DOCTORAL DISSERTATION

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PREDICTORS AND CONSEQUENCES OF COMPULSIVE SEXUAL BEHAVIOR DISORDER - RESULTS FROM CROSS-CULTURAL AND LONGITUDINAL STUDIES

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List of Abbreviations

α	Cronbach's alpha
AA	Alcoholics Anonymous
ACT	Acceptance and Commitment Therapy
ADHD	Attention-Deficit Hyperactivity Disorder
CBOSBS	Cognitive and Behavioral Outcomes of Sexual Behavior Scale
CBT	Cognitive Behavioral Therapy
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Confidence Interval
CR	Composite Reliability
CSB	Compulsive Sexual Behavior
CSBD	Compulsive Sexual Behavior Disorder
CSBD-19	19-items Compulsive Sexual Behavior Disorder scale
BSMAS	Bergen Social Media Addiction Scale
DF	Degree of Freedom
DSM-III-R	Third Edition of the Diagnostic and Statistical Manual of Mental Disorders - Revised
DSM-5	Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders
EFA	Exploratory Factor Analysis
EMA	Ecological Momentary Assessment
HBCS	Hypersexual Behavior Consequences Scale
HBI	Hypersexual Behavior Inventory
HD	Hypersexual Disorder
HD-DCI	Hypersexual Disorder Diagnostic Clinical Interview
HPA	Hypothalamic-Pituitary-Adreal Axis

ICD-10	Tenth Edition of the International Statistical Classification of Diseases and Related Health Problems
ICD-11	Eleventh Edition of the International Statistical Classification of Diseases and Related Health Problems
ICT	Information and Communication Technology
IGDT-10	Internet Gaming Disorder Test-10
INDUC-2R	Inventory of Drug Use Consequences - Revised
I-PACE	Interaction of Person-Affect-Cognition-Execution
LGCM	Latent Growth Curve Model
M	Mean
MLR	Robust Maximum Likelihood Estimator
OCD	Obsessive-Compulsive Disorder
OSF	Open Science Framework
PGSI	Problem Gambling Severity Index
PPCS	Problematic Pornography Consumption Scale
PPU	Problematic Pornography Use
PTSD	Post-Traumatic Stress Disorder
RCT	Randomized Control Trial
RMSEA	Root Mean Square Error of Approximation
SASH	Society for the Advancement of Sexual Health
SD	Standard Deviation
SDT	Self-Determination Theory
SE	Standard Error
SEM	Structural Equation Modeling
SexMS	Sexual Motivation Scale
STI	Sexually Transmitted Infection
TLI	Tucker–Lewis Index
WEIRD	Western, Educated, Industrialized, Rich and Democratic (population)
WLSMV	Weighted Mean- and Variance-Adjusted Weighted Least Squares Estimator

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List of Publications that the Dissertation is Based Upon

Bőthe, B**., Koós, M**., & Demetrovics, Z. (2022). Contradicting classification, nomenclature, and diagnostic criteria of Compulsive Sexual Behavior Disorder (CSBD) and future directions: Commentary to the debate: "Behavioral addictions in the ICD-11." *Journal of Behavioral Addictions, 11*(2), 204–209. https://doi.org/10.1556/2006.2022.00030

Koós, M., Fuss, J., Klein, V., Demetrovics, Z., & Bőthe, B. (2022). Sexual Motivations Underlying Compulsive Sexual Behavior in women and Men From Germany and Hungary. *The Journal of Sexual Medicine, 19*(2), 170–181. https://doi.org/10.1016/j.jsxm.2021.11.005

Koós, M., Bőthe, B., Orosz, G., Potenza, M. N., Reid, R. C., & Demetrovics, Z. (2021). The negative consequences of hypersexuality: Revisiting the factor structure of the Hypersexual Behavior Consequences Scale and its correlates in a large, non-clinical sample. *Addictive Behaviors Reports,* 13, 100321. https://doi.org/10.1016/j.abrep.2020.100321

Koós, M., Demetrovics, Z., Griffiths, M. D., & Bőthe, B. (2022). No Significant Changes in Addictive and Problematic Behaviors During the COVID-19 Pandemic and Related Lockdowns: A Three-Wave Longitudinal Study. *Frontiers in Psychology,* 13, 837315. https://doi.org/10.3389/fpsyg.2022.837315

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I. Introduction

1. History of Compulsive sexual behavior disorder (CSBD)

Compulsive sexual behavior (CSB) took a long journey to arrive where it is now, an independent category in the 11th edition of the *International Classification of Diseases* (ICD-11) (World Health Organization, 2022). The concept of excessive sexual behavior has a long history, starting in the nineteenth century, with separate terms by genders, "*satyriasis*" and "*nymphomania*", originating from Greek mythological figures (Briken, 2020), and has been described by several different names, including *hyperphilia, erotomania, promiscuity, Don Juanism, Don Juanitaism, paraphilia-related disorder, sex addiction, sexual compulsivity, sexual impulsivity* and *hypersexuality* (Coleman, 2011; Kafka, 2000). Besides nomenclature, there is a lack of certainty regarding its nosology, predisposition, prognosis, and treatment. Scientific description of the disorder was first published in 1983, in a book of clinical descriptions and treatment methods, called *Out of the Shadows: Understanding Sexual Addiction* (Carnes, 1983). Systematic and empirical examination of the subject has taken off after.

It first appeared in the revised third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R) (American Psychiatric Association, 1987), under the diagnosis *Sexual Disorders, Not Otherwise Specified,* where the description "*distress about a pattern of repeated sexual relationships involving a succession of lovers who are experienced by the individual only as things to be used*" was used. Even so, it was completely omitted from the fourth edition in 1994, but the category of "excessive sexual drive" was included a year before in the tenth revision of the ICD (ICD-10), under sexual dysfunctions – as an opposite of hypoactive sexual disorder, or on its previous name, Lack or Loss of Sexual Desire (World Health Organization, 1993). In the DSM-5 (American Psychiatric Association, 2013) there was an attempt to include Hypersexual Disorder (HD) (Kafka, 2010) under behavioral addictions, but it was declined, for the lack of comprehensive scientific studies, concern regarding cultural cofounds, and for the possibility that the diagnosis could be misused in legal settings (Kafka, 2014). This proposal motivated research in the area. Since 2010, the number of studies about out-of-control sexual behavior published shows a steep elevation – in 2010, the number was only ten, while in 2020, it reached 70 (Grubbs, Hoagland, et al., 2020). As a result, a decade later Compulsive Sexual Behavior Disorder (CSBD) was listed

under the category of impulse-control disorders, next to Pyromania, Kleptomania, and Intermittent Explosive Disorder (World Health Organization, 2022).

2. Definition and Conceptualization of CSBD

By definition, CSBD (World Health Organization, 2022) is characterized by reoccurring and intense sexual thoughts, urges, and - due to diminished control over them – sexual behaviors. Sexuality becomes a central focus of one's life, resulting in neglected personal life, relationships, responsibilities, health, and other important areas of functioning. There is a pattern of failed attempts to try to control or reduce these behaviors, and little or no satisfaction is gained from them anymore. These patterns of thoughts, urges, and behaviors continue for an extended period of time (over 6 months), and cause significant distress to the person, experiencing several negative consequences of them (e.g., impairment in personal, social, educational, occupational or other areas of functioning). The criteria defining it is largely overlapping with Kafka's proposal, initially with two main differences: the criteria that sexual behavior occurs as a response to dysphoric mood states, like anxiety, depression or boredom was only listed in the HD diagnosis, while the lack of pleasure gained from the behavior appeared only in the CSBD diagnosis (Gola et al., 2020). The former specification was eventually included in the additional clinical features of CSBD, suggesting considering emotional and behavioral cues as part of the treatment planning (World Health Organization, 2022).

Exclusions are specified that CSBD symptoms cannot be better explained by another mental disorder (e.g., manic state, substance use, or medication), and there is a great effort to distance CSBD symptoms from Paraphilic Disorders (PDs). Since the characteristics of the two disorders are similar (persistent pattern of failure to control intense repetitive sexual urges, resulting in sexual behavior that causes marked distress or impairment in functioning), except the object of these urges are different (in case of CSBD, consenting adults, while in case of PD individuals who are unable to consent due to their age, status etc.). Consequently, if both disorders' diagnostic criteria are met, both of the diagnosis can be assigned (World Health Organization, 2022). Besides sexual behavior with consenting others, masturbation, pornography consumption, cybersex (sex via the internet) and telephone sex are listed as the main repetitive sexual behaviors of CSBD. A fairly new terminology of moral incongruence was also specified in the diagnosis as an exclusion criterion. Those who feel that their sexual behavior and their moral judgment are not aligned might feel that

they have a problem with controlling their sexual needs and urges, due to this discrepancy (Grubbs & Perry, 2019). The current diagnostic criteria is listed in chapter 6 of the ICD-11, in the category of mental, behavioral and neurodevelopmental disorders, and more specifically, under the impulse control disorders, instead of under the sexual dysfunctions or disorders due to addictive behaviors (Grant et al., 2014).

Listing CSBD under the impulse-control disorders however, did not close the ongoing debate of its conceptualization (Fuss, Lemay, et al., 2019). One would assume that this classification would put the emphasis on the overall diminished control individuals feel over their sexual behavior, and the decisions made acting on an impulsive urge – just like as in other impulse-control disorders, like kleptomania or intermittent explosive disorder. Yet in the diagnostic description, compulsive features are highlighted (e.g., repetitive acts, continuity despite gaining little or no satisfaction from it). Furthermore, intrusive impulses are not characteristics exclusively to impulse-control disorders, but to addictive or compulsive behaviors too (Kraus et al., 2016). Not to mention, that CSBD clearly has a negative impact on one's sexual wellbeing and sexual health (e.g., difficulties to maintain emotionally and physically healthy and satisfactory sexual relationships), therefore listing it under the "Conditions related to sexual health' chapter of ICD-11 would have been another, reasonable option (Glica et al., 2023; Lew-Starowicz & Coleman, 2022). As we can observe, several contradictions are present in the denomination, classification, and diagnostic features of CSBD (Bőthe et al., 2022; Gola et al., 2020; Sassover & Weinstein, 2020). To understand the root of these inconsistencies, different models explaining CSBD is discussed in the following sections.

3. Background Theories

3.1. Non-Pathological Models

According to the non-pathological, sexual health models, compulsive sexual behavior has been conceptualized as an extreme on a normal spectrum, rather than an independent clinical disorder (Vigorito & Braun-Harvey, 2017; Winters et al., 2010). The core of the critique is that pathological models of CSBD do not differentiate properly between patterns of extreme sexual behavior characteristics of a healthy individual, and those who might be disordered (Moser, 1993), as most of the symptoms (e.g. persistent pattern of sexual thoughts, urges and acting on them, feeling shameful of one's own sexual behavior, impairment in social or occupational life) can be a characteristic of a healthy, sexually active individual, with high sexual drive (Winters et al., 2010).

Considering that the subjective feeling and the manifestation of sexual drive are not solely dependent on biological factors, but embedded in motivational, psychological, social and cultural context (Levine, 2003), labeling someone pathological who is at an extreme end of the spectrum, might be biased based on cultural norms and standards. In other words, high sexual desire might not be necessarily problematic in itself. Although, the distress caused by the challenges of managing the high levels of desire and nonconforming sexual behaviors, and by the moral judgments of the frequent sexual behaviors in our society can have negative impact on one's life (Grubbs et al., 2019; Winters et al., 2010). In this sense, excessive or out-of-control sexual behavior can be considered as a sexual health problem that might root in the sociocultural differences on what should be considered normal in certain cultures (Vigorito & Braun-Harvey, 2017).

3.2. Impulse Control Disorder

Impulse Control Disorders can be characterized by the pattern of failure to resist impulses, drives or urges to perform a behavior that has rewarding value for the individual on the short term, despite the long term negative consequences and risks (Grant et al., 2014). Thus, this classification is putting the emphasis on impaired self-control and conditioning through positive reinforcement (Kraus et al., 2018). Sexual risk-taking and sexual sensation seeking are often examined in relation to CSBD, focusing on health-risks as in sexually-transmitted infections (STIs), unsafe sexual practices, or having sex under the influence of alcohol or drugs (Yeagley et al., 2014; Yoon et al., 2016), which both presume impulsive decision making and not weighing the future consequences of the behavior (Donohew et al., 2000). Impulsivity as a personality trait has been studied in relation to CSBD as well, resulting in small-to-moderate, positive associations (Bőthe et al., 2019; Rousseau et al., 2020).

3.3. Obsessive-Compulsive Spectrum

When a given behavior is performed repetitively in a habitual or stereotyped fashion, either according to rigid rules or as a means to avoid perceived negative consequences, we identify compulsion (Lochner et al., 2014). Therefore, the compulsivity spectrum differs qualitatively from the impulsivity spectrum, since the former is reinforced by negative (i.e., distress resulting from breaking the rules, avoiding perceived negative consequences), while the latter is reinforced by positive outcomes (i.e., gaining temporary pleasure). Compulsivity has been associated with

excessive sexual behaviors, though the effect size of the association was small (Bőthe et al., 2019). Furthermore, gaining little or no satisfaction from the sexual acts has been listed in the ICD-11 diagnostic criteria, implying that the behavior is more rigid and habitual, than pleasure-seeking. Additionally, there was an effort to merge the impulse control and the compulsive models, taking into consideration different pathways to develop CSBD. Therefore, the *Impulsive/Compulsive Sexual Behavior* model of Coleman (Coleman, 2011) attempts to incorporate both theories to explain CSBD. It accounts for the possibility that some people reporting problems with excessive sexual behavior may struggle more with impulse control, while others may struggle more with compulsivity-related issues in relation to their sexuality.

3.4. Addiction Theory

According to the Sex Addiction concept, the root of the disorder is in connection with the "wounded sense of self" (Goodman, 2001; Walton et al., 2017). Therefore , the self-medication theory can be applied, where sex has a copying function (Khantzian, 1997). The repeated pattern of out-of-control sexual behavior is maintained by two main pathways: by the aforementioned pain relief pathway, similarly as in the compulsive model, and by pleasure-seeking pathway, as in the impulse-control model. Taken together, the Sex Addiction theory incorporates cognitive biases, preoccupation, triggers, and rituals into the cycle. Traditionally, this conceptualization was also characterized by disordered attachment styles, comorbid mood disorders, family history of addiction, and childhood trauma (i.e., abuse, neglect, or sexual abuse) (Bancroft & Vukadinovic, 2004; Walton et al., 2017). Although some of these attributes got empirical verification, like the high comorbidity of CSBD with depression and anxiety (Weinandy et al., 2022; Schultz et al., 2014), or the positive association with insecure attachment style (Gilliland et al., 2015; Labadie et al., 2018; Meyer et al., 2017; Miner et al., 2016), others were not completely stable through studies, like the connection with childhood trauma (Slavin, Scoglio, et al., 2020), which differences might derive from different pathways that could lead to CSBD.

3.5. Dual Control Model

Exhibitory and inhibitory functions were attributed to most brain functions. To conceptualize and explain individual variability in sexual arousal, behaviors, and responses, the two systems were introduced in this context as well (Bancroft et al., 2009). The model suggests that some individuals

are prone to excitatory, others to inhibitory system domination, and in case of extreme dysregulation, the imbalance might result in dysfunctions and pathological conditions (Rettenberger et al., 2016). In other words, those individuals who display inhibitory dominance might be at risk for hypoactive sexual desire, sexual arousal, or other related disorders and sexual dysfunctions, while those with excitatory system dominance, might be at risk for out-of-control sexual behaviors, like CSBD (Rettenberger et al., 2016).

3.6. Integrated Model of Compulsive Sexual Behavior

Combining the notions of the *Dual Control Model* and the *Sexual Tipping Point Model* (Perelman, 2009), Birken published the *Integrated Model of Compulsive Sexual Behavior*, to create an applicable approach for diagnosis and treatment (Briken, 2020). Both of these models explain sexual behavior by the interaction of two largely independent systems (i.e., excitatory and inhibitory effects), where sexual arousal (i.e., turn on) or the opposite of it (i.e., turn off) are results of one system outweighing the other. While the Dual Control model explains this with physiological and neurobiological systems, the Sexual Tipping Point model does it by incorporating psychological and socio-contextual effects as well. Therefore, according to the Integrated Model, sexual responses are embedded in biological (e.g., genetic vulnerability), psychological (e.g., coping mechanisms) and sociocultural (e.g., religious beliefs) factors (Briken, 2020). In case of CSBD, there is an imbalance between the systems, when the excitatory effects clearly exceeding and dominating the inhibitory ones.

4. Epidemiology

Due to the differences in the conceptualization and assessment of CSBD, it is challenging to estimate the prevalence of CSBD. Nationally representative studies are even rarer, only a handful fulfilled this criterion. A study conducted in the USA found that 10.3% of the men and 7% of the women reported difficulties with controlling their sexual urges and behaviors, resulting in clinically significant levels of distress and impairment on different areas of functioning a (Dickenson et al., 2018). In Germany, 4.9% of men and 3% of women reached the cut-off criteria of the ICD-11 diagnosis (Briken et al., 2022). In a representative study in Hungary, 7% of men, and 5.5% of women were classified to have high-risk for CSBD, based on the results from a scale developed in accordance with the ICD-11 diagnostic guidelines (Bőthe et al., 2020). Lastly, according to the

newest representative study conducted in Poland, 6.25% of men and 3.17% of women reached eligibility for CSBD (Lewczuk et al., 2022). These results should be interpreted with caution however, since all of them were conducted in western, developed countries, where economic and cultural similarities are undeniable. The critique of mainly focusing on WEIRD samples (i.e., Western, Educated, Industrialized, Rich and Democratic) often formulated against sexuality research in the past years (Bőthe et al., 2021; Klein et al., 2021).

5. Assessment

As of now, clinical interviews and self-report scales are the tools to assess CSBD. More than fifteen different scales were developed over the last three decades to assess out-of-control sexual behaviors, working with the – at the time of the development – newest definitions. Before the ICD-11 was published, Kafka's proposal of the Hypersexual Disorder served as basis, for the Hypersexual Disorder Inventory (HBI) as well (Reid et al., 2011). For a time, the HBI appeared to be the most reliable and valid questionnaire (Bőthe et al., 2018; Klein et al., 2014; Montgomery-Graham, 2017). To date, only one self-report scale assesses CSBD in accordance with the ICD-11 diagnostic criteria, the Compulsive Sexual Behavior Disorder Scale (CSBD-19) (Bőthe et al., 2020). In the present investigation, the HBI and he CSBD-19 were used. For the content of the scales, see Table 1.1.

The present scales are not without deficiencies either. None of them specifies what kind of behaviors CSBD manifests in the individual's life (e.g., "hook-ups", solicitation of sex-workers), nor can they differentiate between that the subjective feeling of being out of control, can originate from different pathways. In other words, what is excessive and problematic for one person, is not necessarily for another. There is a growing body of evidence that some individuals who report problems controlling their sexual urges and desires, and fail to do so, might not show other similarities with the CSBD diagnosis, but have a strong moral judgment towards sexual urges, desires, behaviors or pornography use, and since their own actions are not aligned with their judgment, they experience their sexuality as problematic and out-of-control (Grubbs et al., 2019).

Table 1.1. Content and Example Items of the Hypersexual Behavior Inventory and the Compulsive Sexual Behavior Disorder Scale.

Characteristics	HBI	CSBD-19

Loss of control	"My sexual behavior controls my life."	"I could not control my sexual cravings and desires".
Failed attempts to reduce	"Even though I promised myself I would not repeat a sexual behavior, I find myself returning to it over and over again."	"Trying to reduce the amount of sex I had almost never worked."
Impairment on important life domains	"My sexual thoughts and fantasies distract me from accomplishing important tasks."	"My sexual activities interfered with my work and/or education".
Other negative consequences	"I sacrifice things I really want in life in order to be sexual."	"My sexual urges and impulses changed me in a negative way."
Distress	-	-
Salience	-	"Sex has been the most important thing in my life."
Little or no satisfaction	-	"I had sex even when I did not enjoy it anymore."
Response to negative emotional states	"I turn to sexual activities when I experience unpleasant feelings (e.g., frustration, sadness, anger)."	-
Response to stress	"Doing something sexual helps me cope with stress."	-
Impulsive decision making	"I engage in sexual activities that I know I will later regret."	"Even though my sexual behavior was irresponsible and reckless, I found it difficult to stop.
Moral judgement	"Sexually, I behave in ways I think are wrong"	-

6. Aetiology

As with any other mental health problems, the causes and potential predictors of CSBD needs to be explored in a multifactorial approach (Briken, 2020). Human sexuality, and thus sexuality-related problems are diverse and specific for the individuals. Therefore, one specific cause of the problem cannot be determined. However, since – as it was touched on this subject previously – the conceptualization of CSBD is still under debate, and varies in empirical studies, reliable and reproducible causes and correlates are difficult to assess (Briken, 2020).

To this date, there is very little known of the potential physiological predictors of CSBD, with only a handful of studies exploring brain pathways, hormonal and neurotransmitter dysregulations in

association with CSBD (Kowalewska et al., 2018; Love et al., 2015; Turner et al., 2022). Some of these evidence suggest imbalances in the dopaminergic and serotonergic systems, which are key neurotransmitters in the development of sexual response and addictive behaviors, because of their role in the reward circuitry, and therefore in positive reinforcement (Bradford, 2001; Briken & Basdekis-Jozsa, 2010; Kühn & Gallinat, 2016). Additionally, differences in the amygdala, frontal lobe, hippocampus, hypothalamus and other brain regions, that are involved in the reward processing system were explored (Kühn & Gallinat, 2016). Dysregulations on the hypothalamic-pituitary-adreal (HPA) axis were examined as well as in other addiction problems. Higher tendencies of non-supression were found in CSBD patients than in the healthy control group, suggesting hyperactivity on the HPA axis (Chatzittofis et al., 2016). In another study, a dysregulation in stress response was found (i.e., low levels of methylation in the corticotropin-releasing hormone gene region) (Jokinen et al., 2017). These preliminary findings are suggesting biological differences in those brain pathways, that have a role in the regulation of sexual behavior. Regarding psychological predictors, non-secure attachment styles were examined in association with childhood sexual trauma and CSBD, suggesting that attachment insecurity might play a role in CSBD (Gilliland et al., 2015; Labadie et al., 2018; Meyer et al., 2017; Miner et al., 2016). Moreover, copying with unpleasant mental states as in self-medicating with sexual activities are emphasized through the relevant literature (Lew-Starowicz et al., 2020; Werner et al., 2018). The common symptom of emotional regulation difficulties and neuroticism might explain the high comorbidity with other mood disorders, like depression or anxiety (Weinandy et al., 2022; Schultz et al., 2014). Based on these findings, with CSBD it is crucial to assess the role sex has in the individual's life, therefore exploring the motivational background of it (Koós, Fuss, et al., 2022). Several personality traits has been connected to CSBD as well, trait impulsivity and compulsivity being the most common (Bőthe et al., 2019; Engel et al., 2019; Reid et al., 2015, 2014).

7. Comorbidities

As mentioned before, CSBD shows high comorbidity with mood disorders like depression (Schultz et al., 2014) and anxiety (Weinandy et al., 2022). These associations are not surprising, since both anxiety and depression are mentioned as conditions CSBD might be a response to (*"... engage in sexual behavior in response to feelings of depression, anxiety (...) or other negative affective states."*) (World Health Organization, 2018). Other psychiatric disorders also demonstrated

moderate associations, like obsessive-compulsive disorder (OCD), where lifetime prevalence of CSBD among patients with current OCD reached 5.6% in a recent study (Fuss, Briken, et al., 2019). The comorbidity with attention-deficit hyperactivity disorder (ADHD) were recently drawn into attention, with the moderate association between the symptoms of CSBD (Bőthe et al., 2019), and similar, or stronger associations with problematic pornography use (Niazof et al., 2019; Zhang et al., 2022). In connection with the research regarding childhood sexual trauma, post-traumatic stress syndrome (PTSD) was also connected to CSBD symptoms (Blain et al., 2012; Ciocca et al., 2021; Slavin, Blycker, et al., 2020). Alcohol and substance use disorders had demonstrated positive, small to moderate associations as well (Brem et al., 2017, 2018; Štulhofer et al., 2016). Naturally, other addictive behaviors, like gambling disorder, compulsive buying or internet gaming disorder had been researched thoroughly as well, and consistently demonstrated similar comorbidity with CSBD (Koós, Demetrovics, et al., 2022; Lochner et al., 005; Lochner et al., 2014; Müller et al., 2018). There is a great body of studies assessing different paraphilic disorders (e.g., voyeurism, pedophilia) in connection with CSBD, presenting strong associations (Kafka & Hennen, 2002; Krueger et al., 2017). Although, this co-occurrence might be more complex, than two distinct disorders showing comorbidity with each other, because they share some core symptomology: both disorders are characterized by reoccurring patterns of sexual thoughts, fantasies or behaviors; these fantasies being the central focus of the individual's life; having negative social, occupational or legal consequences; cause significant distress; and the subjective feeling of being out-of-control (World Health Organization, 2022). For these similarities in the criteria, distinctively measuring them is challenging, therefore, the results should be interpreted with caution.

There are special conditions, when compulsive-sexual behavior is a symptom of a disorder, rather than a comorbid disorder in itself. In manic or hypomanic episodes, as part of bipolar disorder, compulsive sexual behavior is one of the most frequent symptom (Van Meter et al., 2016; Varo et al., 2019). In neuropsychiatric problems, like frontal brain injuries or temporal lobe leisons, elevated sex drive, and therefore out-of-control sexual behavior can occur (Kühn & Gallinat, 2016; Turner et al., 2015). Certain medication or substances that affect the reward (e.g., dopaminergic) system, can cause compulsive sexual behavior as a side-effect. Medication like L-dopa, which is mainly used for Parkinson disease or dystonia (Moore et al., 2014; Nakum & Cavanna, 2016), has this effect, as well as methamphetamine use (Carrico et al., 2012; Semple et al., 2006). In these

cases, the diagnosis of CSBD is not justified, since the psychopathology could be better explained with another clinical disorder (Lew-Starowicz & Coleman, 2022).

8. Negative Consequences

Negative outcomes of CSBD are listed in the diagnostic description of the ICD-11 (World Health Organization, 2022), such as impairment in occupational, social or other important domains of functioning. Going into more detail, CSBD patients report a wide range of problems, caused by their sexual behavior. Regarding interpersonal consequences, ending romantic relationships, emotionally hurting someone close to them, losing respect of their loved ones, conflicts with their family or friends are the most frequently reported adverse consequences (Muench et al., 2007; Reid et al., 2012). However, financial problems, sacrificing goals that are important to them, even losing employment or having legal problems are not uncommon either (Koós et al., 2021; Muench et al., 2007; Reid et al., 2012). As in case of many mental disorders, individuals with CSBD often feel isolated and ashamed (Fernandez et al., 2021; Giugliano, 2006)., especially since moral judgment around sexual behavior is strong in most cultures (Grubbs, Kraus, et al., 2020). Apart from psychological problems, out-of-control sexual behavior can result in serious physiological consequences, such as in an elevated risk of STIs (Muench et al., 2007; Reid et al., 2011).

9. Gender- and sexual orientation-based differences

Despite the prevalence of CSBD is much higher in men, that is, representative studies report close to twice as high rate in men than in women (Bőthe et al., 2020; Briken et al., 2022; Dickenson et al., 2018), the core and peripherical symptoms do not seem to differ significantly between genders (Werner et al., 2018). The majority of the CSBD-related studies were conducted on men, sometimes more narrowly, on men who have sex with men (Dodge et al., 2008; Grov et al., 2010; Hart et al., 2021; O'Leary et al., 2005), and thus, there are relatively few studies examining women to this date (Baranowski et al., 2019; Klein et al., 2014). Overall, women report lower CSBD symptom severity than men, and less frequent sexual behaviors, including pornography use (Kowalewska et al., 2020). Concerning sexual orientation, being an LGBTIQ+ (i.e., lesbian, gay, bisexual, transgender, intersex, queer/questioning, asexual and many other terms, such as non-binary and pansexual) man can be a risk factor for developing and maintaining CSBD (Bőthe et al., 2018; Langstrom & Hanson, 2006). In general, men, and more specifically, sexual minority men report higher rates of

sexual behavior, masturbation, and pornography consumption, than women, and sexual minority women (Bőthe et al., 2018; Kowalewska et al., 2020). Although this would not conclude in itself, that they are more prone to developing CSBD, but based on prevalence data, twice as many men reach at-risk levels for CSBD, than women (Bőthe et al., 2020; Briken et al., 2022; Dickenson et al., 2018; Lewczuk et al., 2022).

10. Aims of the dissertation and overview of the investigation

To summarize, there are still several gaps in the scientific literature about the conceptualization, predictors, risk factors, potential negative outcomes, or course of CSBD (Gola et al., 2020; Grubbs, Hoagland, et al., 2020; Kraus et al., 2016; Sassover & Weinstein, 2020). Although there is a rapidly growing number of studies in the subject, most of them are cross-sectional, mono-cultural, conducted on small populational samples, using conceptualizations and measurement tools that do not meet the newest diagnostic criteria of CSBD (Grubbs, Hoagland, et al., 2020). Therefore, responding to recent calls from the field of CSBD research (Antons & Brand, 2021; Brand et al., 2020; Grubbs, Hoagland, et al., 2020; Kraus et al., 2016; Lew-Starowicz & Coleman, 2022), the aims of the present dissertation were to systematically examine the following questions, using diverse samples, rigorous methods, high-quality measurement tools and empirically supported theories. The first study (Study 1) was a theoretical commentary, reflecting on the inconsistency between the nomenclature, the classification, and the conceptualization of CSBD, also covering the subject of impulsivity, compulsivity, their potential role in CSBD, and the practical and clinical impact the classification might have (Gola et al., 2020; Sassover & Weinstein, 2020). In the second study (Study 2), we examined sexual motivations as potential predictors of CSBD on two large, non-clinical adult samples from Hungary and Germany. The model was conducted on four independent samples, considering gender as well (i.e., Hungarian men, Hungarian women, German men, German women), and assessed comparability between those subsamples. Therefore, the generalizability of the model was assessed across cultures and genders. In the third study (Study 3), the potential negative consequences of CSBD were assessed in a big non-clinical adult sample. As part of the project, the Hypersexual Behavior Consequences scale (HBCS; Reid et al., 2012) was translated and adapted into Hungarian, and its factor structure and reliability were assessed. Furthermore, measurement properties of the scale were examined via different gender and sexual orientation-based groups to ensure the reliable comparability of these groups. The last study of the

present dissertation (Study 4) aimed to examine the temporal stability of CSBD in a moderately large populational sample and compare it to other out-of-control behaviors (i.e., problematic social media use, internet gaming disorder, gambling disorder and problematic pornography use) during different stages of the COVID-19 outbreak. The longitudinal design also assisted to answer the concerns regarding the potential harmful effects of the nationwide lockdowns, especially concerning addictive behaviors (Awan et al., 2021; Mestre-Bach et al., 2020; Singh et al., 2020). In sum, these four studies of the present dissertation provide an overview on the current state of CSBD, starting from theoretical concerns and insights on CSBD, through predictors and outcomes, and finally, its course over time.

Table 1.2. Characteristics and brief overview of the studies presented in the dissertation.

	Empirical/ Theoretical	Sample(s)	Methods	Measurement tool for CSBD	Covariates	Research aims
Study 1.	Theoretical	-	-	-	-	Reflecting on the contradictions between the current classification, nomenclature, and diagnostic criteria of CSBD, and their potential outcomes in research and clinical settings.
Study 2.	Empirical	Hungarian and German community samples (N = 9814).	Cross-sectional, cross-cultural survey design	CSBD-19 (Bőthe et al., 2020)	Sexual motivations	Examining the associations between sexual motivations and compulsive sexual behavior and examining potential gender differences in these associations. Additionally, comparing the empirical support this study could provide for the most popular theoretical models explaining CSBD.
Study 3.	Empirical	Community sample (N = 16935)	Cross-sectional survey study	HBI (Reid et al., 2011)*	Negative consequences of CSBD	Translating and adapting the Hypersexual Behavior Consequence Scale (HBCS) into Hungarian, testing its validity, reliability, and factor structure across genders and sexual orientations, and examining its association with compulsive sexual behavior.
Study 4.	Empirical	Community sample (N_{T1} = 1747; N_{T2} = 656; N_{T3} = 411)	Longitudinal survey study	CSBD-19 (Bőthe et al., 2020)	Problematic social media use, internet gaming disorder, gambling disorder and problematic pornography use	Assessing longitudinal changes in addictive and problematic behaviors (e.g., CSBD) over time during the COVID-19 pandemic.

Note. CSBD = compulsive sexual behavior disorder. * In the earliest empirical study, the HBI was used to assess CSBD, because the ICD-11 diagnostics were published after the data collection was conducted.

11. References of the Introduction

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II. Contradicting Classification, Nomenclature, And Diagnostic Criteria Of Compulsive Sexual Behavior Disorder And Future Directions

Commentary on what should be included in the criteria for compulsive sexual behavior disorder? (Gola et al., 2020) and should compulsive sexual behavior (CSB) be considered as a behavioral addiction? A debate paper presenting the opposing view (Sassover and Weinstein, 2020)[1]

Abstract

Building on the conclusions of the debate papers by Gola et al., 2020 and Sassover & Weinstein, 2020, the present commentary further addressed the contradictions between the current classification, nomenclature, and diagnostic criteria of Compulsive Sexual Behavior Disorder (CSBD) with elaborating on the potential roles impulsivity and compulsivity may play in CSBD, and how these characteristics may relate to addictive behaviors in particular. Moreover, it shortly discussed how the classification of CSBD might impact research and clinical practice and proposed potential future research directions that may help to reach a consensus on the classification and core symptoms of CSBD.

[1] Bőthe, B**., Koós, M**., & Demetrovics, Z. (2022). Contradicting classification, nomenclature, and diagnostic criteria of Compulsive Sexual Behavior Disorder (CSBD) and future directions: Commentary to the debate: "Behavioral addictions in the ICD-11." *Journal of Behavioral Addictions, 11*(2), 204–209. https://doi.org/10.1556/2006.2022.00030

The debate papers by Gola et al., 2020 and Sassover & Weinstein, 2020 discuss important questions about the conceptualization and diagnostic criteria of Compulsive Sexual Behavior Disorder (CSBD). Both papers mention that impulsivity and compulsivity may play important roles in CSBD, and discuss the current classification and diagnostic criteria of CSBD included in the eleventh edition of the *International Classification of Diseases* (ICD-11) (World Health Organization, 2019). In this commentary, we (1) reflect on the contradictions between the current classification, nomenclature, and diagnostic criteria of CSBD; (2) elaborate on the potential roles impulsivity and compulsivity may play in CSBD and how these characteristics may relate to addictive behaviors in particular; and (3) shortly discuss how CSBD's classification may impact research and clinical practice with suggesting potential future research directions helping to address the long-standing debate on the classification and symptomatology of CSBD (Bőthe, Tóth-Király, et al., 2019; Grubbs et al., 2020; Kor et al., 2013; Kraus et al., 2016; Potenza et al., 2017; Prause et al., 2017).

1. Contradictions in the Classification, Nomenclature, and Diagnostic Criteria of CSBD in ICD-11

CSBD is currently included in the Impulse Control Disorders category in ICD-11. Therefore, the general description of Impulse Control Disorders should apply to CSBD, which includes a criterion that *"repeated failure to resist an impulse, drive, or urge to perform an act that is rewarding to the person"* should be present in these disorders, suggesting that sexuality should be rewarding for individuals with CSBD (World Health Organization, 2019). However, when we take a closer look at the specific diagnostic criteria of CSBD, one criterion contradicts the previously described rewarding nature of Impulse Control Disorders. Specifically, it is stated in the CSBD diagnostic criteria that individuals engage in sexual behaviors *"deriving little or no satisfaction from it"* (World Health Organization, 2019). While based on the classification of CSBD, sexual behaviors should be rewarding and pleasurable for the individuals and thus be the reason for engaging in them (i.e., reward-driven, impulsive activity), the CSBD diagnostic criteria describe the opposite of it by emphasizing that pleasure and satisfaction are not the drivers of sexual behaviors in CSBD, reflecting the compulsive nature of the behavior (Fineberg et al., 2014; Gola et al., 2020; World Health Organization, 2019).

This seemingly contradictory classification (i.e., *impulse* control disorder), nomenclature (*compulsive* sexual behavior disorder), and diagnostic criteria (i.e., sexual activities should be *rewarding* based on the impulse control disorders diagnostic criteria vs. sexual activities should provide little or *no satisfaction* based on the CSBD diagnostic criteria) may relate to and suggest similarities with the conceptualizations of addictive disorders (Brand et al., 2016, 2019; Fineberg et al., 2014). However, in accordance with the conclusions of Sassover and Weinstein (2020) and prior work (Bőthe, Tóth-Király, et al., 2019; Kor et al., 2013; Kraus et al., 2016; Potenza et al., 2017; Prause et al., 2017), we believe there is no sufficient scientific evidence yet to conclusively determine whether CSBD should be classified as an impulse control, compulsivity-related, or addictive disorder. Therefore, carefully examining transdiagnostic features, such as impulsivity and compulsivity, are crucial next steps in contributing to this prolonged debate (Bőthe, Tóth-Király, et al., 2019; Fineberg et al., 2014).

2. The Potentially Complex Roles of Impulsivity and Compulsivity in CSBD

As Sassover and Weinstein (2020) mentioned in their debate paper, both impulsivity and compulsivity share similarities in terms of impaired control or behavioral disinhibition regarding given activities and are important features of psychiatric disorders (Fineberg et al., 2014; Stein & Hollander, 1995). When comparing the diagnostic criteria of Impulse Control Disorders, Obsessive-Compulsive and Related Disorders (represented by obsessive-compulsive disorder), Substance Use-Related Disorders (represented by alcohol use disorder), and Non-Substance Use-Related Disorders (represented by gambling disorder) in DSM-5 and ICD-11, impaired control is present in all (Table 2.1.). However, crucial differences can be observed between impaired control in impulsivity and compulsivity and how they appear in different disorders. While impaired control is characterized by rapid and unplanned reactions to gratifying stimuli without considering potential negative consequences (i.e., reward-driven risk-taking) in the case of impulsivity, it occurs as repetitive engagement in behaviors in a habitual manner following rigid rules to avoid adverse consequences (i.e., habit-related harm-avoidance) in compulsivity (Fineberg et al., 2014; World Health Organization, 2019).

Both the reward-driven impulsive and habit-related compulsive features of impaired control might contribute to and be present in addictive disorders. The findings of previous studies suggest that impulsivity may be considered as a risk factor of addictive behaviors and pronounced at the early

stages of addictions (Fineberg et al., 2014). These findings align with the propositions of the Interaction of Person-Affect-Cognition-Execution (I-PACE) Model, suggesting that engagement in potentially addictive behaviors may start as a given activity can provide reward and gratification for the individual. Thus, impulsivity might be an important drive for engagement in the early stages of developing addictive behaviors (Brand et al., 2016, 2019). However, in the later stages of addictions, as the gratification gradually decreases, the compensatory processes and effects increase, and the engagement in the behavior or substance use becomes more rigid and habitual (Brand et al., 2016, 2019). This notion might relate to the findings of previous studies in substance use disorders, in which case compulsivity appeared after prolonged substance use, especially in impulsive individuals (Fineberg et al., 2014; Verdejo-García et al., 2008).

Supporting these hypothesized processes in CSBD, findings from previous studies reported CSBD's positive associations with both impulsivity and compulsivity in treatment-seeking and community samples (Bőthe, Tóth-Király, et al., 2019; Kafka, 2015; Reid et al., 2014; Reid & Carpenter, 2009; Walton et al., 2017). Moreover, findings from a community sample of more than 9000 individuals from three countries suggest that while 2.8% of individuals might demonstrate high levels of all ICD-11 diagnostic criteria of CSBD (i.e., high-risk group), there was a second group including 4.5% of individuals (i.e., satisfied at-risk group), who reported similar levels of salience, control, relapse and negative consequences as the high-risk group, but did not show elevated levels of dissatisfaction with their sexual activities (Bőthe, Potenza, et al., 2020). These results may suggest that individuals in the satisfied at-risk CSBD group might be at the early stages of the development of the addiction process when gratification and reward deriving from sexual activities are present, while the high-risk CSBD group may be at later stages of the addiction process when tolerance and compulsive engagement in sexual activities might be more dominant (Brand et al., 2016, 2019; Gola et al., 2020; Sassover & Weinstein, 2020). However, given that these identified profiles of individuals were examined in a cross-sectional setting, it was not possible to examine whether individuals' satisfaction may indeed decrease over time and they may eventually transfer to the high-risk CSBD group (i.e., the gradual shift from reward-seeking to habitual, compulsive engagement) (Brand et al., 2016, 2019; Fineberg et al., 2014). Other potential explanations may be applicable, such as individuals with higher levels of sexual desire might have reported elevated levels of preoccupation with sexual activities, difficulties with controlling or

cutting back on their sexual activities, and some negative consequences without CSBD (Štulhofer et al., 2016).

In sum, theoretical models and empirical findings suggest that both impulsivity and compulsivity may play crucial roles in the development and maintenance of addictive disorders and should be carefully examined to better understand CSBD's etiology. Nevertheless, it needs to be noted that no single personality trait or set of traits may result in the development of addictive disorders (Brand et al., 2016, 2019; Conway et al., 2003; Griffiths, 2017; Kerr, 1996; Tóth-Király et al., 2018). Rather, they develop and maintain as a result of the interaction between several structural (e.g., accessibility of pornography), situational (e.g., loneliness), psychological (e.g., basic psychological needs), and genetic and biological characteristics (e.g., suboptimal functioning of the dopamine system) of a given individual (Bőthe, Tóth-Király, et al., 2019, 2020; Brand et al., 2016, 2019; Griffiths, 2005; Tóth-Király et al., 2018).

Therefore, if we want to gain deeper insights on the complex roles of impulsivity and compulsivity in CSBD and get closer to a consensus on the classification of this disorder, more nuanced research questions and more sophisticated study designs and methods are necessary. Future research should examine not only whether impulsivity and compulsivity are related to CSBD, but should also explore in which phases of CSBD impulsivity and compulsivity may play essential roles, which features of impulsivity and compulsivity may relate to CSBD (e.g., sensation seeking or motor impulsivity), and in interaction with which other characteristics they may be associated with CSBD, considering well-established theoretical models (Grubbs et al., 2020). Future studies should strive to apply optimally powered longitudinal study designs, ecological momentary assessment methods, and neuroscientific and experimental paradigms that may be more suitable to address the aforementioned questions than cross-sectional study designs with small, homogenous samples (e.g., university students) (Grubbs et al., 2020; Grubbs & Kraus, 2021). In terms of study populations, both community and treatment-seeking as well as adult and adolescent populations, including non-WEIRD (i.e., white, educated, industrialized, rich, democratic) and minority populations (e.g., sexual minority individuals) should be involved in future studies (Bőthe et al., 2021; Bőthe, Vaillancourt-Morel, et al., 2019; Fineberg et al., 2014; Grubbs et al., 2020; Grubbs & Kraus, 2021; Klein et al., 2021).

3. Why Is It Important How CSBD Is Classified?

Although both debate papers (Gola et al., 2020; Sassover & Weinstein, 2020) mention the ongoing scientific debate about the classification of CSBD in diagnostic manuals, they do not elaborate on why it is important for researchers, practitioners, and treatment-seeking individuals how we classify out-of-control sexual behaviors, despite that appropriate classification holds several implications (Potenza, 2015b). From a research perspective, disorders classified in the same category may provide theoretical frameworks for testing potential mechanisms regarding the etiology of given disorders, contributing to more refined insights into the development of CSBD and may also advance the field, which is mostly based on atheoretical studies (Grubbs et al., 2020; Potenza, 2015b). Both in research and clinical practice, the adequate classification of CSBD may promote a better understanding and accelerate the assessment of potential comorbid disorders (e.g., if CSBD shares similarities with compulsive disorders and is classified so, other should be screened for) (Fuss et al., 2019).

From a practical perspective, a proper classification may help clinicians to develop new or use already existing interventions with demonstrated efficacy to reduce CSBD (e.g., if CSBD is classified as an addiction, interventions efficient in reducing substance use-related addictions may hold promise reducing CSBD as well) (Potenza, 2015b). In addition, treatment efficacy and dropout rates, and reasons for dropout may vary in different disorders. For example, previous studies showed that impulsivity in addictive disorders might result in early dropout and higher relapse rates (Cox et al., 2002; Fineberg et al., 2014; Streeter et al., 2007). Thus, adding impulsivity-related dropout prevention strategies to interventions reducing addictive disorders may contribute to the success and achievement of treatment goals. Lastly, identifying the functions of transdiagnostic features (e.g., impulsivity and compulsivity) and arriving at a conclusion about the classification of CSBD may guide prevention programs, policy making, and public health decisions as well (Potenza, 2015b, 2015a).

4. Conclusions

We agree with the conclusions of the two debate papers and previous work (Gola et al., 2020; Grubbs et al., 2020; Kor et al., 2013; Kraus et al., 2016; Potenza et al., 2017; Sassover & Weinstein, 2020) that no sufficient scientific evidence is available to conclude on the most adequate classification and symptomatology of CSBD. We propose potential future research directions that

may contribute to key insights on the roles of impulsivity and compulsivity in CSBD, advancing the classification of CSBD. With a better understanding and classification, we may not only move the field forward by integrating understandings of CSBD into larger theoretical frameworks, such as the network models of psychopathology (Bőthe, Lonza, et al., 2020; Chen et al., 2021; Werner et al., 2018), which is almost absent from the literature (Grubbs et al., 2020), but we might also assist theory development, research, and clinical work.

Table 2.1.

Comparison of the Diagnostic Criteria of Impulse Control Disorders, Obsessive-Compulsive Disorder, Alcohol Use Disorder, Gambling Disorder, and Compulsive Sexual Behavior Disorder in the Current Diagnostic Manuals

Criteria [a]	**Impulse Control Disorders**		**Obsessive-Compulsive Disorder** [b]		**Alcohol Use Disorder/Alcohol Dependence** [c]		**Gambling Disorder** [d]		**Compulsive Sexual Behavior Disorder** [e]	
	DSM-5	ICD-11	DSM-5	ICD-11	DSM-5	ICD-11	DSM-5	ICD-11	DSM-5	ICD-11
Impaired control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Negative consequences	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Salience / Preoccupation	—	—	✓	✓	✓	✓	✓	✓	—	✓
Unsuccessful efforts to control or reduce behavior	—	—	—	—	✓	—	✓	—	✓	✓
Tolerance	—	—	—	—	✓	✓	✓	—	—	—
Withdrawal	—	—	—	—	✓	✓	✓	—	—	—
Craving	—	—	—	—	✓	✓	—	—	—	—
Mood modification/ Coping	—	—	—	—	—	—	✓	—	✓	—
Dissatisfaction	—	—	—	—	—	—	—	—	—	✓
Chasing one's losses	—	—	—	—	—	—	✓	—	—	—
Lies to conceal involvement	—	—	—	—	—	—	✓	—	—	—
Relying on others' financial support	—	—	—	—	—	—	✓	—	—	—
Moral incongruence towards the behavior	—	—	—	—	—	—	—	—	—	✓

Note. DSM-5 = Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders; ICD-11 = Eleventh Edition of the International Classification of Diseases. [a] = It is important to note that although a symptom is not mentioned in the diagnostic criteria of a given disorder, it may be an important feature of it both from theoretical and practical perspectives. [b] = We selected Obsessive-Compulsive Disorder from DSM-5 and ICD-11 to represent Obsessive-Compulsive or Related Disorders in the present comparison. [c] =

We selected Alcohol Use Disorder and Alcohol Dependence from DSM-5 and ICD-11, respectively, to represent substance use disorder in the present comparison. [d] = We selected Gambling Disorder from DSM-5 and ICD-11 to represent Non-Substance-related Addictive Disorders in the present comparison. [e] = Based on the proposed but rejected diagnosis of Hypersexual Disorder (Kafka, 2010).

5. References

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III. Sexual Motivations Underlying Compulsive Sexual Behavior In Women And Men From Germany And Hungary[2]

Abstract

Background: There are ongoing debates about conflicting models on how to conceptualize compulsive sexual behavior. At the heart of these discussions is the question about the sexual motivations underlying compulsive sexual behavior, as different models assume different motivations.

Aim: The aim of the present study was to understand sexual motivations underlying compulsive sexual behavior and their relation to the most prominent conceptualizations of compulsive sexual behavior (e.g., compulsive sexual behavior disorder (CSBD), sex addiction).

Methods: We used self-reported data from two large samples of Hungarian and German populations (N = 9814). The Sexual Motivation Scale (SexMS), a 24-item self-report measure based on self-determination theory, was used to assess a diverse set of sexual motivations. Compulsive sexual behavior was assessed with the 19-item Compulsive Sexual Behavior Disorder Scale (CSBD-19), that is based on the ICD-11 diagnostic guidelines of CSBD. We used structural equation modeling to examine the hypothesized associations between sexual motivations and compulsive sexual behavior and examined potential gender differences in these associations.

Outcomes: Compulsive sexual behavior was assessed in relation to a set of sexual motivations.

Results: Amotivation had the strongest positive association with compulsive sexual behavior, but integrated, introjected, and intrinsic motivations were also positively related to it. Importantly, these associations did not differ for women and men, and between the two samples.

Clinical Translation: Future research and treatment should also consider sexual motivations that are not listed among the ICD-11 guidelines for CSBD, including high levels of sexual interest, continuing the behavior despite having little satisfaction from it and coping with sex.

Strengths & Limitations: Although we used large samples of general populations in two Western countries, this motivational background of compulsive sexual behavior awaits replication in a clinical sample of individuals experiencing CSBD.

[2] **Koós, M**., Fuss, J., Klein, V., Demetrovics, Z., & Bőthe, B. (2022). Sexual Motivations Underlying Compulsive Sexual Behavior in women and Men From Germany and Hungary. *The Journal of Sexual Medicine, 19*(2), 170–181. https://doi.org/10.1016/j.jsxm.2021.11.005

Conclusion: The identified sexual motivations underlying compulsive sexual behavior are relevant for assessing and treating patients as motivations may be integrated into psychotherapeutic interventions.

1. Introduction

Although Compulsive Sexual Behavior Disorder (CSBD) has been introduced into the International Classification of Diseases, 11th Revision (ICD-11) (Kraus et al., 2018), the debate about how to conceptualize compulsive sexual behavior continues (Fuss, Lemay, et al., 2019). In the ICD-11, CSBD is conceptualized as an impulse control disorder with an inability to control repetitive sexual impulses or urges, resulting in repetitive sexual behaviors, which causes clinically significant problems in social and emotional functioning and marked distress. Nonetheless, there are various other conceptualizations that are currently discussed. The most prominent ones include a non-pathological model of high sexual drive, a model which situates compulsive sexual behavior on the extreme end of 'normal' sexual behavior while consider it a sexual health problem (Vigorito & Braun-Harvey, 2017). Further pathological models include sexual addiction, impulsive/compulsive sexual behavior, hypersexuality, and a model which attempts to integrate previous conceptualizations of compulsive sexual behaviors (Potenza et al., 2017; Fuss, Briken, et al., 2019). At the heart of these discussions is the question about sexual motivations underlying compulsive sexual behavior (i.e., why one engages in sexual activities) as different models assume different motivations.

1.1. Sexual Motivations

Self-determination theory (SDT) (Ryan & Deci, 2017) provides a useful framework for understanding sexual motivations. The theory conceptualizes motivations based on how the source of them lies on social-contextual factors. Instead of using the magnitude of motivation to categorize them, it puts the emphases on how the specific activity contributes to the basic psychological needs of autonomy, competence and relatedness, and focuses on the quality of the motivations (Ryan & Deci, 2000). This means that besides these motivations represent a continuum according to the extent of autonomy they imply, they also vary in the source that initiate them, as well as the subjective, emotional, and social experiences, and contexts and behavioral consequences that accompany them (Ryan & Deci, 2017). In line with previous studies on work, sport, and academic achievement-related motivations, sexual motivations can also be interpreted in this theoretical framework (Gagné et al., 2015; Vallerand et al., 1992) (Tóth-Király, Morin, et al., 2021; Tóth-Király, Amoura, Bőthe, et al., 2020; Vallerand et al., 1989; Pelletier et al., 2013).

Sexual motivations can vary on the autonomy-control continuum, from the most self-determined and autonomous behavior on the one end (i.e., intrinsic motivation) to the most

heteronomous behavior that is characterized by the complete absence of intrinsic motivation on the other end (i.e., amotivation) (Gravel et al., 2016). Previous research has divided this spectrum into six separate types of sexual motivations (i.e., qualitatively and quantitatively different motivations), with intrinsic motivation being the most self-determined motivation (Gravel et al., 2016).

Intrinsic motivation is characterized by people's engagement in behaviors for the own sake of the given activity, because it is pleasurable in itself, and is in line with the individual's self, values, and identity. Regarding sexual behavior, it means that individuals engaging in sexual behaviors as they feel it is a pleasurable activity for them and they genuinely enjoy it. Intrinsic motivation is related to optimal functioning, which decreases towards the other end of the spectrum.

Four extrinsic motivations (i.e., integrated, identified, introjected, and external motivation) fall in between intrinsic motivation and amotivation (Deci & Ryan, 2000). Extrinsically motivated behaviors are not intrinsically pleasure-driven, but they play an (extrinsic) role for the individual. *Integrated motivation* touches a meaningful and integral part of an individual's identity and is still coherent with the self. In case of sexuality, it means that individuals engage in sexual behaviors because they feel that their identity requires it. For example, they see themselves as sexual beings, who would act in a certain way in the given situation (i.e., initiate the sexual activity). *Identified motivations* are still perceived as being personally significant but not related to one's identity. In the case of sexuality, it may appear as individuals engage in sexual activities because they consider it as part of life (e.g., sexuality is a normal and important aspect of being a human) (Gravel et al., 2016). In contrast, *introjected motivations* are driven by internal pressures, such as negative emotions. These motivations are thus decreasingly perceived as autonomous. However, the purpose of all these extrinsic motivations is to validate some aspects of the self (e.g., to prove that individuals are good lovers or to boost their self-esteem). In sum, external motivations are about receiving reward or avoiding punishments from an external entity, such as engaging in sexual activities to gain social benefit from it or to avoid conflicts with a partner.

Finally, *amotivation* is highly distinct from the other motivational orientations, which were all based on some degree of intentionality. In the case of amotivation, the absence of motivation and intention could derive from the lack of competence (when one feels they are not able to control the outcome), lack of interest, or the motivation to resist the influence, masked as amotivation regarding the given activity. In case of sexual behaviors, for example, it would

mean that someone feels they are not interested in the sexual activity in the way others do, or that they do not know why they engage in sexual activities.

Notably, important gender differences were found in sexual motivations. Gravel and colleagues (Gravel et al., 2016) reported significant, moderate difference in external motivation and small differences in integrated, introjected and amotivation, with men scoring higher on these motivations than women. However, there is only a small body of studies addressing potential gender differences in the case of SDT-based sexual motivations, thus examining whether sexual motivations' associations with CSB may differ based on gender may fill a gap in the literature. In sum, based on the self-determination theory, the extent of how intrinsic the motivation behind the activities is in association with well-being. Regarding the theory of optimal functioning, the more self-determined the behavior is, the association tends to be more positive with well-being indicators and more negative with ill-being indicators (Ryan & Deci, 2000; Gravel et al., 2016) (Milyavskaya & Koestner, 2011; Gravel et al., 2019). Thus, compulsive sexual behavior may be considered as a potential negative outcome of sexual motivations.

1.2. Different Conceptualizations of Compulsive Sexual Behavior and Their Associations with Sexual Motivations

Similarly to sexual motivations, while compulsive sexual behavior may be present in anyone, some gender differences should be mentioned. Gender differences in prevalence data regarding feelings of distress caused by the difficulties controlling sexual urges and impulses was found in a U.S. national probability survey (Dickenson et al., 2018b) . In a recent Hungarian study, almost twice as many men score above the CSBD cut-off score as women (5.2% and 3.3%, respectively) (Bőthe, Potenza, et al., 2020b). Previous studies examining nationally-representative population samples showed that, in general, men score higher on CSB scales and report more frequent sexual behaviors than women (Kürbitz & Briken, 2021) (Bőthe et al., 2018). Regarding clinical populations, a study found significantly higher lifetime prevalence and current CSBD in men than in women (Fuss, Briken, et al., 2019). Conversely, a study conducted on a treatment-seeking, clinical sample (Öberg et al., 2017) reported women scoring higher on a scale assessing hypersexual symptoms, and reporting more frequent sexual behavior, as well as concerns and negative effects of these behaviors. However, it is important to note that most previous studies mainly focused on male samples, providing little knowledge on women's CSB and potential gender differences (Reid et al., 2012; Klein et al., 2021).

Table 3.1.

Sexual motivations underlying different concepts of compulsive sexual behavior

	Intrinsic motivation	Integrated motivation	Identified motivation	Introjected motivation	External motivation	Amotivation
High Sexual Desire (non-pathological)	✓	-	-	-	-	-
Out of Control Sexual Behavior as a Sexual Health Problem	✓	-	-	-	-	✓
Hypersexual Disorder	✓	-	-	✓	(!)	✓
Sex Addiction	(✓)	-	-	✓	-	✓
Integrated Model	✓	(✓)	-	✓	-	✓
Impulsive/Compulsive Sexual Behavior	-	-	-	-	-	✓
Compulsive Sexual Behavior Disorder	-	-	(✓)	-	!	✓

Note. ✓= the model is characterized by a positive relation to this motivation; ! = the model is characterized by a negative relation to this motivation; (…) = the motivation is only partly present in the model.

The importance of the motivational background in compulsive behaviors (e.g., internet gaming disorder, alcohol use, problematic pornography use) is well-established (Kuntsche, 2007) (Bőthe et al., 2021), and different conceptualizations of compulsive sexual behavior can be understood through the lens of sexual motivations. Even though various motivational factors are usually simultaneously present, even the highly overlapping conceptualizations of compulsive sexual behavior have differently emphasized the role of certain underlying motivations (see Table 3.1.). In the following, several existing models describing compulsive sexual behavior will be presented in association with a focus on the motivational components. These associations will be presented as they appear in the original description of the theoretical models.

The *non-pathological model of high sexual drive* (Winters et al., 2010) emphasizes that high levels of sexual interest and behavior might not be considered as a mental disorder, instead, dysregulated sexuality might be just a marker of high sexual desire, resulting in frequently occurring sexual thoughts, fantasies, and behaviors. This model would expect high levels of intrinsic sexual motivation (such as high levels of sexual desire) being related to compulsive sexual behavior. In other words, high levels of sexual desire are not per se problematic; rather, a person's distress is caused by the difficulties of managing the high degree of desire, and by the moral notions and judgments about frequent sexuality in society (Grubbs et al., 2019).

Similar to the high sexual drive conceptualization, Vigorito and Braun-Harvey (Vigorito & Braun-Harvey, 2017) approaches the issue from a spectrum-mindset, where one extent (out of control sexual behavior) is a problem on the extreme end of the "normal" range of sexual behavior, and not a qualitatively different concept. Viewing out-of-control sexual behavior as a *sexual health problem*, and not a distinct disorder, might root in the sociocultural differences on what should be considered normal or abnormal in certain cultures. They emphasize that the disordered levels of this problem (if exist) are extremely rare. Intrinsic motivation appears in their interpretation when sexual urges (e.g., physiological experiences motivating sexual behaviors, a force pushing the self), thoughts, and behaviors are described, since these are subjective internal experiences (i.e., urges and fantasies), often resulting in outward expressions (i.e., behaviors). Amotivation is also presented in the model, when the subjective feeling of lack of agency (i.e., feeling out of control) is mentioned.

In contrast, the pathological models of compulsive sexual behavior, namely hypersexual disorder (Kafka, 2010), compulsive sexual behavior disorder (Kraus et al., 2018), and sexual addiction models (Potenza et al., 2017), assume motivations that are mainly located towards the heteronomous end of the spectrum (for a review of these models see (Walton et al., 2017)).

Only the *hypersexuality model* (which was developed based on the sexual desire dysregulation, impulsivity, compulsivity, and addiction frameworks) considers a highly intrinsically motivated sexual desire at the core of symptoms *("Hypersexual Disorder is a sexual desire disorders characterized by an increased frequency and intensity of sexually motivated fantasies, arousal, urges, and enacted behavior"),* while the others do not emphasize intrinsic motivations. Additionally, introjected motivations are also listed among the rejected DSM-5 diagnostic criteria of hypersexual disorder (i.e., repetitively engaging in sexual fantasies, urges, and behavior in response to dysphoric mood states [e.g., anxiety, depression, boredom, and irritability] as well as in response to stressful life events) (Kafka, 2010).

Opposed to the hypersexuality model, the *sexual addiction model* mainly stresses introjected motivations (Walton et al., 2017) (i.e., understanding compulsive sexual behavior as a means to regulate negative emotions and stress) and amotivation (i.e., the feeling of out-of-control behavior and the continuation of given behavior despite the substantial harmful consequences). However, it also partly includes intrinsic motivations (i.e., besides pain/negative emotion reduction, pleasure seeking may appear as well) (Goodman, 2001). Therefore, this model includes both pleasure-seeking, impulsive (motivated by positive reinforcement) and negative affect reducing, compulsive behaviors (motivated by negative reinforcement) (Walton et al., 2017).

Coleman's (Coleman, 2011) *Impulsive/Compulsive Sexual Behavior* model is open to the possibility of multiple pathological pathways. It takes into account that some individual might have more problems with impulse control, while other might have more compulsivity-related problems. Amotivation is mentioned through the obsessive-compulsive mechanisms, when the behavior is driven by obsessive and intrusive thoughts (and not by pleasure seeking), and the act is followed by temporary relief. However, the individual does not report pleasure out of the behavior. Based on this model, amotivation might be the most decisive motivation of compulsive sexual behavior.

The *Integrated Model of Compulsive Sexual Behavior* by Birken (Briken, 2020) describes compulsive sexual behavior by using neurobiological and physiological concepts of sexual excitation (integrating the Dual Control Model (Rettenberger et al., 2016) and the Sexual Tipping Point Model (Perelman, 2009))[3] and implementing it to the Incentive Salience Theory

[2]The Dual Control Model (29) describes human sexuality on the continuum of sexual excitation and inhibition, where the two neurological systems relatively independently produce sexual behavior. The possible imbalance

framework (Berridge & Robinson, 2016). The model includes intrinsic motivation (and even distinguishes between wanting – conditioned stimulus, and liking – unconditioned stimulus), introjected motivation (explicitly states using sex as a coping strategy in response to negative mood or stress), and amotivation (mentions habituation, which leads to an increase in sexual behavior but a decrease in satisfaction). Integrated motivation is partly described in habituation, since a habitual act could mean that the individual behaves this way because he or she feels it is part of their identity.

The *ICD-11 conceptualization of CSBD* primarily understands compulsive sexual behavior as an impulse control disorder. Central to the diagnosis is a lack of control over sexual urges that is not driven by sexual motivation but rather an absence of motivation, which reflects amotivation *(*i.e., *"continued repetitive sexual behavior despite (...) deriving little or no satisfaction from it")*. Moreover, it emphasizes that people exhibiting compulsive sexual behavior are less inhibited by the perceived external consequences of their sexual behavior, suggesting a negative correlation with external motivations (i.e., a continuation of sexual behavior despite negative consequences).

Although said models differ with regard to the underlying concept and how incorporated different sexual motivations in their conceptualizations (see Table 1), they were all developed to better understand a population of patients seeking help because they have problems regulating their sexual behavior, resulting in distress for them and/or their families. Even though the motivations underlying such behaviors may be highly individual, it is useful for nosological purposes, and to develop therapeutic interventions to understand which motivational mechanisms drive compulsive sexual behavior.

Despite sexual motivations appear to play important roles in all described conceptualizations of compulsive sexual behavior (Table 1), no previous studies have examined the associations between a diverse set of sexual motivations and compulsive sexual behavior. Therefore, we examined the associations between sexual motivations and compulsive sexual behavior in the present study. The aims of the present study were twofold. First, we explored sexual motivations underlying compulsive sexual behavior. Second, we examined if the associations between sexual motivations and CSB differ for women and men. Given that women were often completely neglected in research (Grubbs et al., 2020), most knowledge of compulsive sexual behavior in women is based on clinical conjectures, and inappropriate generalizations being

between the two systems could be one explanation of compulsive sexual behaviors. The Sexual Tipping Point Model describes sexual behaviors as a result of inhibitory versus arousing biopsychosocial variables.

made from research results based on male samples (Montgomery-Graham, 2017; Klein et al., 2014). Recent research, however, shows that compulsive sexual behavior is much more common among women than previous research suggested (Dickenson et al., 2018a; Bőthe, Potenza, et al., 2020a). We, therefore, examined potential gender differences in sexual motivations underlying compulsive sexual behavior in an exploratory manner.

2. Method

2.1. Procedure

Data were collected via online questionnaires, advertised on a large news portal (Hungarian sample) and Internet forums of health care sites and social networks (German sample). It took approximately 30 minutes to complete the questionnaires as the present study was part of a larger project (Bőthe, Potenza, et al., 2020a). Individuals aged 18 years or older were invited to participate. In the case of the Hungarian sample, participants were recruited via an online advertisement on a large Hungarian news portal in the summer of 2019. Among those who provided their contact information, gift vouchers for an electronics store were drawn as an incentive. In the case of the German sample, participants were recruited via online health-care forums and social networking sites (e.g., Facebook) at the end of the summer of 2019. We aimed to recruit at least 300 participants in both countries to ensure that the statistical analyses would not be underpowered, but we did not set an upper limit for participation. All procedures were approved by the Research Ethics Committee of the Eötvös Loránd University (2016/286-3) and the Institutional review board of the Centre of Psychosocial Medicine/University Medical Center Hamburg Eppendorf (LPEK-0060).

2.2. Participants

Hungarian sample. Of 12,026 respondents who agreed to participate, 55 were excluded for inconsistent or unengaged response patterns (e.g., a given participant's age at first sexual experience was higher than their age; selecting the same response option for all items in a given scale which includes reverse scored items), and 2,591 were excluded for not completing any of the scales used in the present study (i.e., only those participants were included in the present study who completed either the Sexual Motivations Scale or the Compulsive Sexual Behavior Disorder Scale, or both scales). Thus, 9,380 individuals (3,178 women, 33.9%) aged between 18 and 76 years (M_{age} = 36.11 years, SD_{age} = 12.22) were included in the present study.

Concerning the place of residence[4], 4,773 reported living in the capital city (50.9%), 3,626 in a town (38.6%), and 981 in a village (10.5%). Concerning the highest level of education, 180 reported having an elementary school diploma or lower level of education (1.9%), 433 obtained a vocational school degree (4.6%), 2,918 a high school degree (62.4%), and 5,849 a university degree (62.4%). Concerning relationship status, 2,460 reported being single (26.2%), 6,833 in any romantic relationship (i.e., being in a relationship, engaged, or married) (72.9%), and 87 selected the "other" option (0.9%).

German sample. Of 541 respondents who agreed to participate, 107 were excluded for not completing any of the scales used in the present study (i.e., only those participants were included in the present study who completed either the Sexual Motivations Scale or the Compulsive Sexual Behavior Disorder Scale, or both scales), and no participant was excluded for inconsistent or unengaged response patterns (e.g., a given participant's age at first sexual experience was higher than their age; selecting the same response option for all items in a given scale which includes reverse scored items). Thus, 434 individuals (259 women, 60.1%) aged between 18 and 70 years (M_{age} = 27.57 years, SD_{age} = 7.73) were included in the present study. Concerning the place of residence, 47 reported living in the capital city (10.8%), 317 in a town (73.0%), and 70 in a village (16.1%). Concerning highest level of education, one reported having an elementary school diploma or lower level of education (0.2%), 10 obtained a vocational school degree (2.3%), 186 a high school degree (42.9%), and 237 a university degree (54.6%). Concerning relationship status, 115 reported being single (26.5%), 307 in any romantic relationship (i.e., being in a relationship, engaged, or married) (70.7%), and 12 selected the "other" option (2.8%).

2.3. Measures

Sexual Motivations Scale (SexMS) (Gravel et al., 2016; Tóth-Király et al., 2019). The SexMS is a 24-item, six-factor scale assessing sexual motivations based on the self-determination theory. The intrinsic motivation factor includes items related to engagement in sex because of the inherent pleasure it provides (four items, e.g., "Because I enjoy sex."). The *integrated* motivation factor includes items related to engagement in sex because sex is an integral part of one's identity (four items, e.g., "Because sexuality is a meaningful part of my life."). The *identified* motivation factor includes items related to engagement in sex because sex is a normal

[4] Capital city means the state capital in each country (i.e., Budapest and Berlin respectively). The terms town and villages represent judicial information about residency, which is publicly known for all residence. These are not based on entirely of population number.

and healthy part of life (e.g., “Because sexuality is a normal and important aspect of human development.”). The *introjected* motivation factor includes items related to engagement in sex because sex may enhance individuals’ self-worth by proving that they are good in sex (four items, e.g., “To prove to myself that I am a good lover.”). The *external* motivation factor includes items related to engagement in sex to receive rewards or avoid conflict (four items, e.g., “Because I don't want to be criticized by my partner.”). The *amotivation* factor includes items related to an absence of motivation to engage in sex due to either a lack of control or efficacy over the behavior (four items, e.g., “I don't know; I feel it's not worth it.”). Participants indicated to what extent each of the statements correspond to their motivates for having sex in general, using a seven-point scale (1 = “does not correspond at all”, 7 = “corresponds completely”). Higher scores on each factor indicate higher levels of the given motivation. Although there is a continuity of these motivations (i.e., based on SDT theory, sexual motivations lay on a continuum based on the extent of autonomy they represent), and are highly correlated with each other, the motivations are treated as separate factors, since they are qualitatively and quantitatively different from each other.

Compulsive Sexual Behavior Disorder Scale (CSBD-19) (Bőthe, Potenza, et al., 2020a). The CSBD-19 is a 19-item, five-factor scale assessing compulsive sexual behavior. The development of the instrument followed the ICD-11 diagnostic guidelines for CSBD, considering the past six months. The scale was cross-culturally validated in three different languages, and a threshold was determined to identify at-risk individuals. The *control* factor includes items related to failure to control compulsive sexual behavior (three items, e.g., “Even though my sexual behavior was irresponsible or reckless, I found it difficult to stop.”). The *salience* factor includes items related to compulsive sexual behavior being the central focus of one’s life (three items, e.g., “When I could have sex, everything else became irrelevant.”). The *relapse* factor includes items related to unsuccessful efforts to reduce compulsive sexual behavior (three items, “I was not successful in reducing the amount of sex I had.”). The *dissatisfaction* factor includes items related to experiencing less or no satisfaction from sexual behaviors (three items, e.g., “I had sex even when I did not enjoy it anymore.”). The *negative consequences* factor includes general and domain-specific items related to clinically significant distress or impairment as a result of compulsive sexual behavior (seven items, e.g., “I did not accomplish important tasks because of my sexual behavior.”). Before completing the scale, participants were provided with the following definition: *“For the purpose of this questionnaire, sex is defined as any activity or behavior that stimulates or arouses a person with the intent to produce an orgasm or sexual pleasure (e.g., self-masturbation or solosex,*

using pornography, intercourse with a partner, oral sex, anal sex, etc.). Sexual behaviors may or may not involve a partner.". Participants indicated their levels of agreement with each item using a four-point scale (1 = "totally disagree", 4 = "totally agree"). Higher scores indicate higher levels of compulsive sexual behavior, and the score 50 points or above indicate individuals at high risk of compulsive sexual behavior.

2.4. Statistical Analysis

Descriptive statistics were computed in SPSS 25. All other analyses were conducted in Mplus 7.3. We used the weighted least squares mean- and variance-adjusted estimator (WLSMV), which has been found to be superior to maximum-likelihood estimation for ordered items, particularly when the response options follow asymmetric thresholds (for a review, see (Hancock & Mueller, 2006)). Following previous work (Tóth-Király, Bőthe, et al., 2021), the main statistical analyses were conducted in three steps.

First, measurement models were separately tested in the four subgroups of interest (Hungarian men, Hungarian women, German men, German women). Following prior work (Gravel et al., 2016), sex motivations were modeled with the standard confirmatory factor analytic (CFA) framework that included the six correlated motivational factors and in which scale items loaded on their a priori factors. In contrast, compulsive sexual behavior was modeled using bifactor confirmatory factor analysis (Reise, 2012). Bifactor models provide a way to directly disaggregate the total item covariance into a global component (G-factor) underlying responses to all items and specific components (S-factor) that are specific to a subset of items and not explained by the global component, thus providing a clear global estimate of respondents' compulsive sexual behavior. This analytic decision was based on recent statistical evidence documenting the advantages of relying on the more flexible bifactor, instead of higher-order, representations (Gignac, 2016; Morin et al., 2016). Consequently, items were allowed to load on the G-factor and their a priori S-factor simultaneously. Following typical bifactor specifications (Reise, 2012; Morin et al., 2016), all factors were specified as orthogonal (i.e., not allowed to correlate with one another).

Second, to ascertain comparable measurement properties, and thus minimize measurement biases across countries and gender, tests of measurement invariance were conducted on sexual motivations and compulsive sexual behavior. These tests were conducted in the following sequence (Meredith, 1993; Tóth-Király & Neff, 2021); (1) configural (equal factor structure); (2) weak (equal loadings); (3) strong (equal thresholds); (4) strict (equal uniquenesses); (5) latent variance-covariance (equal variance-covariance matrix); and (6) latent means (equal

latent means). While it is possible, with weak invariance to combine the samples for predictive tests (Millsap, 2012), there are statistical advantages associated with additional tests of invariance (i.e., the resulting model is more parsimonious, leading to more stable and trustworthy estimates).

Third, the most invariant measurement models were then incorporated into a path model in which sex motivations predicted the global levels of compulsive sexual behavior (Fuss, Lemay, et al., 2019). This path model was estimated in a multi-group framework to assess the extent to which the relations would generalize across the groups, in the following sequence: (a) predictions freely estimated; (b) regression slopes constrained to equality; (c) regression intercepts constrained to equality across groups; and (4) regression residuals constrained to equality (Tóth-Király, Morin, et al., 2020).

As for model evaluation, commonly used goodness-of-fit indices were used (Hu & Bentler, 1999): values higher than .90 and .95 for the CFI and TLI were considered to reflect adequate and excellent fit, respectively; and values smaller than .08 or .06 for the RMSEA were considered to indicate acceptable and excellent fit, respectively. Nested model comparisons for tests of measurement invariance and predictive similarity were compared via the examination of changes (Δ) in goodness-of-fit indices, where a decrease in CFI and TLI of .010 or higher or an increase in RMSEA of .015 or higher indicates a lack of invariance (Chen, 2007; Cheung & Rensvold, 2002). Finally, we also computed model-based composite reliability indices (McDonald, 1970; Morin et al., 2016) from the standardized factor loadings and the error variances associated with the items.

3. Results

3.1. Descriptive Statistics and Measurement Models

Descriptive statistics, reliability indices, and correlations between the variables are presented in Table 3.2. The group-specific measurement models (see Table 3.3.) demonstrated adequate fit to the data in all subgroups (CFI and TLI > .90, RMSEA < .08).

Next, tests of measurement invariance were conducted on the separate models across the four groups. For sexual motivation, the negligible decrease in model fit (ΔCFI and ΔTLI ≤ .010 and ΔRMSEA ≤ .015) supported the configural, weak, strong, and strict invariance as well as the invariance of the latent variances-covariances and the invariance of latent means across groups. The compulsive sexual behavior measurement model was invariant up to the level of latent variances-covariances. However, latent mean invariance was not achieved based on the

differences in fit indices (ΔCFI = -.014, ΔTLI = -.011, ΔRMSEA = +.004). Consequently, we estimated a partial invariant model in which, based on modification indices, the latent mean of the global compulsive sexual behavior factor was freed up in the Hungarian women group. This partial latent mean invariant model, as well as the full latent mean invariant model for sexual motivation, was retained for interpretation.

Final parameter estimates from the most invariant models are reported in Appendix 3.1. (for sexual motivations) and Appendix 3.2. (for compulsive sexual behavior) in the appendices. Examination of these parameter estimates reveal well-defined and reliable motivational factors (intrinsic: λ = .580 to .864, ω = .839; integrated: λ = .843 to .906, ω = .926; identified: λ = .679 to .844, ω = .841; introjected: λ = .806 to .921, ω = .931; external: λ = .700 to .900, ω = .886; and amotivation: λ = .813 to .900, ω = .927). Additionally, the compulsive sexual behavior, the G-factor was well-defined and reliable (λ = .412 to .830, ω = .965). Four out of the five S-factors retained a higher amount of specificity (salience: λ = .377 to .525, ω = .554; relapse: λ = .123 to .529, ω = .633; dissatisfaction: λ = .635 to .735, ω = .886; negative consequences: λ = -.442 to .446, ω = .637), whereas the control S-factor appeared to retain a lower amount of specificity (λ = -.106 to -.387, ω = .291) over and above the G-factor. As our goal was to achieve a global estimate of compulsive sexual behavior while maintaining control over subscale specificity, we only used the compulsive sexual behavior G-factor as an outcome.

Table 3.2.

Descriptive statistics, reliability indices, and latent correlations between the Sexual Motivations Scale (SexMS) and the Compulsive Sexual Behavior Disorder Scale (CSBD-19)

	Range	Mean (*SD*)	Skewness (SE)	Kurtosis (SE)	Cronbach's alpha (α)	1.	2.	3.	4.	5.	6.
1. CSBD-19	19-76	28.18 (9.02)	1.39 (0.03)	1.85 (0.05)	.91	—					
2. Intrinsic motivation (SexMS)	4-28	21.93 (4.22)	-0.88 (0.02)	1.12 (0.05)	.76	.06	—				
3. Integrated motivation (SexMS)	4-28	19.34 (5.81)	-0.51 (0.02)	-0.34 (0.05)	.91	.13	.83	—			
4. Identified motivation (SexMS)	4-28	18.46 (5.13)	-0.38 (0.02)	-0.17 (0.05)	.79	.14	.79	.73	—		
5. Introjected motivation (SexMS)	4-28	12.08 (6.01)	0.50 (0.02)	-0.58 (0.05)	.91	.29	.18	.21	.37	—	
6. External motivation (SexMS)	4-28	8.47 (4.43)	1.27 (0.02)	1.67 (0.05)	.82	.17	-.31	-.19	-.04	.46	—
7. Amotivaton (SexMS)	4-28	5.71 (3.12)	2.93 (0.02)	11.14 (0.05)	.85	.13	-.77	-.64	-.42	.14	.65

Note. CSBD-19 = Compulsive Sexual Behavior Disorder Scale; SexMS = Sexual Motivations Scale*;* SD = standard deviation; SE = standard error. All correlations were significant at level $p < .001$.

Table 3.3.

Measurement Invariance of the Sexual Motivations Scale (SexMS) and Compulsive Sexual Behavior Disorder Scale (CSBD-19)

Model	χ^2 (df)	CFI	TLI	RMSEA	90% CI	Comparison	$\Delta\chi^2$ (df)	ΔCFI	ΔTLI	ΔRMSEA
SexMS										
CFA – Hungarian men	9284.415 (237)*	.952	.944	.079	.077-.080	—	—	—	—	—
CFA – Hungarian women	3206.503 (237)*	.976	.972	.063	.061-.065	—	—	—	—	—
CFA – German men	423.904 (237)*	.967	.962	.068	.057-.078	—	—	—	—	—
CFA – German women	463.085 (237)*	.974	.970	.061	.052-.069	—	—	—	—	—
1. Configural invariance	10815.007 (948)*	.970	.965	.065	.064-.066	—	—	—	—	—
2. Weak invariance	10848.979 (1002)*	.970	.967	.063	.062-.064	2 vs. 1	326.751 (54)*	.000	+.002	-.002
3. Strong invariance	13247.091 (1317)*	.964	.970	.061	.060-.062	3 vs. 2	3719.583 (315)*	-.006	+.003	-.002
4. Strict invariance	12967.211 (1389)*	.965	.972	.058	.057-.059	4 vs. 3	653.069 (72)*	+.001	+.002	-.003
5. Latent variance-covariance invariance	8993.947 (1452)*	.977	.983	.046	.045-.047	5 vs. 4	709.859 (63)*	+.012	+.011	-.012
6. Latent means invariance	9152.181 (1470)*	.977	.983	.046	.045-.047	6 vs. 5	278.627 (18)*	.000	.000	.000
CSBD-19										
Bifactor CFA – Hungarian men	4154.343 (133)*	.953	.940	.077	.075-.079	—	—	—	—	—
Bifactor CFA – Hungarian women	2631.167 (133)*	.924	.902	.082	.079-.084	—	—	—	—	—
Bifactor CFA – German men	217.598 (133)*	.974	.966	.067	.050-.082	—	—	—	—	—
Bifactor CFA – German women	276.465 (133)*	.945	.929	.068	.057-.079	—	—	—	—	—
1. Configural invariance	5855.292 (532)*	.957	.944	.069	.068-.071	—	—	—	—	—
2. Weak invariance	5619.283 (628)*	.959	.956	.062	.060-.063	2 vs. 1	344.522 (96)*	+.002	+.012	-.007
3. Strong invariance	5250.821 (709)*	.963	.964	.055	.054-.057	3 vs. 2	215.561 (81)*	+.004	+.008	-.007
4. Strict invariance	4895.686 (766)*	.966	.970	.051	.049-.052	4 vs. 3	325.965 (57)*	+.003	+.006	-.004
5. Latent variance-covariance invariance	3416.796 (784)*	.979	.981	.040	.039-.041	5 vs. 4	66.851 (18)*	+.013	+.011	-.011
6. Latent means invariance	5046.952 (802)*	.965	.970	.050	.049-.052	6 vs. 5	967.392 (18)*	-.014	-.011	+.010

6p. Partial latent mean invariance	3978.106 (801)*	.974	.978	.044	.042-.045	6p vs. 5	424.728 (17)*	-.005	-.003	+.004

Note. CFA = confirmatory factor analysis; χ^2: Mean- and variance-adjusted weighted least-squares estimator (WLSMV) chi-square test of exact fit; df: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; 90% CI: 90% confidence interval of the RMSEA; $\Delta\chi^2$ = Mean- and variance-adjusted weighted least-squares estimator (WLSMV) (calculated with the difftest function in Mplus); Δ: Change in model fit in relation to the comparison model.

*$p < .01$.

Table 3.4.

Examination of the associations between the factors of the SexMS and the CSBD-19 in the multi-group predictive invariance framework

Model	χ^2 (df)	CFI	TLI	RMSEA	90% CI	Comparison	$\Delta\chi^2$ (df)	ΔCFI	ΔTLI	ΔRMSEA
1. Freely estimated associations	9442.358* (1542)*	.977	.982	.046	.045-.047	—	—	—	—	—
2. Invariant regression slopes	9389.985 (1560)*	.977	.982	.045	.044-.046	2 vs. 1	53.055 (18)*	.000	.000	-.001
3. Invariant regression intercepts	9544.247 (1563)*	.976	.982	.046	.045-.047	3 vs. 2	469.539 (3)*	-.001	.000	+.001
4. Invariant regression residuals	9556.335 (1566)*	.976	.982	.046	.045-.047	4 vs. 3	26.751 (3)*	.000	.000	.000

Note. χ^2: Mean- and variance-adjusted weighted least-squares estimator (WLSMV) chi-square test of exact fit; df: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; 90% CI: 90% confidence interval of the RMSEA; $\Delta\chi^2$ = Mean- and variance-adjusted weighted least-squares estimator (WLSMV) (calculated with the difftest function in Mplus); Δ: Change in model fit in relation to the comparison model.

*$p < .01$.

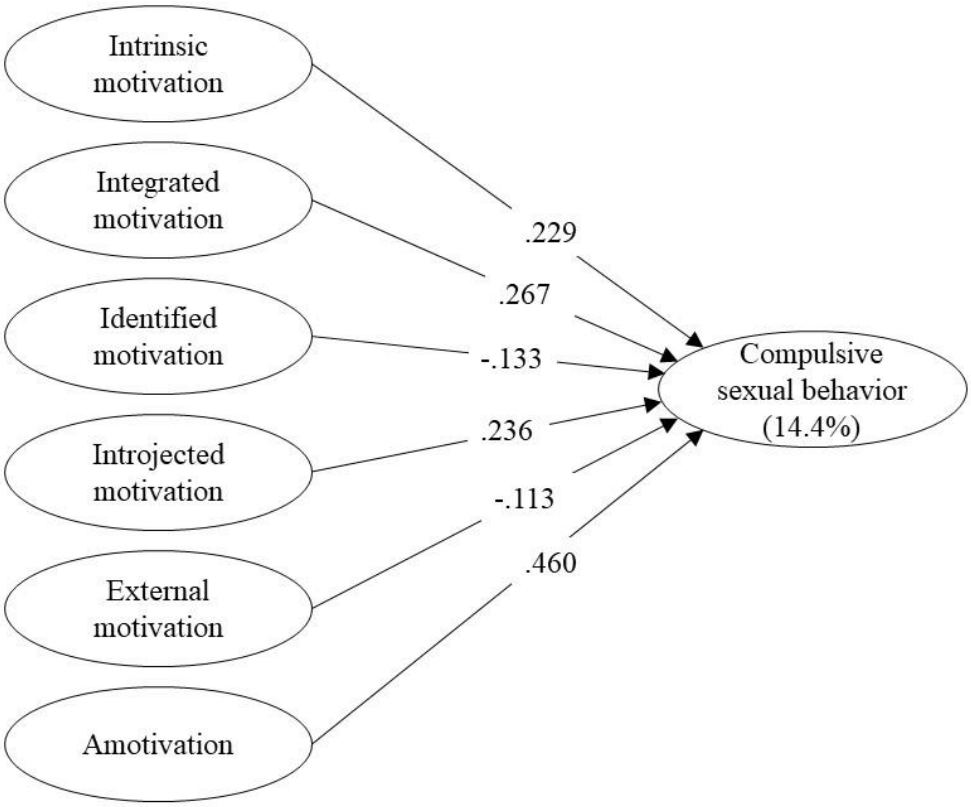
3.2. Examining the Associations between Sexual Motivations and Compulsive Sexual Behavior

Results from the tests of predictive similarity for models are reported in Table 3.4. and support the complete predictive similarity (i.e., invariant regression slopes, invariant regression intercepts, and invariant regression residuals) of these results across the four groups, suggesting no significant differences in the examined associations between German and Hungarian men and women. Therefore, following the principle of parsimony and the conventions of presenting the findings of predictive invariance testing, results are reported for the total sample (Figure 1). Amotivation had the strongest positive association with compulsive sexual behavior (β = .460 [95% CI .353 to .566], p < .001), while integrated (β = .267 [95% CI .218 to .316], p < .001), introjected (β = .236 [95% CI .207 to .266], p < .001), and intrinsic (β = .229 [95% CI .097 to .361], p < .001) motivations were also positively, but weakly related to compulsive sexual behavior. However, identified (β = -.133 [95% CI -.207 to -.059], p < .001) and external (β = -.113 [95% CI -.164 to -.063], p < .001) motivations showed negative and weak associations with compulsive sexual behavior. Sexual motivations explained 14.3% of compulsive sexual behavior (Figure 3.1.).

4. Discussion

Expanding previous research, furthering knowledge on the theoretical conceptualizations of compulsive sexual behavior, and responding to recent calls emphasizing the importance of simultaneously examining different models of compulsive sexual behavior in diverse populations (Grubbs et al., 2020), we aimed to examine sexual motivations underlying compulsive sexual behavior in two separate samples of women and men. Results indicate that higher levels of amotivation, integrated, introjected, and intrinsic motivation were related to higher levels of compulsive sexual behavior. Identified and external motivations were also weakly and negatively related to compulsive sexual behavior. These findings did not differ between Hungarian and German women and men.

Figure 3.1. Visual presentation of the associations between the factors of the Sexual Motivations Scale (SexMS) and the Compulsive Sexual Behavior Disorder Scale (CSBD-19) on the total sample



Note. All variables presented in ellipses are latent variables. For the sake of clarity, indicator variables and correlations between the predictors are not depicted in this figure. One-headed arrows represent standardized regression weights. Percentage in parentheses below the compulsive sexual behavior represents the proportion of explained variance. All pathways were significant at level $p < .001$.

We identified the potential role of a set of sexual motivations underlying compulsive sexual behavior that resembles the conceptualization of the Integrative Model of Compulsive Sexual Behavior (Briken, 2020), namely, positive associations with amotivation, intrinsic, integrated and introjected motivations. Besides the Integrative Model of Compulsive Sexual Behavior (Briken, 2020), these findings resembles Kafka's (Kafka, 2010) Hypersexual conceptualization and the Addiction Model as well (Walton et al., 2017), but to a lesser extent. These results

contribute to the debate surrounding the conceptualization of compulsive sexual behavior as a pathological condition (Walton et al., 2017; Briken, 2020).

4.1. The Motivational Background of Compulsive Sexual Behavior

Compulsive sexual behavior's strong positive association with *amotivation* could be surprising at first. However, it might be due to the compulsive nature of compulsive sexual behavior emphasizing that loss of control over sexual behavior and engagement in sexual behaviors despite other intentions seems to be a central diagnostic in several concepts (Table 1). When the individuals are not conscious of the root of their action (the "why"), the repetitive behavior is "performed in a habitual or stereotyped fashion, either according rigid rules or as a means of avoiding perceived negative consequences" (Fineberg et al., 2014). This notion suggests that individuals rigidly and compulsively engaging in a given activity may not know the reason behind this engagement (i.e., feelings of amotivation).

Although the ICD-11 neither includes integrated nor introjected or intrinsic motivations in the diagnostic guidelines for CSBD (Kraus et al., 2018), those motivations identified in our sample were listed among the features of the Integrated Model for Compulsive Sexual Behavior (Briken, 2020), and partly listed among the DSM-5 criteria of Hypersexul Disorder (Kafka, 2010). First, the current findings support the notion that high *intrinsic motivation* for sexuality (e.g., high sexual desire) is in association with compulsive sexual behavior. Although accompanied by criticism (Winters, 2010), Kafka´s suggestion (Kafka, 1997) of an increased or excessive sexual drive as a marker for compulsive sexual behavior, is supported by our data. However, an increased sexual drive in itself might not be a reliable or sufficient indicator of compulsive sexual behavior (Carvalho et al., 2015; Štulhofer et al., 2016). That said, even sexual motivations that are related to optimal functioning, as they can be beneficial for some people, have the potential to contribute to the development of compulsive sexual behavior. However, it is likely that highly autonomous motivations, such as intrinsic (i.e., having sex because it is pleasurable) and integrated (i.e., sexuality being a meaningful part of a subject's identity) sexual motivations may only contribute to the development of compulsive sexual behavior when they co-occur with high levels of amotivation (i.e., a loss of control over sexual behavior). This notion warrants further examination using person-centered statistical approaches that are naturally suited for the purpose of identifying unique combinations of motivations (e.g., typical/frequent and less typical/less frequent motivational profiles), resulting

in favorable or less optimal outcomes (Tóth-Király et al., 2019; Bőthe, Tóth-Király, et al., 2020).

Our findings also support the notion that *introjected* motivations (such as coping with negative emotions and stress using sexual activities) may be another important motivational factor underlying compulsive sexual behavior (*Contribution of Sexual Desire and Motives to the Compulsive Use of Cybersex in: Journal of Behavioral Addictions Volume 8 Issue 3 (2019)*, n.d.). These two introjected motivations were listed among the proposed DSM-5 diagnostic criteria (i.e., repetitively engaging in sexual behavior in response to dysphoric mood states or stressful life events) but are now absent in ICD-11 (Kraus et al., 2018; Kafka, 2010; Gola et al., 2020). However, longitudinal data suggests that using sex as a coping mechanism to emotional dysregulation could be an early marker of CSBD (Bőthe et al., 2021). Furthermore, these motivations are mentioned also in the Integrated Model of Compulsive Sexual Behavior (Briken, 2020). These results highlight that even though these motivations are not considered in the current classification in ICD-11, they should be addressed in future research to inform future classifications and better understand the clinical characteristics of compulsive sexual behavior (Bőthe et al., 2021).

The associations between women and men's sexual motivations and compulsive sexual behavior did not differ significantly in the present study. Previous research indicates that people's motivations for having sex may differ for women and men (Gravel et al., 2016) . Within heterosexual interactions, men are expected to initiate sex and pursue physical pleasure (Sanchez et al., 2012), whereas gendered sexual norms suggest women have a relationship-centered view of sexuality, (i.e., enhancement of intimacy and partnership bonding) (Levant et al., 2012). Not only does compulsive sexual behavior appears to occur in both women and men - as recently acknowledged (Dickenson et al., 2018a; Bőthe, Potenza, et al., 2020a), but our results indicate that women and men seem to also share comparable sexual motivations when it comes to compulsive sexual behavior. Exaggerating gender differences in sexuality may be therefore problematic, given that stereotypes suggesting that women and men differ greatly on dimensions of sexuality (such as expressions of compulsive sexual behavior) can perpetuate the double standard what in turn might result in judging women's and men's sexuality by different standards (Fuss et al., 2018; Klein et al., 2019).

4.2. Implications

The discussion around the precise conceptualization of compulsive sexual behavior is not only a theoretical issue for its own sake but represents a much larger scope of significance. Without

proper and evidence-based models of the given construct (i.e., compulsive sexual behavior) the assessment, the guidelines for diagnosis or the development of the potential treatment programs is impossible. Thus, making an attempt to identify the conceptualization which fits the behavior the best is key. We identified a pattern of sexual motivations that most strongly resembles the conceptualization of compulsive sexual behavior Integrated Model of Compulsive Sexual Behavior (Briken, 2020). Considering the motivational background of compulsive sexual behavior might be helpful for clinical practitioners to better understand their patients and guide their attention on the suitable aspects of the disorder regarding their treatment. Thus, future research and treatment approaches should consequently consider sexual motivations that are not listed among the ICD-11 guidelines, such as high levels of sexual interest as well as coping with sex. While the first may be subject to pharmacological treatments if it is associated with distress, the latter can be addressed by psychotherapeutic interventions that aim at developing other coping techniques such as mindfulness (Holas et al., 2020).

4.3. Limitations and future studies

Although we used two independent samples from two countries, an important limitation of the present study is the use of convenience samples of general populations in two Western countries (Klein et al., 2021). Consequently, this motivational background of compulsive sexual behavior awaits replication in non-WEIRD (i.e., Western, Educated, Industrialized, Rich, and Democratic) and clinical samples to corroborate our findings. Moreover, the study results lack generalizability, given that studies from a different cultural background may yield other motivational backgrounds of compulsive sexual behaviors since sexual behaviors are highly influenced by the cultural context of the studied population (Klein et al., 2021). Although both samples (i.e., Hungarian and German samples) met the requirements of the conducted analyses, it is important to note that the samples differed in size. This might be due to the different data collection advertisement strategies. Also, we used cross-sectional, self-reported data on self-selected samples that may be prone to biases (e.g., social desirability or recall bias, under-reporting or over-reporting, or participation of individuals who were motivated to complete an online survey).

The present results call for further research in the area of amotivation in association with compulsive sexual behavior. The present study did not differentiate between the different types of amotivation (e.g., lack of interest, lack of relevance for the individual, self-perceived incapability), hence leaving a gap regarding this subject. Furthermore, based on the present and previous findings (Tóth-Király et al., 2019; Tóth-Király, Amoura, Bőthe, et al., 2020; Tóth-

Király, Morin, et al., 2021), person-centered approaches are highly recommended in the future of sexual motivation research, since motivations are not appeared to be exclusive, someone can feel internal and external pressures at the same time for certain behaviors, and sexuality is no exception.

4.4. Conclusions

Addressing recent calls for the integrated examination of different models of compulsive sexual behavior in diverse populations (Grubbs et al., 2020), we explored the roles of a diverse set of sexual motivations in compulsive sexual behavior, reflecting on the current theoretical conceptualizations of compulsive sexual behavior. Amotivation played the strongest role in compulsive sexual behavior, but integrated, introjected, and intrinsic motivations also positively contributed to compulsive sexual behavior, regardless of gender. These findings appear to support the Integrated Model conceptualization of compulsive sexual behavior, furthering our knowledge concerning the conceptualization of compulsive sexual behavior, and providing potential intervention targets in treatment settings.

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IV. The Negative Consequences Of Hypersexuality: Revisiting The Factor Structure Of The Hypersexual Behavior Consequences Scale And Its Correlates In A Large, Non-Clinical Sample[5]

Abstract

Introduction: Despite the growing literature about hypersexuality and its negative consequences, most studies have focused on the risk of sexually transmitted infections (STI's), resulting in relatively few studies about the nature and the measurement of a broader spectrum of adverse consequences.

Methods: The aim of the present study was to examine the validity and reliability of the Hypersexual Behavior Consequence Scale (HBCS) in a large, non-clinical population (N = 16,935 participants; females = 5,854, 34.6%; M_{age} = 33.6, SD_{age} = 11.1) and identify its factor structure across genders. The dataset was divided into three independent samples, taking into consideration gender ratio. The validity of the HBCS was investigated in relation to sexuality-related questions (e.g., frequency of pornography use) and the Hypersexual Behavior Inventory (Sample 3).

Results: Both the exploratory (Sample 1) and confirmatory (Sample 2) factor analyses (CFI = .954, TLI = .948, RMSEA = .061 [90% CI = .059 – .062]) suggested a first-order, four-factor structure that included work-related problems, personal problems, relationship problems, and risky behavior as a result of hypersexuality. The HBCS showed adequate reliability and demonstrated reasonable associations with the examined theoretically relevant correlates, corroborating the validity of the HBCS.

Conclusion: Findings suggest that the HBCS may be used to assess consequences of hypersexuality. It may also be used in clinical settings to assess the severity of hypersexuality and to map potential areas of impairment, and such information may help guide therapeutic interventions.

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[5] **Koós, M.**, Bőthe, B., Orosz, G., Potenza, M. N., Reid, R. C., & Demetrovics, Z. (2021). The negative consequences of hypersexuality: Revisiting the factor structure of the Hypersexual Behavior Consequences Scale and its correlates in a large, non-clinical sample. *Addictive Behaviors Reports*, 13, 100321. https://doi.org/10.1016/j.abrep.2020.100321

1. Introduction

Hypersexual disorder was examined, proposed for inclusion in, and ultimately excluded from the *Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). However, approximately half a decade later and following additional research (e.g., Bőthe, Bartók et al., 2018; Bőthe, Tóth-Király et al., 2018b; Kraus, Meshberg-Cohen, Martino, Quinones, & Potenza, 2015; Voon et al., 2014), compulsive sexual behavior disorder (CSBD) was included in the *11th Revision of the International Classification of Diseases* (ICD-11; World Health Organization, 2018) and officially adopted at the May, 2019 World Health Assembly. CSBD is characterized by repetitive, intense, and prolonged sexual fantasies, sexual urges, and sexual behaviors resulting in clinically significant personal distress or other adverse outcomes, such as significant impairment in interpersonal, occupational, or other important domains of functioning.

Most hypersexuality-related scales contain a factor assessing the negative consequences of hypersexuality (see Table 1 for a detailed description of the scales). One of the most frequently used self-reported assessments, the *Hypersexual Behavior Inventory* (HBI; Reid et al., 2012), is comprised of three subscales, including the four-item Consequences subscale [e.g., “My sexual thoughts and fantasies distract me from accomplishing important tasks.”]. In the *Sexual Addiction Screening Test-Revised* (SAST-R; Carnes et al., 2012) there are two outcome-related factors: (1) the Relationship Disturbance factor consists of items about interpersonal conflicts and difficulties [e.g., “Has your sexual behavior ever created problems for you and your family?”]; and, (2) the Affect Disturbance factor has question related to intrapersonal problems [e.g., “Do you ever feel bad about your sexual behavior?”]. Although the *Compulsive Sexual Behavior Inventory* (Coleman, Miner, Ohlerking & Raymond, 2001) does not contain a whole factor dedicated to negative consequences, it has items assessing problems related to sexual behavior in financial, relationship and emotional domains [e.g., “How often have your sexual activities caused financial problems for you?” or “How often have you felt guilty or shameful about aspects of your behavior?”]. A more recent scale for measuring hypersexuality is the *Compulsive Sexual Behavior Disorder Scale* (CSBD-19; Bőthe et al., 2020), which also contains a factor dedicated to negative consequences [e.g., "My sexual activities interfered with my work and/or education." or "I often found myself in an embarrassing situation because of my sexual behavior"].

As the aforementioned scales suggest, it is important to measure potential adverse outcomes when assessing the impact of hypersexuality. However, there is a relative shortage of validated

and thorough assessments of the consequences of hypersexuality, despite their clinical relevance (Reid, 2015). There exist limitations to extrapolating from the amount or frequency of sexual acts given differences in their potential impacts on individuals. More specifically, determining severity based solely on frequency of engagement in a given behavior may be problematic as human sexual behavior is diverse and how often one engages in sexual behaviors may not always be a reliable indicator of problematic sexual behavior (Bőthe, Tóth-Király, Potenza, Orosz & Demetrovics, 2020). Using symptom count as a guide may also have limitations, especially because in the ICD-11, there are relatively few distinct criteria, and presence/absence of specific aspects may not link directly to clinical impact uniformly across individuals. Furthermore, it is not specified how many features are necessary to diagnose CSBD. Similarly, the proposed DSM-5 description (Kafka, 2010) required meeting four or more of five criteria, making it impossible to create categories of mild, moderate, and severe cases based on criterion count alone. Therefore, assessing the negative consequences —besides the previously established, mainly symptom-oriented aspects— of hypersexuality may contribute to a more reliable clinical assessment, especially concerning the severity of CSBD (Reid, 2015)

Table 4.1. Scales including elements of consequences of hypersexuality

Author	Questionnaire	Type of consequence	Method	
			Participants	Statistical analysis
Andreassen, Pallesen, Griffiths, Torsheim & Sinha, 2018	Bergen-Yale Sex Addiction Scale (BYSAS)	One item about negative consequences (problems in association with relationships, economy, health and/or job/studies)	non-clinical sample (N = 23,533)	Exploratory and Confirmatory Factor Analysis
Bőthe et al., 2020	Compulsive Sexual Behavior Disorder Scale (CSBD – 19)	Negative consequences factor	Study 1: non-clinical, Hungarian-speaking sample (N = 12,026) Study 2: non-clinical, Hungarian-speaking sample, representative to the population of Hungary (N = 505) Study 3: non-clinical, English-speaking sample (N = 538) Study 4: non-clinical German-speaking sample (N = 541)	Exploratory and Confirmatory Factor Analysis
Carnes, Green & Carnes, 2010	Sexual Addiction Screening Test-Revised (SAST – R)	Relationship Disturbance and Affect Disturbance subscales	College students (N_{female}= 60, N_{male} = 47), clergy (N_{female} = 60, N_{male} = 205), outpatients (N_{female} = 85, N_{male} = 508) and inpatients (N_{male}= 57)	Principal Component Analysis, ROC analysis

Carter & Ruiz, 1996	Disorders Screening Inventory – Sexual Addiction Scale (DSI – SAS)	Consequence factor	self-identified patient group (N = 34) and healthy control group (N = 34)	Inter-item correlation
Coleman, Miner, Ohlerking & Raymond, 2001	Compulsive Sexual Behavior Inventory (CSBI)	Items about financial problems, relationship difficulties, and negative emotions	Treatment-seeking non-paraphilic individuals with sex addiction (N = 15), in-treatment individuals with pedophilia (N = 35) and healthy control group (N = 42)	Factor Analysis, Varimax rotation
Efrati & Mikulincer, 2018	Individual-Based Compulsive Sexual Behavior Scale (I- CSB)	Unwanted Consequences factor	Study 1: non-clinical Jewish Israeli sample (N = 492) Study 2: non-clinical Jewish Israeli samples (N_1 = 205; N_2 = 201)	Parallel-analysis, Confirmatory Factor Analysis
Kalichman et al., 1994)	Sexual Compulsivity Scale (SCS)	Items about having sex causing problems in daily life, commitment neglect	Gay men (N = 106)	Item-total correlation, test-retest coefficients, intercorrelation
McBride, Reece & Sanders, 2010	Cognitive and Behavioral Outcomes of Sexual Behavior Scale (CBOSB)	Cognitive and Behavioral factors	Non-clinical sample of young adults (N = 390)	Principal component analysis
Mercer, 1998	Sex Addicts Anonymous Questionnaire (SAAQ)	Items about legal problems, relationship difficulties, and negative emotions	Individuals with sex addiction (= 45), individuals with sexual offenses (n = 45) and healthy control group (N = 37)	ANCOVA, Scheffe post-hoc tests
Muench et al., 2007	Compulsive Sexual Behavior Consequences Scale (CSBCS)	Several global domains, including intimate relationships,	Treatment seeking gay or bisexual men (N = 34)	Item-total correlations,

		physical, personal growth, changing priorities, intrapersonal, interpersonal and occupational		Exploratory Principal Axis Factoring (PAF), Paired t-test (change over time)
Muench et al., 2007	Primary Appraisal Measure: Compulsive Sexual Behavior (PAM- CSB)	Seven life domains from the Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva & Retzlaff, 1992)	Treatment seeking gay or bisexual men (N = 34)	Descriptive Statistics
Raymond et al., 2007	Sexual Symptom Assessment Scale (SSAS)	Items about emotional distress and personal trouble	Men in group therapy (N = 30)	Pearson correlation (test-retest validity and internal consistency)
Reid et al., 2011	Hypersexual Behavior Inventory (HBI)	Consequences subscale	Study 1: male patient group (N = 324) Study 2: male patient group (N = 203)	Study 1: Exploratory Factor Analysis Study 2: Confirmatory Factor Analysis
Reid et al., 2012	Hypersexual Behavior Consequence Scale (HBCS)	Occupational, social, emotional, legal, financial and health-related items	clinical sample of men (N = 130)	Principal Component Factor Analysis

Note. The search was conducted on 28th June 2020

Currently, three self-report scales assess the negative consequences of hypersexuality (McBride, Reece & Sanders, 2010; Miner, Coleman, Center, Ross, & Rosser, 2007; Reid et al., 2012). The *Cognitive and Behavioral Outcomes of Sexual Behavior Scale* (CBOSBS, McBride et al., 2010) was published in the third edition of the Handbook of Sexuality-Related Measures (Fisher et al., 2013), but little information is available on the development process of the scale. The CBOSBS reflects the six-life-domain theory of the Society for the Advancement of Sexual Health (SASH) stating that in the case of hypersexuality, one may experience impairments in financial/occupational, legal, physical, emotional, spiritual, and social domains of daily life, thus providing a framework for assessing adverse outcomes associated with hypersexuality. However, to our best knowledge, this proposed structure was not examined empirically (e.g., with factor analysis) to determine whether these theory-based domains are truly represented in the items of the CBOSBS.

The *Compulsive Sexual Behavior Consequences Scale* (Muench et al., 2007), was constructed using a drug abuse outcome scale as a guide (shortened and modified version of the Inventory of Drug Use Consequences (INDUC-2R; Tonigan & Miller, 2002). The scale was tested on a small sample (34 individuals) for scale development, which limits psychometric assessment of the scale's underlying structure (i.e., for factor analysis, data from 300 individuals have been reported to be necessary; Tabachnick & Fidell, 1996). Furthermore, neither this instrument nor the CBOSBS appears to have been examined empirically for their factor structures.

In contrast, Reid et al. (2012) examined the *Hypersexual Behavior Consequences Scale* (HBCS) in a larger sample (N = 130) as part of the *DSM-5 Field Trial for Hypersexual Disorder*. The field-trial sample consisted of both men and women, the authors explained the development of the HBCS in detail, and the investigators used both self-reported hypersexuality scales and clinical interviews (using the Hypersexual Disorder Diagnostic Clinical Interview – HD-DCI) in the validation process. They conducted a principal component analysis to explore the factor structure of the HBCS (Reid, Garos & Fong, 2012). After the analysis, a one-factor solution emerged with three items (representing legal issues related to sexual behavior and sexually transmitted infections) not fitting well to this factor. However, these items were retained as issues related to legal problems or legal issues, and sexually transmitted infections are relevant for clinicians may have important roles in assessing the severity of the disorder. To investigate the importance of these items, Werner and colleagues' (2018) used a network analytic approach to explore the structure of hypersexuality symptoms. They found a four-component solution of the HBCS in a Croatian sample, in which work-related problems, relationship-related problems,

impairment in personal life, and risk behavior factors were identified. A detailed description of the aforementioned questionnaires is included in Table 4.1.

The aforementioned scales have several limitations with respect to their validation. They were tested using relatively small samples that were often limited to special populations (e.g., young adults, treatment-seeking men, homosexual and bisexual men) and English-speaking populations. Therefore, the aim of the present study was to examine the validity and reliability of one of the most empirically developed and widely used scales (HBCS) in a large, non-clinical, non-English-speaking population and examine the factor structure of the scale in both women and men. We hypothesized that we would identify a single-factor structure as reported previously and that the factor would correlate positively with measures of hypersexuality on the HBI and sexual behaviors.

2. Method

2.1. Procedure and Participants

The present study was approved by the Institutional Review Board of the research team's university and conducted following the Declaration of Helsinki. The study was part of a larger project. Different subsamples from this dataset were used in previously published studies (all previously published studies and included variables can be found at OSF (https://osf.io/dzxrw/?view_only=7139da46cef44c4a9177f711a249a7a4). The HBCS scale was used previously by Zsila and colleagues (2020). Data were collected via an online questionnaire advertised on one of the largest Hungarian news portals. After introducing the study goals and compensation (participants had a chance to win one of three tablets), participants were informed further about the study aims, and informed consent was obtained before data collection. The survey took approximately 30 minutes to complete. Altogether 24,627 people agreed to participate. Our target population was adults; therefore, we excluded 145 underage individuals. Another 110 participants were removed because of inconsistent answers (e.g., they claimed a higher age of the first sexual experience than their actual age). Further, 6,338 individuals were excluded for not having any prior sexual experience. Of the remaining 18,034 individuals, 16,935 completed the Hypersexual Behavior Consequence Scale questionnaire (females = 5,854; 34.6%, males = 10,981, 64.8%; other = 100, 0.6%) aged between 18 and 76 years (M = 33.6, SD = 11.1).

The sample was separated into three non-overlapping groups randomly while preserving the male-female ratio. Participants who claimed to be other than male or female were excluded in

final analyses due to their relatively low representation. Samples 1 and 2 each included 5,611 people (females = 1,951, 34.8%, males = 3,660, 65.2%), and Sample 3 included 5,613 people (females = 1,952, 34.8%, males = 3,661, 65.2%). The detailed demographics of the samples are shown in Appendix 4.1.

2.2. Measures

Hypersexual Behavior Consequences Scale (HBCS, Reid et al., 2012). The HBCS is a 22-item scale reported to consist of one-factor. The HBCS assesses potential sequelae of hypersexual behaviors. Participants endorsed items on a five-point scale (1 = *Hasn't happened and is unlikely to happen*, 5 = *Has happened several times*). The scale was developed with men seeking treatment for hypersexuality in the DSM-5 field trial for hypersexual disorder (Reid, Garos et al., 2012). Problems, such as struggles to maintain healthy self-esteem and self-respect, relationship difficulties, subjective feelings of isolation, legal issues, and diminished quality of one's sex life, are assessed by the scale. The HBCS was translated into Hungarian based on the protocol outlined by Beaton, Bombardier, Guillemin, and Ferraz (2000). The Hungarian version of the scale is presented in Appendix 4.2.

Hypersexual Behavior Inventory (HBI; Reid et al., 2011). The HBI was developed to measure hypersexual behavior via three factors with 19 items: the *coping* factor (α = .86) includes seven items about using sex as a response to stress, or to avoid negative emotions; the *control* factor (α = .82) consists of eight items about the difficulties to manage sexual urges and fantasies; and the *consequences* factor (α = .60) includes four items about work- and school-related concerns secondary to hypersexual behaviors. Participants indicated their answers on a five-point Likert scale (1 = *Never*; 5 = *Very often*). The scale was validated in Hungarian previously (Bőthe, Kovács, et al., 2018).

Sexuality-Related Questions (Bőthe, Bartók, et al., 2018). After standard questions assessing demographic characteristics (gender, age, sexual orientation, relationship status) were presented, additional items queried the number of sexual partners in one's lifetime (16-point scale, 1 = *0 partner*, 16 = *more than 50 partners*), the number of casual partners in one's lifetime (16-point scale, 1 = *0 partner*, 16 = *more than 50 partners*), frequency of sex with a partner in the last year (10-point scale, 1 = *never*, 10 = *6 or 7 times a week*), frequency of sex with casual partner in the last year (10-point scale, 1 = *never*, 10 = *6 or 7 times a week*), frequency of masturbation in the last year (10-point scale, 1 = *never*, 10 = *6 or 7 times a week*), and frequency of pornography consumption while masturbating (8-point scale, 1 = *never*, 8 = *always)*.

2.3. Statistical Analysis

For cleaning and organizing data, IBM SPSS 21 (SPSS Inc., Chicago, IL, USA) software was used, while statistical analysis was conducted using Mplus (Muthén & Muthén, 2005). After the one-factor model did not demonstrate adequate model fit on the total sample, the total sample was randomly separated into three subsamples preserving the male-female ratio. Exploratory Factor Analysis (EFA) was conducted to examine dimensions of the HBCS in Sample 1 (n = 5,611) from one to five-factor solutions. The rotated solutions (oblique rotation of Geomin) with standard errors were obtained for each number of factors. The goodness of fit was assessed (Brown, 2015; Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Muller, 2003) by commonly used goodness-of-fit indices (Brown, 2015; Kline, 2011): the Root-Mean-Square Error of Approximation (RMSEA; ≤ .06 for good, ≤. 08 for acceptable), the Tucker-Lewis Index (TLI; ≥ .95 for good, ≥ .90 for acceptable) and the Comparative Fit Index (CFI; ≥ .95 for good, ≥ .90 for acceptable) with 90% confident intervals. Two reliability indices, Cronbach's alpha (Nunnally, 1978) and Composite Reliability (CR) index, were calculated to assess internal consistency. The CR index was calculated by the formula of Raykov (1997) due to the Cronbach's alpha's potentially decreased efficiency (e.g., Sijtsma, 2009, Schmitt, 1996). Using Sample 2 (n = 5,611), Confirmatory Factor Analysis (CFA) was conducted to test the previously identified four-factor model, using mean- and variance-adjusted weighted least squares (*WLSMV*) estimators. The same fit indices were applied, as in the case of the EFA. Moreover, measurement invariance testing was conducted on six levels based on gender (men versus women) and sexual orientation (heterosexual versus sexual minority) where models with increasingly constrained parameters were estimated (Milfont & Fischer, 2010; Vandenberg & Lance, 2000). After the CFA, configural invariance was tested by freely estimating the factor loadings and thresholds, metric invariance by constraining all factor loadings to be the same, scalar invariance by constraining the intercepts of items to be the same, residual invariance by constraining residuals to be equal, latent variance and covariance invariance by constraining factor variances and covariances to be the same, and latent mean invariance by setting means to be the same across groups. Measurement invariance tests were compared by assessing changes in fit indices, with decreases in CFI and TLI of at least .010 or increases in RMSEA of at least .015 indicating a lack of invariance across the examined groups (Chen, 2007; Cheung & Rensvold, 2002; Tóth-Király, Morin, Bőthe, Orosz & Rigó, 2018).

Using Sample 3 (n = 5,613), the validity of the HBCS was examined. The associations between the HBCS scores and the three factors of the HBI and sexuality-related questions (i.e., number

of sexual partners in one's lifetime, number of casual partners in one's lifetime, frequency of sex with a partner in the last year, frequency of sex with casual partner in the last year, frequency of masturbation in the last year, and frequency of pornography consumption while masturbating) were examined. Bonferroni correction was applied (α=.05; n=91) to reduce the risk of Type I error in the examined associations. Consequently, correlations were considered significant at $p < .0005$.

3. Results

3.1. Results of the Confirmatory Factor Analysis of the One-Factor Model

The one factor model, replicating Reid and colleague's findings (Reid et al, 2012) did not show an acceptable fit to the data when using the total sample (CFI = 0.862, TLI = 0.848, RMSEA = 0.103 [90% CI = 0.102 – 0.104]). Although the items loaded adequately on the one, general factor (λ = 0.416 – 0.871), the model was rejected due to the lack of appropriate goodness-of-fit indices (Brown, 2015; Kline, 2011). Thus, the sample was divided into three subsamples, and exploratory and confirmatory factor analyses were conducted to examine the dimensionality of the HBCS.

3.2. Results of the Exploratory Factor Analyses on Sample 1

In the next step of the analysis, in Sample 1, EFA was performed. To identify the best factor solution, five models were tested. The one-factor (CFI = .719, TLI = .689, RMSEA = .104, [90% CI = .103 – .106]), two-factor (CFI = .856, TLI = .823, RMSEA = .079, (90% CI = .077 – .080]), and three-factor (CFI = .920, TLI = .889, RMSEA = .062, (90% CI = .060 – .064]) solutions were declined as a result of inadequate fit indices. The four-factor model showed an acceptable fit to the data (CFI = .955, TLI = .930, RMSEA = .050, [90% CI = .048 – .051]). Although the five-factor model also showed adequate fit to the data (CFI = .967, TLI = .943, RMSEA = .045, [90% CI = .043 – .047]), following the principle of parsimony and previous findings (Werner, Štulhofer, Waldorp & Jurin, 2018), the four-factor solution was retained. The factors were similar to Werner et al.'s (2018) findings; thus, the names of the factors were based on the names of their components: Personal problems, Relationship problems, Work-related problems, and Risky behavior. The items loaded strongly on their respective factors (overall λ = 0.569-0.898) in the four-factor structure model (see Table 4.2.).

To examine the internal consistencies of the identified factors, two reliability indices were calculated. For three factors, the Cronbach's Alpha ($\alpha_{\text{work-related problems}} = .72$ $\alpha_{\text{personal problems}} = .89$,

$\alpha_{\text{relationship problems}}$ = .75) and Composite Reliability ($CR_{\text{work-related problems}}$ = .68, $CR_{\text{personal problems}}$ = .87, $CR_{\text{relationship problems}}$ = .71) indicators were adequate, whereas those for the Risky behavior factor ($\alpha_{\text{risky behavior}}$ = .56, $CR_{\text{risky behaviorl}}$= .60) were somewhat lower than expected.

Table 4.2. The results of the exploratory factor analysis in Sample 1

	Hypersexual Behavior Consequence Scale			
	Work-related problems	Personal problems	Relationship problems	Risky behavior
I have failed to keep an important commitment because of my sexual activities. (W-RP 2)	.75	-.03	.01	-.04
My sexual activities have interfered with my work or schooling. (W-RP 12)	.72	.08	-.04	-.02
Important goals have been sacrificed because of my sexual activities. (W-RP 7)	.50	.01	.09	.012
I have experienced unwanted financial losses because of my sexual activities. (W-RP 8)	.37	-.03	.15	.12
I have become socially isolated and withdrawn from others because of my sexual activities. (PP 17)	-.08	.81	-.05	.02
My spiritual well-being has suffered because of my sexual activities. (PP 21)	-.01	.80	.01	-.02
My self-respect, self-esteem, or self-confidence has been negatively impacted by my sexual activities. (PP 19)	-.03	.78	-.01	-.04
My sexual activities have negatively affected my mental health (e.g., depression, stress). (PP 16)	-.01	.75	.04	-.02
My ability to connect and feel close to others has been impaired by my sexual activities. (PP 20)	.01	.75	.02	-.02
My sexual activities have interfered with my ability to become my best self. (PP 22)	.26	.59	-.07	-.00
The quality of my personal relationships has suffered because of my sexual activities. (PP 18)	.05	.54	.16	.05
The way I think about sex has been negatively distorted because of my sexual activities. (PP 15)	.17	.47	.07	.03
My sexual activities have interfered with my ability to experience healthy sex. (PP 11)	.17	.41	.01	.03
I have been humiliated or disgraced because of my sexual activities. (PP 13)	.13	.35	.18	.06
I have betrayed trust in a significant relationship because of my sexual activities. (RP 10)	-.07	-.02	.91	-.03
I have emotionally hurt someone I care about because of my sexual activities. (RP 10)	.04	.01	.77	-.05
I have lost the respect of people I care about because of my sexual activities. (RP 14)	.02	.20	.47	.09
A romantic relationship has ended because of my sexual activities. (RP 3)	.08	.13	.39	.07
I have gotten a sexually transmitted disease or infection because of my sexual activities. (RP 4)	.09	.06	.23	.08
I have had legal problems because of my sexual activities. (RB 5)	.01	-.03	.00	.75
I have been arrested because of my sexual activities. (RB 6)	-.03	.04	-.03	.63

I have lost a job because of my sexual activities. (RB 1)	.17	.03	.06	.34

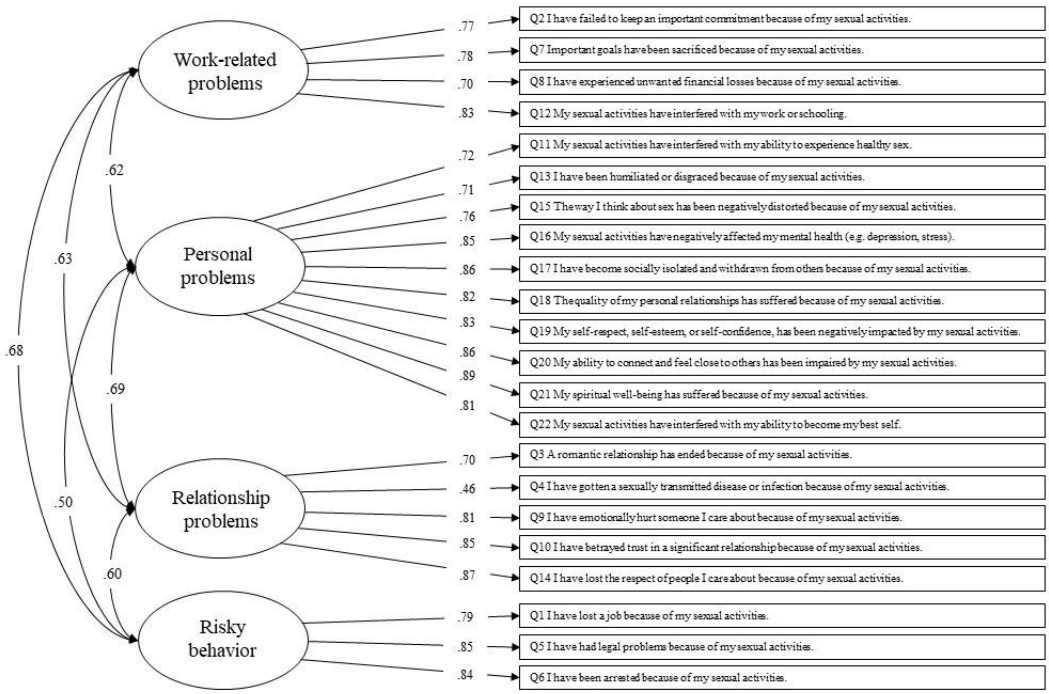
	Descriptive statistics and reliability indices			
Cronbach's alpha	.72	.89	.74	.56
Composite Reliability	.68	.87	.71	.60
Mean	1.51	1.54	1.70	1.06
Standard Deviation	0.74	0.76	0.80	0.22
Skewness	1.71	1.73	1.16	7.24
Kurtosis	2.81	2.55	.64	83.31
	Inter-factor correlations			
Work-related problems factor	-	-	-	-
Personal problems factor	.45*	-	-	-
Relationship problems factor	.47*	.52*	-	-
Risky Behavior factor	.35*	.27*	.31*	-

Note. W-RP = Work-Related Problems factor; PP = Personal Problems factor; RP = Relationship Problems factor; RB = Risky Behavior factor. All factor loadings are standardized. Loadings in bold indicate on which factor the given items loaded. Factor loadings were statistically significant at $p < .001$. Correlations that are significant at the $p < .01$ level are marked with *. The analysis was conducted on Sample 1.

3.3. Confirmatory Factor Analysis

In Sample 2, to further test the construct validity of the four-factor model of the HBCS, CFA was conducted. The model showed acceptable fit to the data (CFI = 0.954, TLI = 0.948, RMSEA = 0.061 [90% CI = 0.059 – 0.062]), and the items loaded adequately on their respective factors (overall $\lambda = 0.489 – 0.900$). The internal consistency indices were also appropriate ($\alpha_{\text{work-related problems}} = 0.71$, $\alpha_{\text{personal problems}} = 0.89$, $\alpha_{\text{relationship problems}} = 0.74$, $CR_{\text{work-related problems}} = 0.85$, $CR_{\text{personal problems}} = 0.95$, $CR_{\text{relationship problems}} = 0.86$), except for the Risky behavior factor ($\alpha_{\text{risky behavior}} = 0.48$, $CR_{\text{risky behavior}} = 0.86$). The results of the CFA can be seen in Figure 4.1.

Figure 4.1. Confirmatory Factor Analysis and the factor structure of the HBCS



Note. Standardized loadings are marked on the arrows, and significant at $p < .01$. One-headed arrows represent standardized factor loadings, two-headed represent correlations.

3.4. Results of the Gender-based Measurement Invariance

Previously, the factor structure of the HBCS (Reid et al., 2012) was examined only on a clinical sample, and only 5.1% of the sample was female (N = 7). Since 34.8% of our sample is female, measurement invariance was conducted between the gender groups (men vs. women) to examine whether the instrument in the two groups measures the same psychological constructs in the same way. First, baseline models were calculated in the two groups, and both of them

showed good fit to the data (see Table 3). Afterward, parameters were restricted gradually in each step, and changes in the goodness-of-fit indicators were examined (Table 4.3.). The changes were within an acceptable range for all of the levels; thus, the two groups do not differ on the underlying construct, suggesting that men and women report similar levels of hypersexuality consequences.

Table 4.3. Gender-based Measurement Invariance of the Hypersexual Behavior Consequences Scale in Sample 2

Model	WLSMV χ^2 (df)	CFI	TLI	RMSEA	90% CI	Comparisons	$\Delta\chi^2$ (df)	ΔCFI	ΔTLI	ΔRMSEA
CFA	4413.105* (203)	.954	.948	.061	.059 - .062	-	-	-	-	-
Gender-based invariance										
Baseline male	4413.105* (203)	.954	.948	.061	.059 - .062	-	-	-	-	-
Baseline female	1222.729* (203)	.966	.962	.051	.048 - .056	-	-	-	-	-
M1. Configural	3833.590* (406)	.963	.958	.055	.053 - .056	-	-	-	-	-
M2. Metric	3808.638* (424)	.964	.961	.053	.052 - .055	M2 – M1	-24.952* (18)	+ .001	+ .003	- .002
M3. Scalar	4027.747* (464)	.962	.962	.052	.051 - .054	M3 – M2	219.109* (40)	- .002	+ .001	- .001
M4. Residual	4071.546* (486)	.962	.964	.051	.050 - .053	M4 – M3	250.159* (22)	.000	+ .002	- .001
M5. Latent variance-covariance	2634.941* (496)	.977	.979	.039	.038 - .041	M5 – M4	111.754* (10)	+ .015	+ .015	- .012
M6. Latent means	2774.451* (500)	.976	.978	.040	.039 - .042	M6 – M5	186.355* (4)	- .001	- .001	- .001

Note. Bold letters indicate the final level of invariance that was achieved. WLSMV = weighted least squares mean- and variance-adjusted estimator, $\chi 2$ = Chi-square, df = degrees of freedom, CFI = comparative fit index, TLI = Tucker–Lewis index, RMSEA = root-mean-square error of approximation, 90% CI = 90% confidence interval of the RMSEA, ΔCFI = change in CFI value compared to the preceding model, ΔTLI = change in the TLI value compared to the preceding model, ΔRMSEA = change in the RMSEA value compared to the preceding model. The significance at the $p < .01$ level is marked with *.

3.5. Results of the Sexual-orientation-based Measurement Invariance

To further support of the validity of the HBCS, sexual orientation-based invariance was also examined. To simplify the statistical analysis and increase the statistical power, we created only two groups based on sexual orientation, given the small sample sizes in the different sexual minority groups. The first group, the *heterosexual group* (n = 5234), included participants who indicated their sexual orientation as *heterosexual* or *heterosexual with homosexuality to some extent*, while the second, *sexual minority group* (n = 320) included participants who indicated their sexual orientation as *bisexual, homosexual with heterosexuality to some extent* or *homosexual.* Individuals who indicate *asexual, unsure*, or *other* answers were excluded from this specific analysis (n = 59). After the baseline models showed adequate fit, the parameters were gradually restricted in each model, similarly as with the gender-based measurements invariance testing (Table 4.4.). In the case of sexual orientation, the changes also remained within an acceptable range for all the levels, indicating that the HBCS function the same way in heterosexual and sexual minority individuals suggesting that heterosexual and sexual minority individuals reported similar levels of hypersexuality consequences.

Table 4.4. Sexual orientation-based Measurement Invariance of the Hypersexual Behavior Consequences Scale in Sample 2

Model	WLSMV χ^2 (df)	CFI	TLI	RMSEA	90% CI	Comparisons	$\Delta\chi^2$ (df)	ΔCFI	ΔTLI	ΔRMSEA
CFA	4413.105* (203)	.954	.948	.061	.059 - .062	-	-	-	-	-
Sexual orientation-based invariance										
Baseline heterosexual group	3823.155 (203)	.956	.950	.058	.057 - .060	-	-	-	-	-
Baseline sexual minority group	427.744 (203)	.963	.958	.057	.049 - .056	-	-	-	-	-
M1. Configural	3824.767 (406)	.961	.956	.055	.053 - .057	-	-	-	-	-
M2. Metric	3710.449 (424)	.963	.960	.053	.051 - .054	M2 – M1	24.249 (18)	+ .002	+ .004	- .002
M3. Scalar	3479.072 (464)	.966	.966	.048	.047 - .050	M3 – M2	45.867 (40)	+ .003	+ .006	- .005
M4. Residual	3110.962 (486)	.970	.972	.044	.043 - .046	M4 – M3	31.918 (22)	+ .004	+ .006	- .041
M5. Latent variance-covariance	2201.021 (496)	.981	.982	.035	.034 - .037	M5 – M4	16.446 (10)	+ .011	+ .010	- .009
M6. Latent means	2679.666 (500)	.975	.977	.040	.038 - .041	M6 – M5	148.904* (4)	- .006	- .005	- .005

Note. Bold letters indicate the final level of equivalence that can be assessed. WLSMV = weighted least squares mean- and variance-adjusted estimator, $\chi 2$ = Chi-square, df = degrees of freedom, CFI = comparative fit index, TLI = Tucker–Lewis index, RMSEA = root-mean-square error of approximation, 90% CI = 90% confidence interval of the RMSEA, ΔCFI = change in CFI value compared to the preceding model, ΔTLI = change in the TLI value compared to the preceding model, ΔRMSEA = change in the RMSEA value compared to the preceding model. The significance at the $p < .01$ level is marked with *.

3.6. The validity of the HBCS in Sample 3

In Sample 3, associations between scores on the HBCS factors, sexuality-related measures, and HBI scores were examined (Table 5). Taken together, the Consequence and the Control factors of the HBI were associated strongly and positively with the HBCS factors, while the Coping factor scores had a moderate and positive relationship with each.

The Risky behavior factor was relatively distinct in multiple aspects: it had weak relationships with the HBI scores and the HBCS factor scores. Among the sexuality-related variables, the question assessing the frequency of sex with a partner was negatively and weakly associated with the HBCS factors (Table 4.5.).

Table 4.5. Correlations between the HBCS factors, HBI factors, and other sexuality-related behaviors and their descriptive statistics in Sample 3

	Skewness (SE)	Kurtosis (SE)	Range	M (SD)	α	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Work-related problems factor	1.79 (.03)	3.09 (.07)	1 – 5	1.48 (0.72)	.62	-												
2. Personal problems factor	1.64 (.03)	2.19 (.07)	1 – 5	1.56 (0.77)	.89	.38*	-											
3. Relationship problems factor	1.26 (.03)	.94 (.07)	1 – 5	1.64 (0.78)	.67	.43*	.50*	-										
4. Risky behavior factor	6.21 (.03)	59.50 (.07)	1 – 5	1.05 (0.21)	.51	.30*	.23*	.27*	-									
5. HBI	1.18 (.03)	1.52 (.07)	1 – 5	1.77 (0.57)	.90	.48*	.52*	.41*	.24*	-								
6. HBI Coping factor	.83 (.03)	.33 (.07)	1 – 5	2.06 (0.79)	.87	.28*	.32*	.25*	.14*	.82*	-							
7. HBI Consequences factor	1.6 (.03)	2.86 (.07)	1 – 5	1.55 (0.63)	.74	.56*	.44*	.37*	.26*	.78*	.47*	-						
8.HBI Control factor	1.51 (.03)	2.39 (.07)	1 – 5	1.64 (0.64)	.83	.43*	.55*	.41*	.23*	.85*	.45*	.66*	-					
9. Number of sexual partners[1]	.00 (.03)	-1.32 (.07)	1 – 16	8.43 (4.32)	-	.19*	.05*	.34*	.10*	.09*	.05*	.10*	.10*	-				
10. Number of casual sex partners[1]	.76 (.03)	- .76 (.07)	1 – 16	5.58 (4.52)	-	.24*	.10*	.35*	.12	.15*	.09	.15*	.16*	.85*	-			

11. Frequency of having sex with a partner[2]	-1.08 (.03)	1.50 (.07)	1 – 10	5.4 (3.12)	-	- .09*	-.20*	-.11*	-.05*	-.21*	-.15*	-.12*	-.21*	-.06*	-.10*	-	
12. Frequency of having sex with casual partner[2]	.81 (.03)	- .12 (.07)	1 – 10	2.08 (1.84)	-	.17*	-.09*	.25*	.11*	.24*	.16*	.23*	.24*	.38*	.41*	-.29*	-
13. Frequency of masturbation[5]	- .71 (.03)	- .16 (.07)	1 – 10	6.77 (2.41)	-	.13*	.15*	.14*	.09*	.31*	.23*	.27*	.26*	.06*	.10*	-.26*	-.17*	-
14. Frequency of pornography viewing	- .44	-1.29	1 – 8	4.94 (2.46)	-	.11*	.05*	.08*	.06*	.04	.09*	.11*	.12*	.01	.06*	.01	-.02	.44*

Note. HBI = Hypersexual Behavior Inventory. M = Mean, SD = Standard Deviation. α = Cronbach's Alpha, CR = Composit Reliability. Pearson correlations were significant at the $p < .0005$ level marked with *.

[1] 1: 0 partners, 2: 1 partner, 3: 2 partners, 4: 3 partners, 5: 4 partners, 6: 5 partners, 7: 6 partners, 8: 7 partners, 9: 8, partners 10: 9 partners, 11: 10 partners, 12: 11-20 partners, 13: 21-30 partners, 14: 31-40 partners, 15: 41-50 partners, 16 = more than 50.

[2] 1: never, 2: once in the last year, 3: 1-6 times in the last year, 4: 7-11 times in the last year, 5: monthly, 6: two or three times a month, 7: weekly, 8: two or three times a week, 9: four or five times a week, 10: six or seven times a week.

4. Discussion

Although multiple studies have investigated the consequences of hypersexuality, they are often limited to assessing the potential risk of sexually transmitted infections like HIV (Coleman et al., 2010; Grov, Parson & Bimbi, 2010; Kalichman & Rompa, 1995; Yeagley, Hickok & Bauermeister, 2014). Few studies have focused on other adverse outcomes related to hypersexuality (e.g., McBride, Reece & Sanders, 2010; Miner, Coleman, Center, Ross, & Rosser, 2007; Reid, 2015; Reid et al., 2012; Chatzittofis et al., 2006), despite the personal distress or impairment in other significant life domains that hypersexual behaviors may create (World Health Organization, 2018; Kafka, 2010). The availability of psychometrically validated instruments to assess and quantitate the consequences of hypersexual behaviors may assist clinical efforts to understand the impact of CSBD. Further, an improved understanding of the relationships between the consequences of hypersexual behaviors and common sexual activities may help understand the public health impacts of specific sexual behaviors and guide clinical treatment. For example, the reduction of adverse consequences might be one factor to consider in assessing positive treatment outcomes among hypersexual patients. Therefore, we examined the validity and reliability of the HBCS that assesses a range of possible adverse outcomes of hypersexuality in a large, non-clinical sample of women and men, and heterosexual and sexual minority individuals. Our *a priori* hypotheses were partially supported. Our hypothesis that we would identify a single-factor structure was not supported; rather, a four-factor structure was observed and replicated in independent samples. However, our hypothesis regarding positive associations with measures of hypersexuality on the HBI and sexual behaviors received some support. Specifically, the validity of the four-factor model of the HBCS was supported by examining correlations with the HBI and sexual behaviors. The findings suggest some sexual behaviors (e.g., those involving casual sexual partners) may be more closely linked to the consequences of hypersexuality than others (e.g., frequency of having sex with a long-term partner, frequency of pornography viewing).

Based on the results of exploratory and confirmatory factor analyses on two independent samples, four factors relating to the negative consequences of hypersexuality emerged: Work-related problems, Personal problems, Relationship problems, and Risky behavior. These factors are similar to those previously reported (Werner et al.,2018). Based on the results of measurement invariance testing, the identified factors operate similarly in groups differing in gender or sexual orientation, suggesting broad applicability of the factor structure and potential use of the scale (Milfont, 2010).

4.1. The HBCS factors and their correlates

4.1.1. The *Work-related problems* factor consisted of four items about neglecting goals and commitments related to school or work and financial problems. This negative consequence factor is in accordance with the ICD-11 diagnosis of CSBD (World Health Organization, 2018) that includes *"neglecting personal care or other interests, activities and responsibilities"* as a defining feature. In Kafka's proposed diagnostic criteria for hypersexuality disorder (2010), the interference in major areas of functioning due to sexual behaviors, urges, and fantasies was also an important criterion. The internal consistency of this factor was acceptable on two independent samples. The results of the EFA indicated that the items had very low cross-loadings, and the results of the CFA indicated strong factor loadings, suggesting that this factor's items assess the same construct. The Work-related problems factor had the strongest positive association with the HBI Consequence factor, a similarly strong relationship with the HBI Control factor, and a moderate relationship with the HBI Coping factor. As for the sexuality-related questions, the Work-related problems factor had a noticeable relationship with the number of sexual partners and the number of casual sexual partners and negligible correlations with the remaining sexuality-related measures. These findings suggest that the number of sexual partners might relate importantly to work-related and school-related concerns. Similar results were obtained in a study in an outpatient sample of hypersexual individuals, in which the highest percentage of participants considered having multiple partners problematic, among other sexuality-related behaviors (Wéry et al., 2016).

4.1.2. The *Personal problems* factor had ten items related to negative emotions, such as experiencing humiliation, isolation and mental and spiritual health problems, or decays in the quality of relationships or sexual experiences. In accordance with the ICD-11 criteria for CSBD (World Health Organization, 2018), CSBD *"causes marked distress or significant impairment in personal (...) or other important areas of functioning."* In Kafka's (2010) proposed diagnostic criteria for hypersexual disorder, "*there is clinically significant personal distress*" relating to hypersexuality. The reliability indices of this factor were excellent, the cross-loadings were negligible according to the results of the EFA, and the factor loadings were strong in the CFA. The Personal problems factor had the strongest positive association with HBI Control scores and also had a strong, positive association with the HBI Consequence factor and a moderate association with the HBI Coping scores. The Personal problems factor did not have a notable correlation with the sexuality-related questions.

4.1.3. The *Relationship problems* factor included five items about sexual behaviors having hurt or betrayed someone else, created relational discord and cessation, and led to sexually transmitted infections. In the ICD-11 criteria for CSBD (World Health Organization, 2018) and in Kafka's proposed criteria for hypersexual disorder (2010), social deterioration is mentioned as a significant aspect of impairment. The internal consistency indices were acceptable, the cross-loadings in the EFA were low, and the factor loadings in the CFA were strong, except for the fourth item. The fourth item (*"I have gotten a sexually transmitted disease or infection because of my sexual activities."*) had a low factor loading (0.23), but it was retained in the final model. On the one hand, it was a goal not to modify the original scale (Reid, 2012); on the other hand, having a question about health-related consequences is important, considering the potential personal, clinical, and public health impacts of hypersexuality (Coleman et al., 2010; Grov et al., 2010; Kalichman & Rompa, 1995; Yeagley et al., 2014). This item, despite a lower scale loading, was retained based on a similar rationale used to retain suicide items on depression scales that yield poor factor loadings. Specifically, while such items are outliers being endorsed less frequently among respondents, these items are clinically relevant and have important treatment ramifications. The *Relationship problems* factor correlated positively and strongly with the Control factor and moderately with the other two HBI factors. This factor also had the strongest correlations with the numbers of sexual and casual sexual partners from the sexuality-related questions. More partners may result in more intrapersonal interactions, and thus possibly greater likelihood of getting into conflicts with one another. The factor also had a noticeable correlation with the frequency of having sex with a casual partner.

4.1.4. The *Risky behavior* factor included three items about legal concerns, arrests, and losing one's job due to hypersexual behavior. Legal problems are not specifically mentioned in either criterion for CSBD (World Health Organization, 2018) or in those for hypersexual disorder (Kafka, 2015); however, impairments in occupational domains are mentioned, which could include losing a job. The reliability indices were rather low, but the cross-loadings in the EFA were negligible, and factor loadings in the CFA varied. While the first item (*"I have lost a job because of my sexual activities."*) had a low factor loading (.34), the fifth and sixth items had acceptable factor loadings. This situation may reflect the last two items having more similar meanings than the first one, with the first partly cross-loading onto the Work-related problems factor. Regarding the meaning of the first item, it may be located somewhere between these two factors; it could be considered a career-related problem and a more severe, legal consequence at the same time. It is possible that the reliability indices of the Risky behavior factor were low as a result of the diverse item set (i.e., the factor was comprised of items related to losing a job

and getting arrested in association with hypersexual behavior) and the relatively low number of items on this factor. This factor had the weakest correlations among the HBCS factors, especially with the Personal problems factor. These findings may reflect the nature of its items because the component questions seemed to include the most severe circumstances queried. However, again, given the clinical relevance of such items in treatment, it is important for health care providers to know about this information when working with patient populations.

4.2. The associations between the consequences of hypersexuality and other, sexuality-related questions

It is important to highlight that the associations between the HBCS factors and the sexuality-related questions were small, presumably given that strong sexual desire (and consequently, frequent sexual activity) may be related to the elevated levels of these sexual behaviors –and may not necessarily reflect hypersexuality (Carvalho, Štulhofer, Vieira & Jurin, 2015; Štulhofer, Jurin & Briken, 2016; Werner, Štulhofer, Waldorp & Jurin, 2018; Štulhofer, Bergeron & Jurin, 2016). These results are also in line with recent findings suggesting that frequent pornography use in and of itself may not always indicate problematic pornography use (Bőthe, Tóth-Király, Potenza, Orosz & Demetrovics, 2020; Bőthe, Lonza, Štulhofer & Demetrovics, 2020).

Frequency of having sex with a partner was associated negatively with the HBCS and the HBI subscales. These findings suggest that the frequency of sex with a partner may not be related to negative consequences and rather may be less frequently associated with negative consequences. As such, some patterns of frequent partnered sex may be related to positive effects rather than adverse effects (Långström & Hanson, 2006). This finding supports the decision to refer to this the diagnostic entity as CSBD in the ICD-11 rather than hypersexual disorder as it was proposed for DSM-5. These findings are also in line with previous results suggesting that strong sexual desire and many sexual experience with the primary partner may not indicate a hypersexuality disorder (Starks, Grov & Parsons, 2013; Štulhofer, Jurin & Briken, 2016). However, frequent casual partners were more strongly associated with negative consequences, suggesting that frequency of sex with multiple, casual partners may be more likely to be associated with negative consequences.

Interestingly, the frequency of masturbation was inversely associated with the frequency of sex with a partner and positively associated with HBCS scores and slightly more noticeably with the HBI scores. The nature of these relationships warrant additional investigation to determine

whether individuals may masturbate in response to decreased frequency of partnered sex, increased masturbation (for example to pornography) may lead to relationship discord and increased masturbation, relationship problems lead both to decreased partnered sex and increased masturbation, or other possibilities (Reid, Carpenter, Draper & Manning, 2010). These relationships warrant additional investigation in longitudinal studies.

The relationships between frequency of pornography viewing and hypersexual consequences were if significant, positive, and relatively modest. These findings suggest that pornography use frequency in community samples may not link particularly strongly to self-reported hypersexuality consequences (Werner et al., 2018; Bőthe, Koós, Tóth-Király, Orosz & Demetrovics, 2019; Bőthe et al., 2019). Nonetheless, as over 80% of individuals in treatment for hypersexual disorder reported problems with pornography use, such concerns may be very clinically relevant (Reid et al., 2012). As such, an improved understanding of when and how an increased frequency of pornography viewing may be problematic is needed (Bőthe et al., 2020). Some data suggest that quantity and frequency measures may relate differentially to problematic pornography use (Brand, Antons, Wegmann, & Potenza, 2018; Fernandez et al., 2017), and problematic pornography use has been associated with adverse health measures more so than pornography viewing per se (Kor et al., 2014; Kraus et al., 2016; (Bőthe, Tóth-Király, Potenza, Orosz & Demetrovics, 2020; Bőthe et al., 2020). Additionally, the negative consequences of types and patterns of pornography viewing may take time to develop and be recognized by individuals. For example, sexual arousal templates may be influenced by the types and patterns of pornography viewed (Sun, Bridges, Johnson & Ezzell, 2016). Further, the content of pornography (e.g., with respect to depictions of violence and aggression towards women and the potential impacts on aggressive behaviors towards women in real-life settings -Wright, Tokunaga, 2016) may contribute to negative consequences that may not be perceived as being related to sexual behaviors and thus may not be captured through scales like the HBCS. As such, relationships between types and patterns of pornography viewing and hypersexual consequences and other health measures warrant additional careful investigation, including in longitudinal studies.

4.3. Limitations and future studies

The present study was cross-sectional, limiting causal inferences. As a result of the anonymous online survey method, the identities of participants were not known. However, it is suggested that people tend to be more honest online when disclosing potentially sensitive information (Griffiths, 2012). Although the data were not representative of the population (i.e., it excluded

people without internet access or no interest in reading news websites), it included a wide range of respondents. Although the HBCS was developed to assess the consequences of hypersexuality among individuals with hypersexuality, the present study was conducted on a community sample to examine the reliability and validity of the HBCS. This large, non-clinical sample provided the possibility to identify and corroborate the dimensionality, structural validity, and reliability of the HBCS on samples with sufficient samples sizes (more than 300 participants per sample) and to have adequate variability in the responses of the individuals (Tabachnick & Fidell, 1996). The Cronbach's alpha values of the Risky behavior factor were low, likely due to the low number of items on this factor and the wide range of legal consequences it may cover. Further examination of possible gender-related or sexual orientation-related (e.g., Bőthe, Bartók et al., 2018) differences is needed to determine the extent to which they may experience negative consequences of hypersexuality similarly or differently.

5. Conclusions and Implications

The HBCS is a valid and reliable scale to assess adverse outcomes related to hypersexuality. The HBCS may be used not only in large-scale survey studies but possibly also in clinical settings to assess the severity of hypersexuality and to map potential areas of impairment (Reid, Carpenter, et al., 2012). Such information may guide therapeutic interventions (e.g., to focus on relationship problems, difficulties at work or in school, or legal concerns). However, it is important to address that the HBCS scale is not supposed to be used to determine the presence or absence of hypersexuality or measure possible consequences of hypersexual behavioras a stand-alone assessment. It is highly suggested by the authors to use it with well-validated scales that assess hypersexuality directly (e.g., the HBI – Reid et al., 2011; the CSBD-19 – Bőthe, Potenza, et al., 2020), due to the possibility of false negative cases. For example, a person with a paraphilia could easily score high on the HBCS (e.g., legal problems, arrested, lost job, have been humiliated, impairment in relationships), without experiencing actual hypersexual urges and behaviors *per se.* Therefore, the HBCS scale could be used to determine the severity of adverse consequences of hypersexuality and to identify areas of life impacted *after* hypersexuality was assessed.

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V. No Significant Changes In Addictive And Problematic Behaviors During The Covid-19 Pandemic And Related Lockdowns: A Three-Wave Longitudinal Study[6]

Abstract

Introduction: The COVID-19 outbreak and related lockdowns brought substantial changes in people's lives and led to concerns about possible increases of addictive behaviors at the initial stages of the pandemic. To examine these concerns, the aim of the present study was to assess longitudinal changes in addictive and problematic behaviors (i.e., problematic social media use, internet gaming disorder, gambling disorder, problematic pornography use, and compulsive sexual behavior disorder) over time during the COVID-19 pandemic.

Methods: Three waves of data collection took place in different stages of the COVID-19 outbreak in Hungary in a general population, from the first wave of lockdowns to the second and third waves of restrictions (May, 2020; N_{T1} = 1747; June-August, 2020; N_{T2} = 656; January, 2021; N_{T3} = 411). Latent growth curve models were calculated to assess the potential changes in addictive and problematic behaviors over time.

Results: Latent growth curve models showed that the sample varied in their initial scores, but there were no significant changes over time in any of the examined behaviors, except for compulsive behavior disorder, which demonstrated a small but significant increase (i.e., positive and significant slope factor). However, the rate of this change was negligible. Overall, there were no noteworthy changes over time regarding any of the examined addictive and problematic behaviors.

Conclusion: Contrary to initial concerns, no substantial changes over time were observed regarding the examined addictive behaviors during the COVID-19 pandemic and related lockdowns. These findings indicate that those who had no previous problem with these addictive behaviors, might have not developed a problem, and those who had problem with either of the behaviors previously, might have not experienced a significant increase in their symptoms.

[6] Koós, M., Demetrovics, Z., Griffiths, M. D., & Bőthe, B. (2022). No Significant Changes in Addictive and Problematic Behaviors During the COVID-19 Pandemic and Related Lockdowns: A Three-Wave Longitudinal Study. *Frontiers in Psychology*, *13*, 837315. https://doi.org/10.3389/fpsyg.2022.837315

1. Introduction

The spread of the COVID-19 virus and the restrictions that followed substantially changed everyday life worldwide, and individuals had to adapt to these changes quickly. Nationwide lockdowns were enforced, and the major areas of people's lives were moved to the online sphere. The new measures such as physical distancing, lockdowns, quarantining, and working and/or learning from home, led to the deprivation of many basic psychological needs (e.g., being able to physically connect to others, being intimate, the subjective feeling of freedom, and autonomy) (Ryan & Deci, 2017). Consequently, the question has arisen of how these changes and new stressors might have affected individuals' mental health (Armbruster & Klotzbücher, 2020). Previous studies suggest that isolation might have severe negative effects on mental health, such as elevated stress or anxiety levels (Bai et al., 2004; Brooks et al., 2020; Henssler et al., 2021; Liu et al., 2012; Purssell et al., 2020; Sprang & Silman, 2013; Wu et al., 2009). Furthermore, there is already a great body of evidence on the negative impacts of the COVID-19 pandemic on mental health and general well-being (L. Chen et al., 2021; Daly et al., 2021; Kira et al., 2021; Magson et al., 2021; O'Connor et al., 2021; Ravens-Sieberer et al., 2021; Wang et al., 2021). In addition to lockdown-related isolation, several other stressors could be present during these times, including health anxiety, grief, and financial problems (Kira et al., 2021).

Individuals with already existing mental health problems are considered one of the main risk groups affected by isolation (Burton et al., 2020; Gillard et al., 2021), as in some other countries, in-person mental health services have also become limited in Hungary during the pandemic, making relapse prevention even more challenging (Columb et al., 2020; Kar et al., 2020; Liese & Monley, 2021). Moreover, those living with addictive disorders might be at an even higher risk of experiencing decline of their mental health or relapsing (Bonny-Noach & Gold, 2021), since leisure activities are limited to at-home activities (Kar et al., 2020), creating an environment, where avoiding cue stimuli of the given problematic behavior is extremely difficult. Following from learning theories (where addiction involves learning associations between cues, responses and reinforcements), limiting the exposure to these cues and reinforcing new, competing behaviors (which could serve as a healthy alternative) (Hyman et al., 2006; West, 2013) would be key in relapse prevention, although in lockdown situations, these activities appear to be difficult to pursue. However, the imitation theories of addiction, and more specifically, social learning theory (which describes the beginning of an addiction in the context of imitating behavioral patterns, with assimilation of identities) (Heyes, 2011;

Smith, 2021) might not support this notion, since the possibilities of observing and mimicking others' behavior is limited during social distancing. From another perspective, based on the reflective choice theories of addiction, examining (actual or perceived) cost and benefits of the decisions and behaviors (Davies, 2013; Lussier et al., 2006) might be biased if the circumstances are psychologically challenging, such as during a worldwide pandemic. It might be easier to underestimate the risks and the negative consequences of the given behavior (e.g., impairment in social relations, hobbies), resulting in possible cognitive biases (Field & Cox, 2008; Olusanya, 2014).

In association with lockdowns, a significant proportion of life shifted to online platforms (Király et al., 2020). Although the use of the information and communication technology (ICT) are inevitable and provide a great solution to the current unprecedented situation (e.g., working or being taught from home), increased screen-based activities might be a risk factor for developing problematic use, or cause a relapse cycle for those who were already involved in potentially addictive behaviors (Fineberg et al., 2018; King et al., 2020; Ko & Yen, 2020; Masaeli & Farhadi, 2021; Mestre-Bach et al., 2020; Singh et al., 2020). Although more frequent use of ICT is not a sufficient criterion for defining problems with these behaviors, using them to cope with the elevated stress levels and to avoid adverse psychological states and moods are among the strongest motivations underlying problematic and addictive behaviors (Bőthe, Beáta Bőthe, et al., 2021; Bőthe et al., 2022; Király et al., 2015; Sinha, 2001). This phenomenon might be explained by the emotional self-medication theory (Khantzian, 1997; Kor et al., 2013; Torres & Papini, 2016). This theory proposes that using a given activity to reduce stress and avoid negative emotions may contribute to the severity of the addictive behavior, by maintaining that behavior via negative reinforcement (Blume et al., 2000). Moreover, as in some other countries, in-person mental health services have become limited in Hungary during the pandemic, making relapse prevention even more challenging (Columb et al., 2020; Kar et al., 2020; Liese & Monley, 2021).

At the initial stages of the pandemic, it was proposed in the literature that not just the frequency of specific addictive behaviors, but also the severity of problematic behaviors might increase during the COVID-19 pandemic and related lockdowns due to the aforementioned processes (Awan et al., 2021; Király et al., 2020; Mestre-Bach et al., 2020; Singh et al., 2020). However, the methodologies and the research designs of most studies that tried to provide empirical answers to these propositions varied. In the case of some screen-based activities, studies have analyzed the user trends and behavioral patterns. More specifically, pornography searches showed a clear peak during lockdowns (Pornhub Insights, 2020; Zattoni et al., 2021), while

gambling (e.g., online betting, online casino use) showed no changes over time, or even decreased (Auer & Griffiths, 2021; Auer et al., 2020; Lindner et al., 2020).

There is a large body of cross-sectional survey studies conducted during the pandemic, working with retrospective methods (i.e., asking participants to think back to the pre-pandemic times and comparing it to current use) regarding the frequency of the given behavior (e.g., Gainsbury et al., 2021; Håkansson, 2020; Lugo et al., 2021; Sallie et al., 2021; Wardle et al., 2021). However, there is a relative lack of longitudinal studies. Teng et al. (2021) examined 903 adolescents regarding internet gaming disorder. They found significant increases both in gaming behavior frequency and severity of gaming disorder over a period of six months (conducting data collections before and after the COVID-19 outbreak), which was predicted by depressive and anxiety symptoms, but not inversely. These findings could be interpreted as adolescents used gaming to cope with negative feelings and emotions during these stressful times, resulting in more severe symptoms of gaming disorder. This is in line with previous studies indicating that coping and escapism motivations can be strong indicators of problematic internet gaming (Király et al., 2015; Schneider et al., 2018). In contrast, Chen et al. (2021) found that Chinese students reported decreased problematic social media use and problematic gaming during the COVID-19 outbreak period, compared to pre-pandemic baseline measures.

Regarding problematic pornography use, Grubbs et al. (2021) collected data from a nationally representative sample of US adults before and during the COVID-19 pandemic over a period of 15 months, and reported a downward trend in pornography use frequency over time (Grubbs et al., 2021). Although there was an initial peak of use during the first lockdown (April and May 2020), even for those participants who reported a self-perceived increase in their use, pornography use frequency returned to the same level after six months. Problematic pornography use did not change in the case of women, and decreased over time in the case of men between August of 2019 and October of 2020 (Grubbs et al., 2021). Another repeated-measure study of adolescents' pornography use that compared pre-pandemic and during pandemic use had similar findings (Bőthe et al., 2022). Namely, neither the frequency of use, motivations, nor problematic use changed over time.

No longitudinal study has been published examining other problematic or addictive behaviors, such as problematic social media use, gambling disorder, or compulsive sexual behavior disorder symptoms during the COVID-19 pandemic. However, relying solely on cross-sectional and retrospective data might lead to biased conclusions, since causality cannot be inferred from cross-sectional research designs (Rindfleisch et al., 2008). Moreover, based on previous findings, intense and time-consuming behaviors might not be inherently problematic or

addictive and therefore the frequency or quantity of engagement in a given behavior should be considered as a peripherical symptom of problematic use (Billieux et al., 2019; Bőthe, Lonza, et al., 2020; Charlton & Danforth, 2007). Consequently, examining the aforementioned behaviors without assuming that an elevated frequency of use would automatically lead to problematic use (Bőthe, Tóth-Király, et al., 2020) might contribute to the scientific discussion of the possible impacts of the pandemic. The present study aims to fill this gap by monitoring longitudinal changes in addictive and problematic behaviors (i.e., problematic social media use, internet gaming disorder, gambling disorder) over time during the COVID-19 pandemic to better understand the potential impact of the stay-at-home policies and related elevated stress levels. As no prior longitudinal reports are available about these problematic behaviors during the COVID-19 pandemic, the present study was conducted in an exploratory manner.

2. Method

2.1. Procedure and participants

Online data was collected via a popular Hungarian news website. The first data collection wave was conducted in May 2020, immediately after the Hungarian government declared a state of emergency. Schools, universities, and leisure establishments were closed, individuals were advised to stay at home (except for essential workers) and practice physical distancing. The second data collection wave was during the summer of 2020 (July-August), when almost all of these restrictions were lifted. Although schools were not open due to the summer vacation period, cinemas, pubs, and restaurants reopened, and the state of emergency was withdrawn. The third wave of the data collection was conducted in January 2021, when new restrictions were introduced on top of the already existing ones from the spring of 2020. For example, individuals could not leave their homes between 8 p.m. to 5 a.m. (i.e., a curfew was introduced). Participants were informed about the aims of the study and informed consent was obtained. The survey took approximately 30 minutes to complete and only adults (18 years old and above) were invited to participate. Participants were asked to provide their email addresses if they agreed to participate in the next data collection waves, but it was not obligatory. They were assured that their personal information (i.e., email address) was handled according to the General Data Protection Regulation (GDPR) and stored in a different dataset than their answers to the surveys, guaranteeing their anonymity. A unique and reproducible identification code (e.g., a letter from their mother's name, a number from their year of birth) was collected to match their answers in the different data collection waves. The study was approved by the

Institutional Review Board of the research team's university and conducted in accordance with the Declaration of Helsinki.

A total of 1747 participants completed the survey at the first data collection wave. Seven participants were excluded for being underaged. A total of 1091 individuals agreed to participate in the second wave of data collection (i.e., provided their email address during the first data collection wave and agreed to be contacted for follow-up survey), of which 656 filled out the survey during the second data collection wave, and 411 also completed the survey at the third data collection point. The gender ratio was equal at the first data collection wave (N_{males}= 882; 50.5%) and the mean age of the sample was 41.96 years (*SD* = 12.52). Detailed sociodemographic characteristics of the participants are presented in Appendix 5.1.

2.2. Measures

Before each psychometric scale assessing a problematic behavior, a screening question was presented whether the individual had engaged in a given behavior in the past 12 months ("*Did you __ in the last 12 months?*"). If participants engaged in the specified behavior in the past 12 months, they then completed a psychometric scale assessing problematic or addictive engagement in that particular behavior in the past seven days. The reliability of all measures was acceptable (α = .55 to .90; see Table 5.1.). The following measures were used to assess the five problematic behaviors:

Bergen Social Media Addiction Scale (BSMAS; (Andreassen et al., 2017; Hungarian version: Bányai et al., 2017). The six-item BSMAS was used to assess problematic social media use regarding several platforms (e.g., Facebook, Twitter). The items (e.g., "*How often have you become restless or troubled if you have been prohibited from using social media?*") are based on the component model of addictions (Griffiths, 2005). Participants indicate their answers on a five-point scale (1 = "very rarely"; 5 = "very often"). Scores are summed, and higher scores indicate higher degree of problematic social media use.

Internet Gaming Disorder Test-10 (IGDT-10; Király et al., 2019). The ten-item IGDT-10 was used to assess problematic gaming. The ten items cover the nine diagnostic criteria of Internet Gaming Disorder in the DSM-5 (American Psychiatric Association, 2013) by combining items 9 and 10 during the scoring, since they assess the same criteria (e.g., "*Have you risked or lost a significant relationship because of gaming?*"). Although participants indicate the frequency of the given statements on a three-point scale (0 = "never"; 1 = "sometimes"; 2 = "often"), items were recoded as dichotomous variables (1 = "yes'; 0 = "no") to resemble the structure of the DSM-5 criteria for further analyses, in line with the recommendations of the original validation

paper (Király et al., 01/2017). Scores are summed, and higher scores indicate a higher degree of problematic gaming.

Problem Gambling Severity Index (PGSI; Holtgraves, 2009; Hungarian version: Gyollai et al., 2013). The nine-item PGSI was used to assess gambling disorder. Four items assess gambling behavior (e.g., "*How often have you go back another day to try to win back the money you lost?*"), and five items assess related negative consequences (e.g., "*How often 2001has your gambling caused any financial problems for you or your household?*"). Participants indicate their answers on a four-point scale (0 = "*never*"; 3 = "*almost always*"). Scores are summed, and higher scores indicate a higher degree of problematic gambling.

Problematic Pornography Consumption Scale (PPCS-6; Bőthe, Vaillancourt-Morel, et al., 2021). The six-item PPCS-6 was used to assess problematic pornography use. The items (e.g., "*When I vowed not to watch porn anymore, I could only do it for a short period of time*") are based on the component model of addictions (Griffiths, 2005). Participants indicate their answers on a seven-point scale (1 = "never"; 7 = "very often). Scores are summed, and higher scores indicate higher levels of problematic pornography use.

Compulsive Sexual Behavior Disorder Scale (CSBD-19; (Bőthe, Potenza, et al., 2020). The 19-item CSBD was used to assess compulsive sexual behavior. The items are based on those in the ICD-11 (11th Revision of the International Classification of Diseases; World Health Organization, 2019) and assesses five factors (control, salience, relapse, dissatisfaction and negative consequences). The items (e.g., "*I could not control my sexual cravings and desires*") are answered on a four-point scale (1 = "totally disagree; 4 = "totally agree"). Scores are summed, and higher scores indicate higher levels of compulsive sexual behavior.

Table 5.1. Descriptive statistics, normality indices, and psychometric properties of the scales

		Problematic social media use (BSMAS)	Online gaming disorder (IGDT-10)	Gambling Disorder (PGSI)	Problematic pornography use (PPCS-6)	Compulsive Sexual behavior Disorder (CSBD-19)
N	T1	1188	680	547	712	835
	T2	534	219	236	278	408
	T3	340	144	166	182	235

M (SD)	T1	9.61 (3.98)	0.36 (.96)	9.27 (1.60)	10.02 (5.75)	24.31 (6.75)
	T2	9.13 (3.45)	0.25 (.84)	9.16 (0.77)	9.87 (5.56)	23.39 (6.25)
	T3	9.58 (3.77)	0.27 (.93)	9.12 (0.49)	9.81 (5.66)	22.43 (5.84)
Observed range	T1	6-28	0-9	9-27	6- 42	19-66
	T2	6-26	0-8	9-17	6-40	19-55
	T3	6-24	0-7	9-13	6-40	19-62
Cronbach's alpha	T1	.80	.71	.93	.85	.90
	T2	.77	.75	.71	.84	.90
	T3	.80	.78	.55	.86	.90
Composite Reliability Index (CRI)	T1	.81	.76	.91	.86	.90
	T2	.78	.79	.73	.86	.91
	T3	.81	.84	NA	.88	.92
Skewness (SE)	T1	1.30 (.07)	4.02 (.09)	8.16 (.10)	1.97 (.09)	2.06 (.09)
	T2	1.36 (.11)	5.46 (.16)	7.28 (.16)	2.18 (.15)	2.20 (.12)
	T3	1.182 (.13)	5.07 (.20)	4.98 (.19)	2.19 (.18)	3.16 (.16)
Kurtosis (SE)	T1	1.36 (.14)	20.92 (.19)	75.29 (.21)	4.23 (.18)	5.17 (.17)
	T2	1.76 (.21)	38.69 (.33)	61.65 (.32)	5.63 (.29)	5.43 (.24)
	T3	0.93 (.26)	29.93 (.40)	4.98 (.19)	5.67 (.36)	13.20 (.32)

Note. BSMAS = Bergen Social Media Addiction Scale; IGDT-10 = Internet Gaming Disorder Test-10; PGSI = Problem Gambling Severity Index; PPCS-6 = Problematic Pornography Consumption Scale - 6; CSBD-19 = Compulsive Sexual Behavioral Disorder Scale; M = Mean; SD = Standard Deviation; SE = Standard Error.

2.3. Statistical analyses

SPSS 28 (SPSS Inc., Chicago, IL, USA) was used for cleaning and organizing data, and for descriptive statistics, normality indices (i.e., skewness and kurtosis values), attrition analysis, and correlations. In the attrition analysis, three groups of participants (participants who completed the survey, those who dropped-out at T2, and those who dropped-out at T3) were compared regarding their demographic characteristics (e.g., gender, age, relationship status, sexual orientation), using one-way ANOVAs (or nonparametric test if the assumptions were not met) with post-hoc tests for continuous variables, and χ^2 tests for categorical variables. All other analyses were conducted using Mplus 8 (Muthén & Muthén, 1998-2018).

First, confirmatory factor analyses were conducted to obtain factor scores for all constructs, as factor scores have the advantage of providing some control for measurement error by allocating more weight to the items with lower error variances, compared to manifest scale scores (Skrondal & Laake, 2001). These factor scores were used for a series of latent growth curve analyses to examine the change over time in the aforementioned potentially addictive behaviors, with the assumption of linear growth trajectories. For confirmatory factor analyses, the Weighted Least Squares Means and Variance adjusted estimator (WLSMV) was used. Goodness of fit were determined by commonly used indices (Brown, 2015; Kline, 2015): the χ^2 values, the Root-Mean-Square Error of Approximation (RMSEA; ≤ .06 for good, ≤. 08 for acceptable), the Tucker-Lewis Index (TLI; ≥ .95 for good, ≥ .90 for acceptable) and the Comparative Fit Index (CFI; ≥ .95 for good, ≥ .90 for acceptable) with 90% confidence intervals. However, when evaluating RMSEA values, a number of things need to be taken into account including the sample size and degrees of freedom. Moreover, the model specification of the given model, and multiple fit indices should be examined simultaneously when deciding about a given model's adequacy (F. Chen et al., 2008; Kenny et al., 2015). Latent growth curve models were used to examine the changes over time in problematic social media use, internet gaming disorder, gambling disorder, problematic pornography use, and compulsive sexual behavior disorder.

The Robust Maximum Likelihood estimator (MLR) was used for the curve models to account for the natural nonnormality of the examined constructs. To determine goodness-of-fit, the same indices were taken into consideration as in case of the confirmatory factor analyses. The time differences between data collection waves were accounted for in the analyses, linear slopes were defined as a baseline measurement (T1) fixed to two (given that the first data collection wave started two months after the start of the pandemic), the second measurement point (T2)

was fixed to four (i.e., the second data collection wave took place four months after the start of the pandemic), while the third measurement point (T3) was fixed to nine (i.e., the third data collection wave took place nine months after the start of the pandemic), representing the months that passed between them.

Additional latent growth curve (LGC) models were specified for each construct, where the linear slope factors of the second data collection time (T2) were freely estimated, considering the lifted restrictions during that time. In these alternative models, the possibility that data could deviate from the linear trajectory at T2 was allowed (Grubbs et al., 2021). To compare the nested models, χ^2 difference testing was performed (Bryant & Satorra, 2012). Considering the high drop-out rates (ranging from 52.2% to 68.8% at T2, and from 29.7% to 42.4% at T3), the Full Information Maximum Likelihood method (Lang & Little, 2018; Newman, 2003, 2014) was used to handle missing data.

3. Results

3.1. Descriptive statistics and correlations

Attrition analysis was conducted regarding participants demographic characteristics (e.g., gender, age, sexual orientation) and levels of problematic and addictive behaviors at the baseline data collection. Three groups of participants were compared: those who completed the follow-up survey, those who dropped-out at the second data collection, and those who dropped-out at the third. Since the assumptions for one-way ANOVAs were not met in any case, nonparametric tests were used (independent samples Kruskal-Wallis test) for continuous variables and χ^2 tests were used in case of categorical variables. Only gender and the initial scores of problematic social media use showed significant differences between participants who dropped out from the study and those who completed the follow-ups, but the effect sizes remained small in both cases, indicating negligible differences. Participants who stayed in the study reported higher scores of problematic social media use, and men were more likely to drop out of the study. The detailed results are presented in Appendix 5.2.

Descriptive data and correlations between the measured constructs at T1, T2 and T3 are presented in Tables 5.1. and 5.2. The mean scores of the given problematic behaviors in the three time points are presented in Figure 5.1. Due to high floor effects, Spearman's Rhos were calculated. In general, positive and moderate-to-strong associations were observed between the majority of the examined variables. However, in the case of the third data collection wave, higher numbers of associations were non-significant due to the smaller sample sizes. Sexuality-

related behaviors had positive and strong associations at all data collection waves. Internet gaming disorder had positive and moderate-to-strong associations with every other construct in both T1 and T2 data collections. These associations were higher in the case of gambling disorder and problematic pornography use than with compulsive sexual behavior disorder and problematic social media use. Problematic social media use had the weakest associations with all other variables, ranging from .11 to .30.

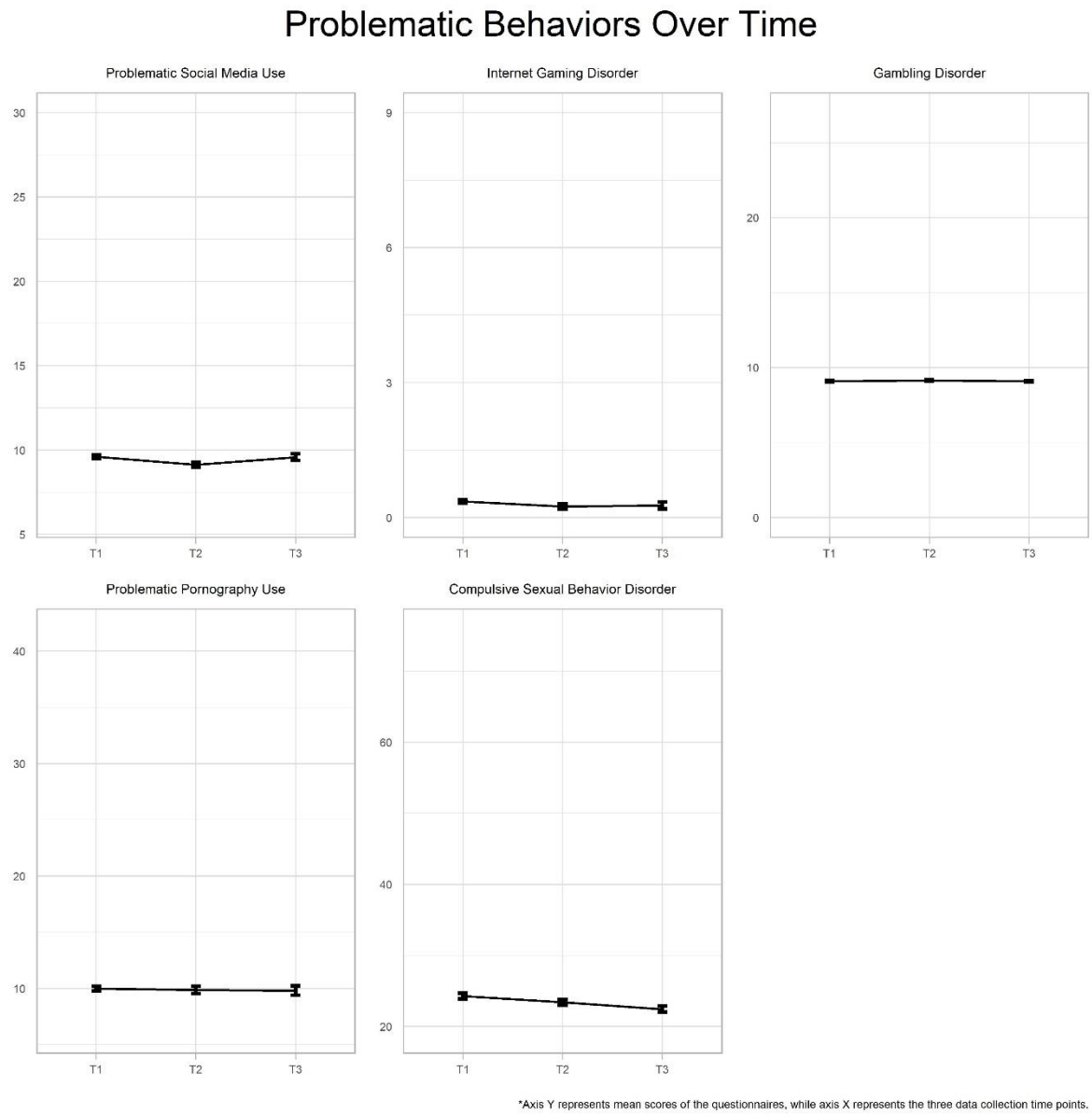
Table 5.2. Correlations between the scales in the three data collection waves

	Problematic social media use	Online gaming disorder	Gambling disorder	Problematic pornography use
Online gaming disorder	.26** / .17* / .23*	-		
Gambling disorder	.12*/ .04 / .00	.38** /.76** /- .06	-	
Problematic social media use	.14** / .30** / .29**	.39** / .52** / .10	.40**/ .25**/ .08	-
Compulsive sexual behavior disorder	.11** / .27** / .17**	.36** / .26** / .02	.43** / .25** /- .02	.54**/ .57** / .76**

Note. The three values in each box are the correlations at the three data collections (i.e., T1 / T2 / T3). *p< .05, **p< .01.

Figure 5.1.

Visual representation of the problematic behaviors over time



Note. X-axis values should be interpreted as follows: T1 = May 2020, T2 = July-August 2020, T3 = January 2021.

3.2. Growth curve models

The goodness of fit indices for all confirmatory factor analyses and latent growth curve models are presented in Tables 5.3. and 5.4. The models consistently showed acceptable fit to the data. In case of every problematic behavior examined, two separate LGCMs were specified: one in which all time-points were fixed to a linear growth trend, and an alternative model, allowing the second time-point (T2) to vary freely, due to the differences in the lockdown-

related restrictions at that time-point. Chi-square difference tests of model fit[7] showed that the alternative model fits were not significantly better than the originals' fit. Therefore, the fixed models were retained for each behavior. All models' goodness-of-fit indices are presented in Table 5.3.

[7] Problematic social media use: $\Delta \chi^2[1] = 2.85$, $p = .221$; internet gaming disorder: $\Delta \chi^2[1] = -0.42$, $p = .110$; gambling disorder: $\Delta \chi^2[1] = 20.07$, $p = .585$; problematic pornography use: $\Delta \chi^2[1] = 0.94$, $p = .301$; compulsive sexual behavior disorder ($\Delta \chi^2[1] = 0.97$, $p = .325$).

Table 5.3. Goodness-of-fit statistics for the estimated models

Model	χ^2	df	CFI	TLI	RMSEA	90% CI of RMSEA
Problematic social media use - CFA, T1	70.154**	9	.986	.976	.076	.060 - .093
Problematic social media use - CFA, T2	73.267**	9	.957	.928	.116	.092 - .141
Problematic social media use - CFA, T3	37.659**	9	.979	.965	.097	.066 - .130
Problematic social media use - LGC	15.725**	1	.959	.876	.108	.065 - .158
Problematic social media use - LGC alternative model	54.844**	0	.846	1.000	.000	.000 - .000
Online gaming disorder - CFA, T1	40.611*	27	.989	.985	.027	.004 - .043
Online gaming disorder - CFA, T2	25.796	27	.989	.985	.027	.004 - .043
Online gaming disorder - CFA, T3	43.901*	27	.984	.978	.066	.026 - .100
Online gaming disorder	2.550	1	.965	.895	.046	.000 - .119

- LGC						
Online gaming disorder - LGC alternative model	0.000**	0	1.000	1.000	.000	.000 - .000
Gambling disorder - CFA, T1[1]	58.123**	27	.997	.996	.046	.030 - .062
Gambling disorder - LGC	0.308	1	1.000	1.000	0.000	.000 - .088
Gambling disorder - LGC alternative model	0.207**	0	.991	1.000	.000	.000 - .000
Problematic pornography use - CFA, T1	21.797**	9	.997	.995	.045	.021 - .069
Problematic pornography use - CFA, T2	14.839	9	.996	.994	.048	.000 - .091
Problematic pornography use - CFA, T3	15.240	9	.995	.992	.062	.000 - 114
Problematic pornography use - LGC	1.145	1	.999	.997	.014	.000 - .098
Problematic pornography use - LGC alternative model	0.148**	0	.999	1.000	.000	.000 - .000

Compulsive sexual behavior disorder - CFA, T1	661.599**	147	.947	.938	.065	.060 - .070
Compulsive sexual behavior disorder - CFA, T2	389.494**	147	.960	.954	.063	.056 - .071
Compulsive sexual behavior disorder - CFA, T3	302.724**	147	.953	.946	.067	.056 - .078
Compulsive sexual behavior disorder - LGC	0.359	1	1.000	1.000	0.000	.000 - .730
Compulsive sexual behavior disorder - LGC alternative model	9.297**	0	.958	1.000	.000	.000 - .000

Note. χ^2 = robust chi square test for exact of fit; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; 90% CI = confidence interval of the RMSEA; CFA = confirmatory factor analysis; LGC = latent growth-curve model; alternative model = the variance of the slope factor left infixed at the second data collection time-point.

The three values in each box are the correlations at the three data collections (i.e., T1 / T2 / T3).

[1]In case of gambling disorder, the Latent Growth Curve Models were computed using the measured scale points, as the confirmatory factor analyses did not converge on T2 and T3 data collection waves.

*p< .05; **p< .01.

Table 5.4. Growth Curve Models

	M	SE	*p*-value	variance	SE	*p*-value	*r*	*p* - value

Problematic social media use intercept	0.060	0.030	0.044	0.665	0.055	<0.001		
Problematic social media use slope	-0.006	0.005	0.249	0.010	0.000	<0.001		
Standardized intercept-slope covariance							-0.046	0.000
Internet gaming disorder intercept	0.108	0.020	0.000	0.255	0.078	0.001		
Internet gaming disorder Slope	-0.004	0.004	0.392	0.005	0.003	0.060		
Standardized intercept-slope covariance							-0.025	0.029
Gambling disorder intercept	9.294	0.074	0.000	2.577	0.937	0.006		
Gambling disorder slope	-0.015	0.009	0.088	0.001	0.000	<0.001		
Standardized intercept-slope covariance							-0.155	0.007
Problematic pornography use intercept	0.130	0.048	0.007	1.172	0.200	<0.001		

Problematic pornography use slope	-0.012	0.009	-0.182	0.014	0.004	0.002		
Standardized intercept-slope covariance							-0.052	0.100
Compulsive sexual behavior disorder Intercept	0.105	0.031	0.001	0.412	0.058	<0.001		
Compulsive sexual behavior disorder slope	0.016	0.006	0.005	0.004	0.001	<0.001		
Standardized intercept-slope covariance							-0.011	0.155

Note. M = Mean; SE = Standard Error.

In the case of problematic social media use, the intercept showed significant and moderate variance, indicating that the sample varied in their initial levels of problematic social media use. The model showed no significant change over time, since the mean of the slope factor was not significant. Although the variance of the slope factor was significant, the variance itself remained negligible (see Table 5.4.).

Based on the intercept factor, there was significant but low variability in the initial scores of the sample regarding internet gaming disorder. However, neither the mean, nor the variance of the slope factor was significant. Therefore, there was no significant change over time regarding internet gaming disorder.

In the case of gambling disorder, the LGCMs were calculated based on the assessed scale point of the PGSI, as confirmatory analyses did not converge on T2 and T3 time-points, not allowing the obtaining of latent factor scores. There was a high variability in the initial scores, suggesting that participants' initial levels of gambling disorder at T1 varied significantly. The mean of the slope factor was not significant, indicating no change over time regarding gambling disorder.

Problematic pornography use's linear trend was also calculated. The intercept was significant, and the variance of it was high, suggesting that the sample varied greatly in the initial scores of problematic pornography use. Although the variance of the slope was significant, it varied very little, and the slope was not significant, indicating no change over time in problematic pornography use.

Regarding compulsive sexual behavior disorder, the intercept showed moderate variability of the initial scores at T1. Although both the mean and the variance of the slope was significant, the small variance indicated negligible increases over time.

In sum, all LGCMs followed a linear trend and showed that the sample varied in their initial scores. However, no significant changes were observed over time in any of the examined problematic or addictive behaviors, except for compulsive behavior disorder, which demonstrated a small but significant increase.

4. Discussion

To address concerns about the potential impact of the COVID-19 outbreak on potentially addictive behaviors, the aim of the present study was to assess longitudinal changes in addictive and problematic behaviors (i.e., problematic social media use, internet gaming disorder, gambling disorder, problematic pornography use, and compulsive sexual behavior disorder) over time during the COVID-19 pandemic. Data collection took place over the course of the first and second wave of the pandemic in Hungary, starting at the beginning of the outbreak,

when most of the restrictions came into force (May 2020), during the summer, when the situation was somewhat more relaxed (June-August 2020), and lastly, in the middle of the second wave of the pandemic, when even more strict rules were applied (January 2020). Results suggested no significant changes over the course of the ten months of data collection in any of the studied problematic behaviors. These findings indicate that those who had no problem with these addictive behaviors at the first data collection, might have not developed a problem over time, and those who had problems with any of the behaviors, might have not experienced a significant increase in their symptoms. However, these findings are based on data collected during the first wave of the pandemic and does not provide us about pre-pandemic levels of problematic behaviors. It is also important to note that in case of every problematic behavior, significant variability was observed at the initial scores and the changes over time as well. Meaning that the sample not only varied in their initial level of problematic behaviors, but that some participants might have experienced greater changes (either increase or decrease) in these behaviors over time than others. The present results are in line with previous, longitudinal findings about problematic pornography use during the pandemic (Bőthe et al., 2022; Grubbs et al., 2021) and contradict other longitudinal results about gaming disorder symptoms (Teng et al., 2021). However, the latter study assessed adolescents' gaming behaviors, therefore, these findings might not be comparable to the present study or previous findings among adults (Grubbs et al., 2021).

Although several studies reported that participants might have experienced elevated self-perceived frequency of the examined behaviors based on retrospective assessment techniques (Gainsbury et al., 2021; Håkansson, 2020; Lugo et al., 2021; Sallie et al., 2021; Wardle et al., 2021), it seems that "hard data" and participants' perception of their own behaviors do not completely overlap (Auer & Griffiths, 2020; Auer et al., 2021). Due to potential recall bias (Hipp et al., 2020; Schmier & Halpern, 2004), findings based on repeated measurements have stronger evidential values than studies using retrospective reports (i.e., asking participants to think back and report their use – frequency or symptom severity – at pre-pandemic times).

Since the first data collection wave was after the COVID-19 outbreak started (May 2020), it needs to be considered that the severity of these disorders might have already been elevated at the time of the first data collection point. Therefore, the findings might have assessed the already increased levels of symptoms throughout the pandemic. If this was the case, it would not be surprising that the analyses indicated no change over time, since the baseline measurement would have already deviated from the general levels of symptom-severity.

Moreover, it is important to note that for most of these potentially addictive behaviors with official diagnostic criteria, one key criterion is to experience symptoms for a prolonged period of time (e.g., at least for six = months) to meet the diagnostic criteria (American Psychiatric Association 2013; World Health Organization, 2019). In the present study, participants were asked about their behaviors over the past seven days. Therefore, even if some elevation had been traceable in the symptoms, it still would not have meant the trends met clinical thresholds. Because of the high drop-out rates, it is also a possibility that participants were lost who had higher risk of developing problematic, out-of-control behaviors (for example, due to living situation, preexisting mental health issues, etc.). Previous studies examining longitudinal attrition analyses demonstrated that there is a chance of losing the most vulnerable participants at an early stage of data collection, when working with repeated measures (Štulhofer et al., 2021). However, attrition analysis did not show significant differences between participants who completed the follow-up surveys and those who dropped out during the follow-ups in the present study in their sociodemographic characteristics and initial levels of problematic behaviors. Nevertheless, it is possible that the COVID-19 pandemic and the related lockdowns impacted individuals' mental health or addictive behaviors. It is possible that other addictive disorders (e.g., alcohol dependence or other substance use disorders), out of the scope of the present study, might have worsened and/or displaced the behaviors studied during these stressful times (Acuff et al., 2021; Xu et al., 2021). For example, alcohol use disorder was a prevalent health issue in Hungary before the pandemic (Horváth et al., 2019; World Health Organization, 2019) and it might have increased during the COVID-19 pandemic.

4.1. Limitations and future directions

Although this study examined longitudinal changes in five potentially addictive and problematic behaviors over a period of ten months, some limitations (in addition to those already mentioned above) need to be noted. Beside the methodological advantages of the repeated measure design, the large drop-out rates resulted in small sample sizes by the final data collection wave. However, the use of the Full Information Maximum Likelihood method decreased the potential biases deriving from this limitation (Lang and Little, 2018; Newman, 2003, 2014). The lack of a pre-pandemic, baseline measurement is also a limitation of the present study. Although the linear slopes of the LGCMs were defined according to the months that passed after the COVDI-19 outbreak in Hungary (T1 assessment was fixed to two instead of the standard zero), these adjustments cannot substitute for a baseline data collection. However, as the outbreak of a global pandemic was unpredictable, the research team were not

able to plan for a baseline data collection before the pandemic. As in the case of studies operating with a large body of survey battery, the study was sparing with the number of scales and items used to minimize survey fatigue. Therefore, several theoretically driven addictive behaviors were not included in the present study (e.g., compulsive online shopping, exercise addiction, work addiction). In the present study, a convenience sample of the general population was used, limiting the generalizability of the results to participants who have internet access. Furthermore, exploring the co-occurrence among different problematic behaviors would have also been a relevant study aim. However, the present study did not have a sufficient sample size to conduct such a complex analysis.

Lastly, using self-report online scales to assess problematic and addictive behaviors and symptoms could potentially lead to biases (e.g., underreporting, or overreporting, social desirability bias). While the examined disorders and symptoms did not worsen over time during the COVID-19 pandemic in the general population, it is possible that a smaller number of participants (i.e., who have been at risk by the beginning of the lockdowns already) would have indicated change over time. But since the present study focused on a general trend, the possible effect was not detectable. Therefore, future studies could focus on more specific samples instead of the general population, such as individuals with pre-existing mental health disorders (Bonny-Noach & Gold, 2021). Alternatively, person-centered approaches could offer a solution for this issue in the future (e.g., mixture models). Furthermore, including theoretically justified control variables (e.g., living situation, health-anxiety) could also result in more specific knowledge on the potential impacts of the pandemic.

4.2. Conclusions

Contrary to initial concerns (Singh et al. 2020; Király et al. 2020; Awan et al. 2021; Marchi et al. 2021; Mestre-Bach et al. 2020), no substantial changes were detected over time in problematic and potentially addictive behaviors (i.e., problematic social media use, internet gaming disorder, gambling disorder, problematic pornography use, and compulsive sexual behavior disorder) during the COVID-19 pandemic. The present study also addressed another concern regarding more frequent engagement in screen-based activities during the COVID-19 pandemic. The present results are in line with previous studies suggesting that more frequent engagement in a given activity might not be a sufficient indicator of problematic use (Bőthe, Tóth-Király, et al., 2020; Grubbs et al., 2019). In this sense, elevated frequency of use during the COVID-19 pandemic might not necessarily result in developing problematic and out-of-control behaviors.

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VI. General Discussion

In the following chapter, summary of the results regarding each study are presented, as well as reflections on these findings, and on the present dissertation as a whole. Besides the main findings, it includes the four studies' theoretical and practical implications as well. Limitations and future research directions and unanswered research questions are further discussed. The chapter closes with the final conclusions of the dissertation.

1. Brief Summary

Although CSBD-related research has been growing exponentially in the past decade (Grubbs, Hoagland, et al., 2020), especially since it became an official diagnosis in the ICD-11 (World Health Organization, 2022), there are several questions still unanswered regarding its conceptualization, classification, predictors, comorbidities, outcomes, course over time, and therapeutic indications (Kraus et al., 2018, 2016; Turner et al., 2022). The present dissertation examined some of these questions through a scientific lens and addressed several of the controversies and gaps by reflecting on recent advancements in the field and by investigating its predictors, outcomes and temporal stability over time.

At this point, no sufficient evidence is available to decide on which classification would be the most suitable for CSBD, since it poses justification and contradictions for impulse control, compulsivity-related, and addictive disorders as well (*Study 1*). Both the Sexual Motivations Scale (SexMS) and the Hypersexual Behavior Consequence Scale showed strong and valid psychometric properties and were invariant across genders and sexual orientations (*Studies 2 and 3*). These results suggest that both scales are reliable and valid assessment tools to measure sexual motivations underlying CSBD and its negative outcomes in a variety of populations. Furthermore, different sexual motivations related to CSBD in a certain way, which pattern was consistent throughout both genders and nationalities. Amotivation had the strongest positive association with CSBD, but integrated, introjected, and intrinsic motivations also positively predicted it. Regarding its negative outcomes, intrapersonal problems showed the strongest, while legal problems resulted in the weakest associations with CSBD. Regarding CSBD's course over time, no significant changes were observed during the different stages of the COVID-19 related lockdowns, meaning that those who had no problem with their sexual behavior to begin with, did not develop CSBD over time, and those who had initial difficulties, did not worsen either (*Study 4*). The main findings of the studies are summarized briefly in Table 6.1.

Table 6.1. Brief summary of the studies' findings presented in the dissertation.

	Running title	Research aim(s)	Main finding(s)
Study 1.	Contradicting classification, nomenclature, and diagnostic criteria of Compulsive Sexual Behavior Disorder (CSBD) and future directions: Commentary to the debate: "Behavioral addictions in the ICD-11"	Reflecting on the contradictions between the current classification, nomenclature, and diagnostic criteria of CSBD, and their potential outcomes in research and clinical settings.	(1) No sufficient scientific evidence is available to conclude what would be the most adequate classification of CSBD; (2) Potential future research directions were proposed that might contribute to key insights on the roles of impulsivity and compulsivity in CSBD, advancing its classification .
Study 2.	Sexual Motivations Underlying Compulsive Sexual Behavior in women and Men from Germany and Hungary	Examining the associations between sexual motivations and compulsive sexual behavior, and examining potential gender differences in these associations. Additionally, comparing the empirical support this study could provide for the most popular theoretical models explaining CSBD.	(1) Amotivation played the strongest role in compulsive sexual behavior, but integrated, introjected, and intrinsic motivations also positively contributed to CSBD. (2) These associations were universal, regardless of gender or nationality. (3) The findings appear to support the Integrated Model of CSBD the most.
Study 3.	The negative consequences of hypersexuality: Revisiting the factor structure of the Hypersexual Behavior Consequences Scale and its correlates in a large, non-clinical sample	Translating and adapting the Hypersexual Behavior Consequence Scale (HBCS) into Hungarian, testing its validity, reliability, and factor structure across genders and sexual orientations, and examining its association with compulsive sexual behavior.	(1) The HBCS is a valid and reliable scale to assess adverse outcomes related to CSBD; (2) Neither genders, nor sexual orientations did not differ on the underlying construct of the HBCS scale.

Study 4.	No Significant Changes in Addictive and Problematic Behaviors During the COVID-19 Pandemic and Related Lockdowns: A Three-Wave Longitudinal Study	Assessing longitudinal changes in addictive and problematic behaviors (e.g., CSBD) over time during the COVID-19 pandemic.	No substantial changes were detected over time in problematic and potentially addictive behaviors during the different stages of the COVID-19 pandemic, including CSBD.

2. Main Findings of the Studies

2.1. Study 1.

The present study drew attention to the inconsistencies between the nomenclature (i.e., compulsive sexual behavior disorder) and classification (i.e., listed under the impulse control disorders) of CSBD. Both diagnostic directions are present in the criteria of ICD-11,. The characteristics of impulse control disorders are implied, where a "*persistent pattern of failure to control intense, repetitive sexual impulses or urges resulting in repetitive sexual behavior*" is stated, and compulsivity is mentioned as this behavior continues *"despite adverse consequences or deriving little or no satisfaction from it*". Both of these diagnostic criteria entail loss of control over a behavior, although it differs greatly whether we approach from impulsivity or compulsivity. In case of impulsivity, being out of control means that the individual is acting without assessing future, potentially negative consequences, to gain instant gratification from the activity (i.e. reward-driven risk taking) (Fineberg et al., 02/2014). However, in the case of compulsivity, impaired control over a behavior implies that the individual is engaging in the acts in a rigid, repetitive manner, dictated by inflexible rules, in order to avoid perceived – either realistic or imagines – negative consequences, which can be external or internal (i.e., habit-related harm-avoidance) (Fineberg et al., 2014).

Importantly, both of these transdiagnostic characteristics are present in addictive behaviors as well (e.g., problematic online gaming, gambling disorder) (Choi et al., 2014; Kim et al., 2017). Impulsivity, as a risk factor for developing addictive behaviors, has been proposed in previous studies (Fineberg et al., 2014; Verdejo-García et al., 2008). Based on those findings, one possible explanation for the seemingly contradicting characteristics of impulsivity-compulsivity might be that impulsivity and reward-seeking is attributed to the early stages of CSBD, and over time, the acts may become habitual, and less pleasurable. However, in the lack of longitudinal and experimental study designs, and ecological momentary assessment methods conducted on treatment-seeking or clinical samples, the scientific literature today does not have enough data to answer with certainty whether CSBD should be classified as an impulse control, compulsivity-related, or addictive disorder. In conclusion, there is no sufficient evidence available just yet to determine classification and diagnostic criteria for CSBD. However, the present paper suggested research directions for the future, which could potentially contribute to expand our knowledge on the role of impulsivity and compulsivity in CSBD, which could lead to better classification.

2.2. Study 2.

According to our findings, higher levels of CSBD were associated with higher levels of amotivation, integrated, introjected, and intrinsic motivation. Furthermore, CSBD was also weakly and negatively correlated with identified and external reasons to engage in sexual behavior. Neither gender, nor nationality-based differences were observed in these associations. This pattern between motivations and CSBD can be partly found in Kafka's proposal for Hypersexual Disorder (Kafka, 2010) and the Addiction Model of CSBD as well (Walton et al., 2017), but it resembles Birken's Integrated Model of Compulsive Sexual Behavior (Briken, 2020) to the highest extent. This resemblance further supports the pathological conceptualization of CSBD, in contrast to the non-pathological models, like the high sexual drive model (Winters et al., 2010).

Among all sexual motivations, amotivation showed the strongest positive association with CSBD. Amotivation refers to not exactly knowing one's motivation for a behavior, but still engaging in it. This association might seem surprising at first, but it could refer to the compulsive nature of CSBD. That is, experiencing impaired control over one's sexual behavior, but engaging in it in a repetitive manner, following rigid rules, to avoid negative consequences (Fineberg et al., 2014), and at the same time, gaining little or no pleasure and satisfaction from these acts anymore. It is possible that someone who is acting rigidly, and not gaining gratification from the behavior, might not even know why they still continue their sexual behaviors, therefore, experiencing high levels of amotivation.

The present findings of positive associations between CSBD, intrinsic (i.e., engaging in sexual acts for the individual's own pleasure) and integrated motivations (i.e., engaging in sexual acts because the individual view themselves as a sexual being) contribute to the notion that even those motivations that are associated with optimal sexual functioning have the potential to contribute to problematic behaviors. However, it is reasonable to assume that they might need to co-occur with other risk factors to have this potential risk effect. Moreover, the association with intrinsic sexual motivation support the notion that high sexual drive and desire might play a role in the development of CSBD (Winters et al., 2010). Yet, it is important to note that high sexual drive in itself might not be considered CSBD (Carvalho et al., 2015).

Finally, the positive association with introjected sexual motivation (i.e., engaging in sexual acts to avoid negative internal states) supported previous findings that using sex to cope with negative emotional states, stress, or depressive and anxiety symptoms is an important element of CSBD. Previous studies reported that emotional dysregulation (i.e., impairment in

recognizing, monitoring, evaluating and controlling one's own emotions) could be one of the core characteristics of CSBD, similarly to other mood and substance use disorders (Lew-Starowicz et al., 2020). The present findings, therefore, support the assumptions that coping with negative internal states, and having difficulties with emotional regulation might be an integral characteristic of CSBD.

Besides examining the associations between sexual motivations and CSBD, another aim of the study was to compare theoretical model explaining CSBD and determine which one or ones of them resemble our findings the most. The Integrated Model of CSBD mirrored these pattern of associations to the highest extent, namely, intrinsic, introjected and amotiovation are all mentioned in the model, and integrated motivation is party implied (Briken, 2020). Drawing elements from the Salience Theory framework, differentiating between liking and wanting, intrinsic motivation is thoroughly explained. The model also incorporates habituation, which could mean that the individual behaves in a certain way, because they feel that it is an integral part of their identity. Therefore, integrated motivation is implied. Habituation, however, also indicates that although the frequency of the given behavior increased, the gratification and satisfaction it gives to the individual, decreases with time, which implies amotivation. Using sex to cope with stress and negative mental states is explicitly mentioned in the model, thus introjected motivation is implied. To conclude, the sexual motivations that were identified to underline CSBD are important for diagnosing and treating patients and could potentially be part of the therapeutic procedure.

2.3. Study 3.

The third study examined negative outcomes that might relate to CSBD by translating and adapting the Hypersexual Behavior Consequence Scale (HBCS) (Reid et al., 2012) to Hungarian. On the Hungarian sample, the scale yielded a four-factor solution instead of the original single-factor, and this result was replicated on independent samples. The scale did not differ in its psychometric properties neither in gender (men and women), nor in sexual orientation-based (heterosexual and sexual minority individuals) groups, suggesting the broad applicability of the scale. All of the HBCS factors correlated moderately and positively with CSBD and weakly and positively with most of the sexual behavior-related questions, except for frequency of having sex with a romantic partner (as opposed to casual partners), which consistently showed weak, but negative correlations.

The *Work-related problems* factor had items about school, work, or other occupational and financial problems. The content of this factor is in line with the ICD-11 diagnostic criteria of CSBD, that includes *"… sexual activities becoming the central focus of the person's life to the point of neglecting (…) activities and responsibilities*" (World Health Organization, 2022). It had strong and positive association with CSBD and weak, positive association with the sexuality related questions, except for the frequency of having sex with the romantic partner. The *Personal problems* factor includes items about subjective, internal negative experiences, like isolation, humiliation, or spiritual problems. It is in line with the ICD-11 guidelines as well, which states that CSBD "*causes marked distress or significant impairment in personal (…) or other important areas of functioning*" (World Health Organization, 2022). The Personal problems factor had the strongest association with CSBD, and the strongest negative correlation with frequency of having sex with a romantic partner. Therefore, it seems like having a romantic partner, with whom the individual can be intimate regularly, might be a protective factor toward negative feelings and internal experiences. The *Relationship problems* factor contains item about having interpersonal problems, like hurting or betraying someone, creation cessation, and having sexually transmitted infection (STIs). The Relationship problems factor had moderate and positive association with CSBD, and the strongest positive correlations with both of the number of sexual partners and the number of casual partners. More sexual partners at the same time, or changing partners frequently might cause more interpersonal problems, hence the likelihood of getting into conflicts with one another is greater. Lastly, the *Risky behavior* factor includes items about legal concerns, arrest and losing one's job as a result of sexual activities. Although these problems are not mentioned in the ICD-11 criteria explicitly, impairments in occupational domains could be related to the content of this factor. It correlated with CSBD the weakest (and altogether, with the sexuality-related questions, and with the other HBCS factor as well. This might be because the Risky behavior factor contains items of the most severe consequences of CSBD out of the whole scale, therefore, being an outlier on the scale.

It is important to emphasize that the associations between the HBCS factors and the sexual behavior-related questions are relatively small, which could be accounted for other factors playing a role in sexual frequency or having multiple sexual partners, like high sexual drive, among other things (Winters et al., 2010). Moreover, the frequency of sexual behavior on its own does not necessarily reflect problems or being out-of-control with one's sexual behavior as other factors, such as high levels of sexual desire may be accountable for it (Bőthe et al., 2020). Another important highlight of the present study is that measuring negative consequences in relation with one's sexual behavior is not enough to determine CSBD. The

items of the HBCS scale could reflect a great variety of situations, not necessarily related to CSBD. For example, someone with paraphilic interest, might have experienced most of the negative consequences that are listed in the present study (e.g., ruining relationships, internal negative feelings, legal and occupational problems, shame), but the root of their problems would be something entirely different. Or, to mention a nonpathological example, a couple who experience a great discrepancy between their sexual drives, might have scored high on several items of the HBCS as well (e.g., having relationship problems, experiencing that their sexuality causing negative internal states). Therefore, the HBCS is advised to be assessed with other, CSBD measuring scales, to determine the extent of negative consequences of the problem, and therefore the severity of it, instead of determining the absence or presence of CSBD.

In sum, HBCS resulted to be a valid and reliable tool to measure negative consequences associated with CSBD, in research or in clinical settings. Furthermore, along with a CSBD measurement tool, it can also be used to assess severity of CSBD, and to examine the potential areas of functioning that are the most impaired in the person's life. However, the HBCS scale is not designed to assess whether the person has CSBSD or not, therefore it should be used along with a CSBD measure.

2.4. Study 4.

Based on data collected during three stages of the COVID-19 pandemic, when restrictions varied greatly (Time 1: first months of the first wave, new and strict lockdown; Time 2: summer after the first wave, lifted restrictions; Time 3: second wave, the strictest restrictions), no significant changes were observed in any of the studied problematic behaviors (i.e., problematic social media use, internet gaming disorder, gambling disorder, problematic pornography use, and compulsive sexual behavior disorder). In other words, those individuals who did not have problem with these problematic behaviors to begin with, did not develop them over time, and those individuals who had problems with one or more of the addictive behaviors, did not experience significant increase in symptom severity. However, a great variety had been observed in the initial scores of the problematic behaviors, and in the changes over the time of the 10 months as well, indicating that the examined sample varied greatly in their initial symptom severity, as well as the course of the change their experience. These results are in line with other studies examining changes in problematic pornography use severity during the pandemic, using longitudinal design (Bőthe et al., 2022; Grubbs et al., 2021), although higher prevalence of the same behavioral addictions were observed than in pre-pandemic studies using

representative samples (Alimoradi et al., 2022). One study using a longitudinal study design did report increase in problematic gaming. However, it was conducted on an adolescent sample, therefore findings might not be comparable (Teng et al., 2021). Other studies examined addictive behavioral changes during the pandemic using retrospective assessment, asking participants to think back and report their behavior frequency or symptom severity before the pandemic, and at the time of data collection, comparing the two results (Gainsbury et al., 2021; Håkansson, 2020; Lugo et al., 2021). These studies did report elevated frequency, although due to potential recall bias, participants perception of their own behavior is not in line with "hard data", collected longitudinally (Auer & Griffiths, 2021). In sum, contradicting the initial concerns, the present study found that all examined problematic behaviors had stagnated over the course of 10 months, throughout the different stages of COVID-19 related lockdowns. Either results suggest that those who did not previously have a problem with these addictive behaviors may not have developed one, and those who previously had a problem with either may not have significantly worsened their symptoms.

3. Implications of the Present Dissertation

3.1. Theoretical Implications

Since the new diagnostic criteria of CSBD has been published during the course of the present dissertation, one of the main focuses of it was to identify and partly address the contradictions in its conceptualization and gaps in the literature. This might seem as a purely theoretical, autotelic issue for its own sake, but the implied significance of it has a much larger scope. Properly researched, evidence-based models explaining a clinical disorder can lead to accurate conceptualization and assessment. Adequate assessment then can lead to applied research minimizing biases in the data collection, which, in turn, can result in the development of evidence-based treatment options. Guidelines for diagnostics, prevention programs, and therapeutic recommendations to use by practicing professionals in the clinical field are then made possible. Therefore, the chain of evidence and results in the clinical field starts with the building blocks of conceptualization, nomenclature, assessment, the identification of predictors and outcomes, and finally, examination a disorders natural course over time. The four studies the present dissertation is based on, contributed to these foundations.

Study 1 further formulated and summarized the discrepancies in the current understanding of the classification of CSBD, and identified what would be needed to clarify and address these discrepancies. These directions have relevance in creating theoretical frameworks and models

to understand the disorder better, which is essential for advancements in the field. Studies examining practical questions, like therapeutic directions, are often based on atheoretical studies (Potenza, 2015). Therefore framework, nomenclature, and diagnostic classification can determine the direction of these investigations. Proper classification may also play a role in a more accurate assessment and better understanding of comorbid disorders with CSBD, and in the ability to distinguish it from related problems (e.g., paraphilic disorders). To answer these calls for clarification of Study 1, the empirical results of Study 2 contributed to a more nuanced understanding of the motivations underlying CSBD by comparing different theoretical models explaining CSBD regarding their motivational components. Based on the patterns of associations between the different sexual motivations and CSBD found in the study, the Integrated Model of Compulsive Sexual Behavior resembled this pattern the most. It is important to note, however, that the study does not imply, that this model explains CSBD the best overall. It simply showed that regarding the appearance of sexual motivations in the description of the model, this is the most similar to the current findings. The strongest positive relationship between amotivation (i.e., not knowing why the person is engaging in sexual behavior anymore) and CSBD has important theoretical relevance. This finding indicates that either there is a distinct subgroup of individuals with CSBD that have no internal or external motivation for sexual behavior, or there is a period, a stage of developing CSBD, when it becomes rigid and lacks motivation. This might be explained by the *compulsiveness* in CSBD (Fineberg et al., 2014). This finding could further contribute to the discussion around the naming and the classification of CSBD. Study 3 took a step further from conceptualization to assessment, and validated the Hypersexual Behavior Consequence Scale (HBCS), which measures adverse outcomes of CSBD. The study's findings provided evidence that the HBCS is a reliable tool to assess CSBD severity, but not everyone who feel out of control of their sexuality, experience these negative consequences, and not everyone who experience them, has CSBD. These findings allowing us to think in a more person-centered, holistic way of the issue, and to design further studies for the specific questions it raised. Finally, Study 4 made it possible to assess changes in CSBD and other problematic and addictive behaviors over the course of nine months. The lack of significant changes further supported the clinical criteria of CSBD, which requires a sustained period of 6 months for symptom presence.

In sum, the present dissertation contributed to the ongoing discussion of the conceptualization, classification, and assessment of CSBD (Briken, 2020; Coleman, 2011; Gola et al., 2020; Grubbs, Hoagland, et al., 2020; Kafka, 2010; Kraus et al., 2018, 2016), and raised further questions regarding potential subgroups of individuals experiencing CSBD.

3.2. Practical Implications

Besides theoretical implications, the practical relevance of the present dissertation should be discussed as well. Firstly, the translation and validation of an assessment tool (i.e., Hypersexual Behavior Consequence Scale) contributed to wider possibilities for data collection, as well as ensuring that the scales are reliable and valid to be used. The scale did not differed between subgroups of participants (i.e., genders, sexual) in terms of their psychometric properties, and thus valid group comparisons could be conducted.

Secondly, the contribution of both Studies 1 and 2 to the discussion of CSBD's classification might assist clinical professionals in designing and developing new prevention and intervention programs to reduce risk factors associated with CSBD, or to reduce the severity of the symptoms. The knowledge of the importance of amotivation in CSBD, and thus implied compulsion might play an important role in CSBD, interventions for compulsion might be successful in reducing CSBD symtoms. For example, elements of intervention programs designed for obsessive-compulsive disorder (OCD), like specific dietary restrictions and stress management (Brierley et al., 2021), might result promising outcomes in case of CSBD as well. Furthermore, the findings of Study 2, regarding CSBD and its strong association with amotivation, may direct research interest towards investigating the complex relationship between CSBD and compulsion-related disorders, like OCD. Addressing comorbidity-related research questions might have crucial clinical consequences for practitioners regarding forming appropriate diagnosis, screening for comorbidities, or specifying the best treatment options.

Study 3 not only provided a valid and reliable tool to measure CSBD severity, which can not only be used in scientific research but in clinical settings as well, it also drew attention to the wide variety of adverse consequences individuals with CSBD might experience. This more in depth understanding of the potential harms the disorder could cause in one's intrapersonal, financial, and interpersonal life could guide clinicians to explore and address these questions in therapeutic settings.

To conclude, adequate classification, assessment, and specification of diagnostic and transdiagnostic features of CSBD might contribute to the development of better prevention and intervention programs, policy making, and overall decisions regarding public health (Grubbs et al., 2023; Potenza, 2015).

4. Limitations and Future Directions

4.1. Limitations of the Present Dissertation

One of the main limitations of the present dissertation is the data collection methods that were used in each study, namely, using online surveys to assess clinically relevant problems in community samples, advertised on news portals. This design has several disadvantages, possibly resulting in biased data, such as social desirability or recall biases. The only reached participants were those who had internet access and devices to use it (all the surveys had to be filled out on a smartphone, tablet, or computer), limiting the generalizability of the results. Moreover, the aforementioned news portals are related to one political wing or direction; therefore, these studies were targeting participants who were leaning in a certain political direction. Self-reported surveys are prone to further biases, including under- or overreporting, or reaching participants who are not motivated to complete the survey properly.

Out of the three empirical studies, two were cross-sectional, therefore limiting casual inferences greatly. Study 4 had longitudinal design, but the high drop-out numbers resulted small samples sizes in the follow up data collections. Although attrition analysis was conducted, which showed no significant differences between the drop-outs and those who stayed in the study, previous findings demonstrated that in longitudinal design, there is a high chance of losing those participants in the earlier stages of data collection, who might be the most vulnerable ones (Štulhofer et al., 2021). Therefore, it is possible that significant changes over time in CSBD and other problematic behaviors were not observed because those individuals dropped out the first (and in large numbers) who experienced the most severe symptoms. It is also important to emphasize that data collection in Study 4 had started after the pandemic and the first lock-down. Therefore, it lacks baseline measurements, and the severity of the problematic behaviors might have already been high and elevated by the time when the first data were collected.

Only one empirical study used a cross-cultural study design, which allowed comparison between nationalities besides gender and sexual orientation. However, it is important to highlight that Germany and Hungary are both European, white populated, developed, and industrialized countries with similar history and culture, and similar attitudes toward sexuality. Therefore, the comparison might be less meaningful as it would have been between a first world country and a non-WEIRD country (Klein et al., 2021). Furthermore, the survey that was used to measure sexual motivations in Study 2 (Sexual Motivation Scale, SexMS) (Gravel et al.,

2016) does not differentiate between amotivation due to lack of interest, relevance or self-perceived incapability.

4.2. Future Directions

To address some of the limitations that were listed above, research methodologies and strategies will be further discussed that would be potentially less prone to biases. First and foremost, since CSBD is a clinically relevant disorder, research conducted on clinical samples would be critical to further understand the problem's characteristics, prognosis, and best treatment options, when it has reached clinical levels. Clinical studies could also contribute to the clarification of the questions related to CSBD and its comorbid disorders (e.g., anxiety) (Weinandy et al., 2022; Schultz et al., 2014) and CSBD as a symptom of another problem (e.g., in manic episodes) (Nakum & Cavanna, 2016; Turner et al., 2015; Varo et al., 2019). In connection with treatment, there is an urgent call for randomized controlled trials comparing potential treatment options (pharmacological, psychological, and mixed methods), as to this date, only preliminary data (Hardy et al., 2010), case-studies (Bostwick & Bucci, 2008; Gola & Potenza, 2016; Kraus et al., 2015; Raymond et al., 2002; Van Gordon et al., 2016) and a handful of trials are available (Bőthe et al., 2021; Hallberg et al., 2017; Lew-Starowicz et al., 2022). Therefore, there is no consensus on evidence-based treatment recommendations for CSBD (for detailed review and summary see: Antons et al., 2022; Efrati & Gola, 2018).

Along with variable-centered studies, person-centered statistical approaches would also be advised to use to provide a more comprehensive and holistic understanding of the area of interest (i.e., CSBD). When using person-centered research methods, the applicability of the results are higher to the individual than in variable-centered, since estimations are first calculated within the individual, instead of the level of the parameter (Eye & Wiedermann, 2015). Therefore, the assumption that participants belonging to the same homogenous group is eliminated, providing information on subgroups of the sample according to their CSBD-related characteristic. A great example for this is that higher frequency of sexual behavior does not equal disordered behavior, and that a significant proportion of treatment seeking individuals might not actually experience all of the typical symptoms associated with CSBD, often not even engaging in sexual behaviors more frequently than average, but still feel that their sexual behavior is out of control. In other words, individuals with high frequency of sexual behavior might not be always problematic (Bőthe et al., 2020), and treatment-seeking individuals for CSBD might not be clinically problematic either (Gola et al., 2016), but feeling out-of-control

because their moral judgment does not align with their behaviors (e.g., consuming any pornographic material) (Grubbs, Kraus, et al., 2020; Grubbs et al., 2019). Person-centered research methods could help to further identify the characteristics of these distinct subgroups. Although there are some studies using longitudinal study designs, as part of the present dissertation as well, data collection is often limited to a small number of times and to non-clinical samples, and the focus is more on problematic pornography use, rather than compulsive sexual behavior in general (Grubbs et al., 2021; Kohut & Štulhofer, 2018; Koós et al., 2022; Rousseau et al., 2020). While those contributions are important and valid, longitudinal studies assessing treatment-seeking or clinical samples of CSBD patients would be recommended, to gather a more nuanced picture of the course of the disorder over time, as well as the course of its recovery. In order to eliminate some of the biases from self-report questionnaires, ecological momentary assessment techniques (EMAs) are available with the development of technological devices, which could record participants' behavior and physiological measures more frequently, timed randomly and in the participants' usual environment (Moskowitz & Young, 2006). These techniques has provided useful information in relapse prevention for addictive disorders, like alcohol and tobacco use (Shiffman, 2009; Swendsen et al., 2014)

5. Final Conclusions

To summarize, the present dissertation aimed to contribute to closing the knowledge gaps concerning conceptualization, predictors, risk factors, potential negative outcomes, or course of CSBD. Each study contributed to a deeper and more thorough understanding of CSBD, more specifically, its conceptualization, classification, predictors, outcomes, and course over time. The preparation of the present dissertation took place in a very particular period in CSBD-related research, hence not only the name, classification, measurement tools, but diagnostic description and criteria have changed since the first earliest study was conducted in 2019 (Koós et al., 2021). With the publication of the ICD-11 (World Health Organization, 2022), and the new diagnosis of CSBD, research conducted in the subject has shown quite a steep increase (Grubbs, Hoagland, et al., 2020). As a results, our knowledge of the disorder has been expanded rapidly, shifting the focus to more detailed and specific research questions, although there are still significant knowledge gaps in our current understanding of its more essential questions (e.g., lack of clinical interventions). The four studies of the present dissertation have attempted to contribute to the fundamentals of understanding CSBD, namely, the questions of classification, predictors, negative consequences, and its temporal

course. Even though the design of the studies were ambitious, and the findings are promising, further nationally-representative, longitudinal, clinical and comprehensive studies are needed to clarify several crucial questions about CSBD, such as its prognosis, subgroups of CSBD patients, or prevention and intervention strategies.

6. References of the General Discussion

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VII. Appendices

1. Study 2

Sexual Motivations Underlying Compulsive Sexual Behavior in women and Men From Germany and Hungary

Appendix 3.1.

Standardized parameter estimates for the six-factor CFA solution for the Sexual Motivations Scale (SexMS) from the most invariant measurement model (latent mean invariance)

	Factor (λ)	δ
Intrinsic motivation		
Item 1	.580	.663
Item 6	.852	.274
Item 16	.691	.552
Item 21	.864	.253
ω	.839	
Integrated motivation		
Item 5	.843	.289
Item 10	.843	.289
Item 15	.906	.178
Item 17	.886	.214
ω	.926	
Identified motivation		
Item 3	.679	.539
Item 12	.788	.380
Item 19	.699	.511
Item 22	.844	.288
ω	.841	
Introjected motivation		
Item 7	.806	.350
Item 14	.891	.206
Item 20	.921	.151
Item 24	.890	.207
ω	.931	
External motivation		
Item 2	.700	.510
Item 8	.854	.271
Item 11	.900	.190

Item 18	.786	.383
ω	.886	
Amotivation		
Item 4	.886	.214
Item 9	.900	.190
Item 13	.886	.215
Item 23	.813	.340
ω	.927	

Note. CFA: Confirmatory factor analysis; λ: Factor loading; δ: Item uniqueness; ω: Model-based omega composite reliability. All factor loadings were significant at $p < .001$.

Appendix 3.2.

Standardized parameter estimates for the bifactor CFA solution for the Compulsive Sexual Behavior Disorder Scale (CSBD-19) from the most invariant measurement model (partial latent mean invariance)

	Compulsive sexual behavior (λ)	Control (λ)	Salience (λ)	Relapse (λ)	Dissatisfaction (λ)	Negative consequences (λ)	δ
Control							
Item 1	.749**	-.106**					.428
Item 6	.765**	-.387**					.265
Item 11	.765**	-.172**					.385
Salience							
Item 2	.648**		.377**				.437
Item 7	.561**		.452**				.481
Item 12	.412**		.525**				.555
Relapse							
Item 3	.786**			.467**			.165
Item 8	.771**			.123**			.390
Item 13	.742**			.529**			.170
Dissatisfaction							
Item 4	.569**				.735**		.137
Item 9	.588**				.635**		.252
Item 14	.583**				.703**		.165
Negative consequences							
Item 5	.746**					.362**	.313
Item 10	.796**					-.201**	.327
Item 15	.685**					-.424**	.351
Item 16	.708**					-.285**	.418
Item 17	.712**					-.121**	.478
Item 18	.727**					.446**	.273
Item 19	.830**					-.224**	.262
ω	.965	.291	.554	.633	.886	.637	

Note. CFA: Confirmatory factor analysis; λ: Factor loading; δ: Item uniqueness; ω: Model-based omega composite reliability. All factor loadings were significant at $p < .001$

2. Study 3

The negative consequences of hypersexuality: Revisiting the factor structure of the Hypersexual Behavior Consequences Scale and its correlates in a large, non-clinical sample

Appendix 4.1.

Descriptive statistics of the examined samples

Demographics	Sample 1 (N = 5,611)	Sample 2 (n = 5,611)	Sample 3 (n = 5,613)
Gender (males)	3660 (65.2%)	3660 (65.2%)	3661 (65.2%)
Mean age in years (SD)	33.47 (11.13)	33.57 (11.08)	33.88 (11.14)
Sexual orientation			
Heterosexual group	5225 (93.2%)	5226 (93.2%)	5234 (93.2%)
Sexual minority group	335 (6%)	344 (6.1%)	320 (5.7%)
Education			
Primary school degrees or less	155 (2.8%)	145 (2.6%)	138 (2.5%)
Vocational degree	270 (4.8%)	202 (3.6%)	234 (4.2%)
High school degree	1775 (31.6%)	1800 (32.1%)	1771 (31.6%)
Degree of higher education (e.g., bachelors, masters or doctorate)	3411 (60.8%)	3464 (61.7%)	3470 (61.8%)
Marital status			
Single	1268 (22.6%)	1238 (22.1%)	1283 (22.9%)
In a relationship	2424 (43.2%)	24800 (44.2%)	2405 (42.8%)
Engaged	218 (3.9%)	234 (4.2%)	236 (4.2%)
Married	1442 (25.7%)	1388 (24.7%)	1411 (25.1%)
Divorced	141 (2.5%)	168 (3.0%)	169 (3.0%)
Widowed	27	14	37

	(0.5%)	(0.2%)	(0.7%)
Other	91	89	72
	(1.6%)	(1.6%)	(1.3%)
Studying currently	2052	2021	1953
	(36.5%)	(36%)	(34.7%)
Working status			
Not working	905	918	923
	(16.1%)	(16.4%)	(16.4%)
Having a full-time job	3615	3634	3712
	(64.4%)	(64.8%)	(66.1%)
Having a part-time job	593	582	557
	(10.6%)	(10.4%)	(9.9%)
Working on ad-hoc basis	498	477	421
	(8.9%)	(8.5%)	(16.4%)
Socio-economic status			
Among the worst	7	0	3
	(0.1%)	(0 %)	(0.1%)
Much worse than average	26	33	32
	(0.5%)	(0.6%)	(0.6%)
Little bit worse than average	216	233	240
	(3.8%)	(4.2%)	(4.3%)
Average	1391	1331	1375
	(24.8%)	(23.7%)	(24.5%)
Little bit better than average	2457	2473	2433
	(43.8%)	(44.1%)	(43.3%)
Much better than average	1393	1429	1431
	(24.8%)	(25.5%)	(25.5%)
Among the best	121	112	99
	(2.2%)	(2.0%)	(1.8%)
Residence			
Capital city	2994	3017	3110
	(53.4%)	(53.8%)	(55.4%)
County town	866	886	830
	(25.4%)	(15.8%)	(14.8%)
Town	1208	1183	1184
	(21.5%)	(21.1%)	(21.1%)
Village	543	525	489
	(9.7%)	(9.4%)	(8.7%)

Note. Sample sizes varied because the total sample was not divisible with three. The total sample was separated while preserving the male-female ratio.

Appendix 4.2.

Hungarian and original English version of the Hypersexual Behavior Consequences Scale (HBCS)

	Hungarian Version	English Version (Reid et al., 2012)
Title	Hiperszexuális Viselkedés Következményei Skála	Hypersexual Behavior Consequences Scale
Instructions	Alább olyan állításokat olvashat, amelyek a szexuális viselkedések különböző lehetséges következményeit írják le. Kérjük, minden állítás esetében jelölje, hogy az mennyire igaz Önre. Ha egy állítást sohasem fordult elő az Ön életében, akkor jelölje annak a valószínűségét, hogy ez (Ön szerint) milyen eséllyel következhet be a későbbiek során. A kérdőív szexnek tekint minden olyan cselekvést vagy viselkedést, amely stimulál vagy felizgat valakit és célja szexuális gyönyör vagy orgazmus elérése (pl. önkielégítés, pornográfia nézése, partnerrel való közösülés bármely formája stb.). Ne feledje tehát, hogy ***szexuális viselkedés egyaránt létre jöhet egyedül és partnerrel.***	Below are a number of statements that describe various consequences people experience because of their sexual behavior and activities. As you respond to each statement, indicate the extent to which each item applies to you. If you haven't experienced a particular item, indicate the likelihood that you will in the future. Use the scale below to guide your responses and write a number to the left of each statement. For the purpose of this survey, sex is defined as any activity or behavior that stimulates or arouses a person with the intent to produce an orgasm or sexual pleasure. ***Sexual behaviors may or may not involve a partner*** (e.g. self-masturbation or solo-sex, using pornography, intercourse with a partner, oral sex, anal sex, etc.).
Rating Scale	1 – Nem történt még ilyen és valószínűtlen, hogy valaha bekövetkezik 2 – Nem történt még ilyen, de akár meg is történhet 3 – Nem történt még ilyen, de nagy esély van rá, hogy be fog következni 4 – Megtörtént már párszor 5 – Megtörtént már többször is	1 – Hasn't happened and is unlikely to happen 2 – Hasn't happened but might happen 3 – Hasn't happened but will very likely happen 4 – Has happened once or twice 5 – Has happened several times

	Hungarian Version	English Version (Reid et al., 2012)
Item 1 (Risky behavior factor)	Vesztettem már el állásomat a szexualitásom valamely megnyilvánulása miatt.	I have lost a job because of my sexual activities.
Item 2 (Work-related problems factor)	Hanyagoltam már el fontos kötelezettségeimet a szexuális viselkedésem miatt.	I have failed to keep an important commitment because of my sexual activities.
Item 3 (Relationship problems factor)	Előfordult már velem, hogy a párkapcsolatom a szexuális viselkedésem miatt ért véget.	A romantic relationship has ended because of my sexual activities.
Item 4 (Relationship problems factor)	Kaptam már el nemi úton terjedő betegséget, fertőzést a szexuális viselkedésemnek következtében.	I have gotten a sexually transmitted disease or infection because of my sexual activities.
Item 5 (Risky behavior factor)	Voltak már jogi problémáim, amit a szexuális viselkedésem okozott.	I have had legal problems because of my sexual activities.
Item 6 (Risky behavior factor)	Tartóztattak már le a szexuális viselkedésem miatt.	I have been arrested because of my sexual activities.
Item 7 (Work-related problems factor)	Fontos céljaimat is áldoztam már föl a szex miatt.	Important goals have been sacrificed because of my sexual activities.
Item 8 (Work-related problems factor)	Előfordultak az életemben anyagi veszteségek a szexuális aktivitásom miatt.	I have experienced unwanted financial losses because of my sexual activities.
Item 9 (Relationship problems factor)	Bántottam már meg számomra fontos embert a szexuális aktivitásommal.	I have emotionally hurt someone I care about because of my sexual activities.
Item 10 (Relationship problems factor)	A szexuális aktivitásom vezetett már bizalomvesztéshez számomra nagyon fontos kapcsolatomban.	I have betrayed trust in a significant relationship because of my sexual activities.
Item 11 (Personal problems factor)	Előfordult már, hogy a szexuális viselkedésem korlátozott az egészséges szexuális élmény átélésében.	My sexual activities have interfered with my ability to experience healthy sex.
Item 12 (Work-related problems factor)	A szexuális viselkedésem akadályozott már a munkában vagy a tanulásban.	My sexual activities have interfered with my work or schooling.

	Hungarian Version	English Version (Reid et al., 2012)
Item 13 (Personal problems factor)	Volt már, hogy megszégyenítő vagy megalázó szituációba kerültem a szexuális viselkedésem miatt.	I have been humiliated or disgraced because of my sexual activities.
Item 14 (Relationship problems factor)	Előfordult már, hogy elvesztettem számomra fontos emberek megbecsülését a szexuális viselkedésem miatt.	I have lost the respect of people I care about because of my sexual activities.
Item 15 (Personal problems factor)	Előfordult már, hogy a szexuális viselkedésem eltorzította a szexualitásról való gondolkodásomat.	The way I think about sex has been negatively distorted because of my sexual activities.
Item 16 (Personal problems factor)	A szexuális viselkedésem negatív hatással volt a lelki egészségemre (pl. depressziót, stresszt okozott)	My sexual activities have negatively affected my mental health (e.g. depression, stress).
Item 17 (Personal problems factor)	Zárkózottá és visszahúzódóvá váltam a szexuális viselkedésem miatt.	I have become socially isolated and withdrawn from others because of my sexual activities.
Item 18 (Personal problems factor)	A személyes kapcsolataim minősége leromlott a szexuális viselkedésem következtében.	The quality of my personal relationships has suffered because of my sexual activities.
Item 19 (Personal problems factor)	Az önbecsülésem, önérzetem és önbizalmam sérült a szexuális viselkedésem következtében.	My self-respect, self-esteem, or self-confidence, has been negatively impacted by my sexual activities.
Item 20 (Personal problems factor)	Az a képességem, hogy kapcsolódjak vagy közel érezzem magam másokhoz sérült a szexuális viselkedésem következtében.	My ability to connect and feel close to others has been impaired by my sexual activities.
Item 21 (Personal problems factor)	A lelki és szellemi jóllétem sérült a szexuális viselkedésem következtében.	My spiritual well-being has suffered because of my sexual activities.
Item 22 (Personal problems factor)	A szexuális viselkedésem meggátol abban, hogy a legjobbat hozzam ki önmagamból.	My sexual activities have interfered with my ability to become my best self.

3. Study 4

No Significant Changes in Addictive and Problematic Behaviors During the COVID-19 Pandemic and Related Lockdowns: A Three-Wave Longitudinal Study

Appendix 5.1.

Sociodemographic characteristics of the sample at the three data collection waves

		T1 (N = 1747)	T2 (N = 656)	T3 (N = 411)
Gender	Men	882	273	172
	Women	846	358	234
	Gender diverse individuals	17	9	5
Age (in years)	M (SD)	41.96 (12.52)	42.89 (13.10)	43.01 (13.43)
	Range	18 - 80	18-80	18-80
Sexual orientation	Heterosexual	1206	520	346
	Bisexual	39	18	12
	Homosexual	35	17	7
	Asexual	22	12	6
	Unsure	6	4	3
	Other	12	6	6
Education	Primary school degree or less	7	7	2
	Vocational degree	100	39	20
	High school degree	329	106	63
	Higher education degree (e.g.,	1306	493	326

	bachelors, masters or doctorate)			
Relationship status	Single	482	163	105
	In a relationship	473	174	112
	Married/Common-law partner*	590	238	147
	Divorced	28	11	11
	Widowed	93	45	31
Studying currently		260	97	66
Working currently		1479	540	345
Residence	Large city (over 100,000 citizens)	1159	436	287
	Large city (100,000 person – 999,999 citizens)	227	82	51
	City (below 100,000 citizens)	325	118	71
	Village	149	71	45
	Other	31	6	3
Socio-economic status	Among the best	24	10	5
	Much better than average	436	158	103
	Little bit better than average	632	248	168
	Average	458	172	102
	Little bit worse than average	86	34	25

Much worse than average	15	4	2
Among the worst	3	1	0

Note. M = mean; SD = standard deviation.

Appendix 5.2.

Comparison of participants who completed vs. who dropped-out at the second, vs. who dropped-out at third data collection wave in their demographic characteristics at baseline (T1) measurements

Variables	(1) Completed the survey (N = 417) *n* (%)	(2) Dropped-out at T2 (N = 608) *n* (%)	(3) Dropped-out at T3 (N = 487) *n* (%)	χ^2 test	p	Cramer's *V*
Gender				26.78	< .001*	.09
Men	171[2]	608[1,3]	102[2]			
Women	233[2]	487[1,3]	125[2]			
Other	5	8	4			
Sexual orientation				5.63	.060	.065
Heterosexual	345	685	175			
Sexually diverse	31	57	26			
Relationship status				2.40	.301	.038
Single/Divorced/Widowed	147	384	72			
In a relationship	257	649	155			

Variables	M (SD); Median	M (SD); Median	M (SD); Median	Kruskal-Wallis test	p	η^2
Age in years	42.97 (13.40); 42	41.40 (12.13); 41	42.76 (12.57); 42	3.91	.142	0.003
Education[a]	8.00 (1.67); 9	7.84 (1.72); 8	7.85 (1.77); 9	3.93	.140	0.001
Residence[b]	1.84 (1.12); 1	1.87 (1.12); 1	1.95 (1.15); 1	1.48	.476	<0.001
Socio-economic status[c]	4.89 (0.93); 5	4.90 (0.99); 5	4.90 (1.03); 5	0.07	.965	<0.001
Problematic social media use at T1 (range: 6 - 30)	10.02 (4.15)[2]; 9	9.46 (3.92)[1]; 8	9.37 (3.83); 8	6.65	.036	0.004
Online gaming disorder at T1 (range: 0-9)	0.41 (1.01); 0	0.34 (0.96); 0	0.33 (0.82); 0	0.98	.614	<0.001
Gambling disorder at T1 (range: 9- 36)	9.10 (0.57); 9	9.27 (1.47); 9	9.23 (0.97); 9	2.40	.302	0.004
Problematic pornography use at T1 (range: 6 - 49)	9.91 (5.55); 7	10.22 (5.96); 7	9.33 (5.23); 7	2.51	.286	0.003
Compulsive sexual behavior disorder at T1 (range: 19 - 76)	24.08 (5.97); 22	24.40 (7.07); 22	24.28 (6.59); 22	0.06	.971	<0.001

Note. *M* = mean; *SD* = standard deviation; T1 = Time 1 data collection; T2 = Time 2 data collection; T3 = Time 3 data collection. Superscript numbers (1, 2, 3) indicate significant ($p < .05$) difference between the given group and the indexed group within the same variable.

[a]1 = less than 8 years of elementary school, 2 = 8 years of elementary school, 3 = trade school; vocational training without high school diploma, 4 = vocational secondary school, 5 = high school diploma, 6 = intermediate level technical institute, 7 = higher forms vocational training; higher forms technical institute (not college), 8 = Bachelor's degree / BA / BSC, 9 = Master's degree / MA / MSC, 10 = postgraduate training, doctoral school (PhD, DLA);

[b]1 = metropolis (over 1 million citizens), 2 = large city (100,000 person – 999,999 citizens), 3 = city (below 100,000 citizens), 4 = village, 5 = other;

[c]1 = my life circumstances are among the worsts, 2 = my life circumstances are much worse than average, 3 = my life circumstances are worse than average, 4 = my life circumstances are average, 5 = my life circumstances are better than average, 6 = my life circumstances are much better than average, 7 = my life circumstances are among the best