORRELATIONS OF THE S-IATSEX WITH INDICATORS OF SEXUAL AROUSAL DUE TO PORNOGRAPHIC PICTURES, QUESTIONNAIRE DATA, AND CYBERSEX USE FOR IPU

^aItems recoded. High scores represent high propensity for sexual excitation.

 $p \le 0.05; \ p \le 0.01.$

44)=3.40, p < 0.001). The whole model remained significant, $R^2 = 0.38$, F(6, 44) = 4.61, $p \le 0.001$. Further values of the regression are shown in Table 4.

Discussion

The main results of our study show that female IPU rated Internet pornographic pictures as more arousing and reported greater craving due to Internet pornographic picture presentation compared with NIPU. Moreover, the sexual arousal rating of pictures, craving, sensitivity to sexual excitation, problematic sexual behavior, and severity of psychological symptoms predicted tendencies toward cybersex addiction in IPU. Being in a relationship, number of sexual contacts, satisfaction with sexual contacts, and use of interactive cybersex were not associated with cybersex addiction. The gratification hypothesis of cybersex addiction also seems to be valid for females. The findings emphasize the important role of anticipating and receiving sexual gratification within the development of cybersex addiction in heterosexual IPU comparable to those reported for males.^{17,18,21}

The finding that subjective sexual arousal predicted tendencies toward cybersex addiction in female IPU needs to be discussed against the background of cue reactivity and craving within the development of addictions. In substance dependency research, cue reactivity has been described as a result of repeated drug use in which learning mechanisms lead to an association of internal or environmental cues with the reinforcing effects of a drug.¹⁹ As a consequence of classical conditioning, formerly neutral cues become

TABLE 4. HIERARCHICAL REGRESSION ANALYSES PREDICTING THE S-IATSEX SCORE AS A DEPENDENT VARIABLE WITHIN THE GROUP OF IPU

Main effects of single predictors in the whole model $(n=51)$	β	t	р
Sexual arousal rating (10 categories)	0.06	0.43	0.66
Craving 1 Δ	0.20	0.98	0.33
Craving 2 Δ	0.23	1.15	0.26
BSI (GSI)	0.07	0.52	0.60
SES	0.03	0.23	0.82
HBI	0.33	2.31	0.02

conditioned, predicting the occurrence of the anticipated consequence.³² That is, if an individual's anticipated effect of a drug does not occur, craving as the need to consume the drug may arise to accomplish the anticipated effect.^{20,33} Since it was shown that sexual arousal is associated with mesolimbic activation in males and females,³⁴ that sexual arousal is highly reinforcing,³⁵ and that sexual arousal can been conditioned,^{36,37} it seems plausible to attach great importance to learning mechanisms in the development of cybersex addiction. In accordance with the gratification hypothesis,²¹ learning mechanisms should lead to an association of internal (e.g., affect) and/or external (e.g., computer) cues with the reward gained by cybersex use resulting in cue reactivity and craving.²¹ Our findings are in line with research on substance and other behavioral addictions.^{38–43}

IPU reported a higher propensity for sexual excitation compared with NIPU, and a predisposition for sexual excitation, problematic sexual behavior, and psychological symptom severity predicted tendencies toward cybersex addiction within IPU. The higher propensity for sexual excitation is in line with the assumed positive reinforcement through cybersex. For males, it has been shown that sexual excitability is linked to risky sexual behaviors associated with a disregard for possible negative consequences.^{44,45} Since this is a key feature of addictive behaviors, it seems plausible to assume that a propensity for sexual excitation is a predefining individual characteristic for cybersex addiction. Other studies have found that males use cybersex for mood management.^{6,46} The finding that a psychological symptom severity covaries with cybersex addiction has also been shown previously for heterosexual males.¹⁸ Additionally, problematic sexual behavior has been shown to be associated with cybersex addiction. The utilization of cybersex to enhance mood might be understood as a risk factor contributing to cybersex addiction. Individuals who are prone to sexual excitation and use sexual arousal for emotion regulation might functionalize sexuality in general to receive reinforcement and to cope with problems or negative emotions in the short run, while negative long-term consequences are less recognized. In fact, it has been shown that sexual arousal generally interferes with decision making.^{30,47} This should be even more relevant for cybersex-addicted individuals, since craving might interfere with the anticipation of negative consequences. Our results also suggest that females' tendencies toward cybersex addiction are not related to real-life contacts. Comparable to heterosexual males,²¹

compensation for missing or unsatisfying real-life sexual contacts is not a main factor for the development of cybersex addiction.

The findings of this study contribute to the understanding of cybersex addiction in heterosexual females. For female IPU, the reaction patterns regarding sexual arousal are comparable to those in male IPU.^{18,21} These results support the gratification hypothesis as the main mechanism within the development of cybersex addiction, that is, that conditioned sexual arousal leads to cue reactivity, craving, and recurrent cybersex use within the face of negative consequences resulting from this behavior. Sexual excitation, problematic sexual behavior, and psychological symptom severity might be understood as predefining factors for cybersex addiction.

Limitations and future studies

Our findings on cybersex addiction are limited to the role of sexual arousal due to Internet pornography and not due to other cybersex applications (e.g., sexchats). Moreover, our findings are limited to adult females under the age of 30 years. In our sample, half of the females reported watching pornographic material on the Internet. Because we indicated that within the study Internet pornographic pictures were presented, a selection bias might have occurred. No conclusions can be drawn on the general proportion of cybersex use in the heterosexual female population. Future studies should replicate the findings demonstrated in our analogue sample by comparing female cybersex addicts watching Internet pornography with comparison groups of interest.

Author Disclosure Statement

No competing financial interests exist.

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