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Implicit associations in cybersex addiction: Adaption of an Implicit Association Test with pornographic pictures

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HIGHLIGHTS

- Adaption of an Implicit Association Test for cybersex addiction
- Positive relationship between implicit associations and cybersex addiction
- Findings are comparable to results from substance dependency research

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ABSTRACT

Recent studies show similarities between cybersex addiction and substance dependencies and argue to classify cybersex addiction as a behavioral addiction. In substance dependency, implicit associations are known to play a crucial role, and such implicit associations have not been studied in cybersex addiction, so far. In this experimental study, 128 heterosexual male participants completed an Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) modified with pornographic pictures. Further, problematic sexual behavior, sensitivity towards sexual excitation, tendencies towards cybersex addiction, and subjective craving due to watching pornographic pictures were assessed. Results show positive relationships between implicit associations of pornographic pictures with positive emotions and tendencies towards cybersex addiction, problematic sexual behavior, sensitivity towards sexual excitation as well as subjective craving. Moreover, a moderated regression analysis revealed that individuals who reported high subjective craving and showed positive implicit associations of pornographic pictures with positive emotions, particularly tended towards cybersex addiction. The findings suggest a potential role of positive implicit associations with pornographic pictures in the development and maintenance of cybersex addiction. Moreover, the results of the current study are comparable to findings from substance dependency research and emphasize analogies between cybersex addiction and substance dependencies or other behavioral addictions.

1. Introduction

In the last decade, dysfunctional Internet use has received growing attention (Byun et al., 2009). Several researchers argue for separating general Internet addiction from specific forms of dysfunctional Internet use (e.g. Brand, Laier, & Young, 2014; Davis, 2001; Montag et al., 2014). An addictive use of cybersex is frequently referred to as a specific type of Internet addiction (e.g. Brand, Young, & Laier, 2014; Kuss & Griffiths, 2011; Meerkerk, van den Eijnden, & Garretsen, 2006; Young, 2008). Cybersex comprises a set of different online sexual activities. According to Döring (2009), cybersex activities can be subdivided into watching pornography, enabling sexual education, visiting online sex-shops as well as initiating, offering or arranging sexual contacts on a private or professional basis. Yet, at least for men, watching pornography is assumed to be the most prominent cybersex activity (Short, Black, Smith, Wetterneck, & Wells, 2011). Until now, the phenomenology and classification of cybersex addiction are under debate, although there is growing support for classifying Internet addiction in general and cybersex addiction in specific as behavioral addiction (e.g. Green, Carnes, Carnes, & Weinmann, 2012; Griffiths, 2001; Kuss, Griffiths, Karila, & Billieux, 2014; Laier & Brand, 2014; Rosenberg, Carnes, & O'Connor, 2014; Young, 2008). Further, there is preliminary evidence for analogies between cybersex addiction and substance dependencies or other behavioral addictions: First, previous studies on cybersex addiction (Brand et al., 2011; Laier, Pawlikowski, Pekal, Schulte, & Brand, 2013) identified mechanisms underlying this phenomenon which are known to be involved in the development and maintenance of

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substance dependencies, such as cue-reactivity and craving (Drummond, 2001; Sayette et al., 2000; Skinner & Aubin, 2010; Tiffany & Wray, 2012). Moreover, Laier and Brand (2014) proposed a theory-driven cybersex addiction model, which hypothesizes similarities with substance dependencies by emphasizing the role of positive and negative reinforcement as well as specific predispositions towards sex (e.g. problematic sexual behavior, sensitivity towards sexual excitation) as vulnerability increasing factors. Secondly, the neural processing of sex- and drug-related cues is supposed to involve similar networks, such as the mesolimbic dopaminergic pathway (Georgiadis & Kringelbach, 2012) which theoretically enables the application of neurophysiological theories of addictive behaviors to cybersex addiction (e.g. Everitt & Robbins, 2005; Robinson & Berridge, 1993, 2001, 2008). Further, dual-process models of addiction (Bechara, 2005; Wiers & Stacy, 2006) argue that addictive behaviors are influenced by competing automatic (implicit) and controlled (explicit) systems, while within addictive behaviors, the controlled system is supposed to be overridden by the automatic system. In the context of cybersex addiction, such models could explain why individuals continue engaging in cybersex activities despite negative consequences. Although explicitly having negative associations towards cybersex because of already experienced negative consequences, cybersex use might be promoted by processes of implicit cognitions such as positive implicit associations with pornography. Moreover, such processes might be connected to implicitly experienced gratification (Young, 2008) or neural sensitizations (Robinson & Berridge, 1993, 2001, 2008) due to repeated cybersex use. Preliminary, this assumption is supported by Voon et al. (2014) who reported activations in the ventral striatum in individuals with problematic sexual behavior when watching pornographic pictures. The ventral striatum is a key neural correlate of cue-reactivity and craving (Noël, Brevers, & Bechara, 2013; Volkow & Baler, 2014) and these processes are supposed to be connected with implicit cognitions (Wiers & Stacy, 2006). However, such implicit associations with pornography have not been studied empirically in the context of cybersex addiction.

One way to assess implicit cognitions is the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) which has been frequently applied to investigate substance dependencies (Rooke, Hine, & Thorsteinsson, 2008) as well as behavioral addictions (Brevers et al., 2013; Yen et al., 2011; Yi & Kanetkar, 2010). The IAT is a classification task, in which participants categorize verbal or pictorial stimuli as fast as possible according to two target and to two attribute concepts. Hence, it is assumed that it is easier to respond to congruent (e.g. “flowers or positive” vs. “insects or negative”) than to incongruent concept-pairings (e.g. “flowers or negative” vs. “insects or positive”), leading to faster reaction times (RTs) in congruent trials. According to Greenwald, Nosek, and Banaji (2003), the IAT measures the “strength of automatic associations” (p. 197) with respect to the investigated concepts. The results of studies using the IAT in substance dependency research are consistent in the way that positive relationships between the relative strength of implicit associations and addiction-related measurements (e.g. cue-reactivity, craving, severity of addiction-related symptoms) were frequently reported. This applies to studies investigating a problematic use of cannabis (Beraha, Cousijn, Hermanides, Goudriaan, & Wiers, 2013) and alcohol (e.g. Ames et al., 2014; Foster, Neighbors, & Young, 2014; Hendershot, Lindgren, Liang, & Hutchison, 2012; Houben, Rothermund, & Wiers, 2009; Lindgren et al., 2013, 2015). Moreover, Rooke et al. (2008) provided evidence for the assumption that processes of implicit cognitions, and especially implicit associations, are a reliable predictor for substance use. According to Wiers and Stacy (2006), it is thereby assumed that implicit associations, which can be seen as a consequence of drug-related neural sensitizations, increase the effect of the automatic system on the controlled system. Regarding behavioral addictions, implicit associations were shown to be connected with Internet gaming addiction (Yen et al., 2011) and problematic gambling (Brevers et al., 2013; Yi & Kanetkar, 2010).

The aim of the current study was to investigate the role of implicit associations in cybersex addiction with a pictorial IAT, modified with pornographic pictures. Based on existing research in the fields of substance dependencies and behavioral addictions, it was hypothesized that implicit associations to pornographic pictures with positive emotions are correlated with tendencies towards cybersex addiction. Additionally, similar relationships should exist for subjective craving as well as other measurements assessing sexual predispositions, such as general problematic behavior or sensitivity towards sexual arousal. Further, since previous studies could show that subjective craving promoted symptoms of cybersex addiction (Laier, Pawlikowski, et al., 2013), we hypothesized that an interaction with positive implicit associations should accumulate the severity of tendencies towards cybersex addiction, which is in accordance to the cybersex addiction model by Laier and Brand (2014).

2. Materials and method

2.1. Participants

A total of 128 heterosexual males participated in the study (M_{age} = 23.88 years, SD = 4.01). Participants reported that their age of first cybersex use was 15.51 (SD = 3.97) years. Additionally, cybersex sites were used 4.63 (SD = 3.90) times per week, while individuals spent averagely M_{time} = 24.56 (SD = 21.64) minutes per visit. Participation was allowed at legal age of 18 years. Prior to the investigation, it was stated that explicit pornographic material would be shown. Individuals were recruited through local advertisements at the University of Duisburg-Essen (Germany) and online platforms. Students could collect credits, whereas non-students were paid 10€ for participation. All participants gave written informed consent prior to the investigation and were fully debriefed at the end of the study. A local ethics committee approved the current study.

2.2. Measures

2.2.1. Pornographic picture rating

After instruction, participants watched and rated 50 pornographic pictures regarding sexual arousal ranging from 1 (= *not sexually arousing*) to 5 (= *highly sexually arousing*). Additionally, viewing times were recorded. According to Imhoff et al. (2010) it was thereby assumed that preferred pornographic pictures would be watched longer than non-preferred pornographic pictures. The 50 picture set consisted of 10 different cybersex categories: heterosexual sex (vaginal, anal sex, cunnilingus, and fellatio), homosexual sex (anal and oral sex between two men, tribadism, and oral sex between two women) as well as single masturbating men and women. Every category included 5 pornographic pictures showing sexually explicit material without fetish relevant scenes. The internal consistency of the sexual arousal ratings (Cronbach's α = .956) as well as the viewing times (Cronbach's α = .940) were very good. As dependent variables, mean values of the sexual arousal ratings and the corresponding viewing times were used while separating heterosexual from homosexual stimuli. The 50 pornographic stimuli were taken from a pre-existing database containing an overall amount of 100 pornographic pictures, which were validated and used in several previous studies (e.g. Laier, Pawlikowski, & Brand, 2014; Laier, Pawlikowski, et al., 2013; Laier, Schulte, & Brand, 2013).

Further, as reported by Laier, Schulte, et al. (2013), sexual arousal and the need to masturbate were assessed before (*t1*) and after (*t2*) the pornographic picture rating on a scale ranging from 0 (= *not sexually aroused/no need to masturbate*) to 100 (= *very sexually aroused/great need to masturbate*). By subtracting *t1* from *t2* measurement Δ-scores characterizing a relative increase or decrease of sexual arousal (craving Δ sexual arousal) and need to masturbate