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Dissertation

Problematic Pornography Use, the Brief Pornography Screen, and Psychological Distress.

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Abstract

Pornography use is widespread in the United States and across the world. Some individuals report problematic pornography use (PPU), which is characterized by dysregulation and negative consequences of use. The limitations of existing PPU screening tools make it difficult to reliably investigate the extent and associations of PPU. Furthermore, mechanisms underlying potential associations between PPU and psychological distress have been insufficiently examined. To meet these research gaps, I conducted three subsequent studies: In Study 1 (scoping review), I examined the existing body of research on the Brief Pornography Screen (BPS) – a new and promising cross-classification screening tool for PPU. In Study 2 (cross-sectional study), I examined the status quo of PPU and psychological distress associations in the United States. In Study 3 (longitudinal study), I examined longitudinal associations between PPU and psychological distress in the United States. The existing body of research supports the validity and the reliability of the BPS. Furthermore, PPU seems to be a common phenomenon in the United States, particularly among young men. It appears to be consistently associated with frequency of pornography use and the experience of psychological distress. Across 6-months-intervals, the psychological distress association appears to be robust and trait-like rather than being determined by fluctuations across the waves. This dissertation contributes to the scientific progress by synthesizing the evidence on the statistical properties of the BPS, while highlighting its ability to differentiate between clinical and non-clinical individuals. It also provides important insights into PPU in the United States and its associations with psychological distress. Associations of PPU with younger age may also inform clinicians and legislators.

Zusammenfassung

Pornografiekonsum ist weit verbreitet – sowohl in den USA als auch weltweit. Einige Personen berichten von Problemen mit ihrem Pornografiekonsum (PPU), etwa von Kontrollverlust und negativen Konsequenzen im Zusammenhang mit der Nutzung. Limitationen existierender Screeninginstrumente für PPU erschweren zuverlässige Untersuchungen zu PPU und Assoziationen mit psychischen Symptomen. Außerdem bestehen Forschungslücken in der Untersuchung von Mechanismen, die zu diesen Assoziationen beitragen könnten. Basierend auf diesen Forschungslücken habe ich drei aufeinanderfolgende Studien durchgeführt. In der ersten Studie (Scoping Review) untersuchte ich den Forschungsstand zum Brief Pornography Screen (BPS), einem neuen und vielversprechenden Screeninginstrument für PPU. In Studie 2 (querschnittliche Studie) untersuchte ich den „Status Quo“ von PPU und Assoziationen mit psychologischem Dystress in den Vereinigten Staaten. In Studie 3 (längsschnittliche Studie) untersuchte ich diese Assoziationen längsschnittlich. Der derzeitige Forschungsstand spricht für die Validität und Reliabilität des BPS. Außerdem scheint PPU in den Vereinigten Staaten – besonders unter jungen Männern – weit verbreitet zu sein. PPU scheint dabei ebenso mit Pornografiefrequenz und Dystresserleben assoziiert zu sein. Über Sechsmonatsintervalle scheint die Dystress-Assoziation eher robust und stabil als anfällig für Fluktuationen über die Wellen zu sein. Meine Dissertation trägt substanziell zum wissenschaftlichen Fortschritt bei, indem sie die statistische Evidenz über die psychometrischen Eigenschaften des BPS syntetisiert und seine Fähigkeit, zwischen klinischen und nicht-klinischen Gruppen zu unterscheiden, herausstellt. Außerdem werden entscheidende Erkenntnisse über PPU und Assoziationen mit psychologischem Dystress in den Vereinigten Staaten gewonnen. Assoziationen zwischen PPU und jüngerem Alter könnten wichtige klinische und gesetzgeberische Implikationen haben.

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Mantle Text of this Dissertation

Introduction

This dissertation was written to achieve the German scientific doctorial grade ("Dr. rerum naturalium") in psychology. Therefore, I, Robin Engelhardt (M. Sc. Psychology), conducted three psychological studies and submitted them to recognized peer-reviewed psychological (Q1) journals. Two of these studies have been accepted for publication to date and one is currently under peer review. In the present text, I will present the content of these three studies, their contributions to field-specific research, and their interrelationships as they resemble the same dissertation project: First, I will lay out the common theoretical background from which I subsequently derived research objectives for all three studies. Second, I will summarize the studies' content in the form of extended abstracts. Third, I will discuss the impact of the three studies, their commonalities, and interactions, and lastly provide detailed information on the authors' contributions.

Theoretical Background

Importance of the Subject

Since the beginning of the age of the Internet, pornography has become more accessible, affordable, and anonymous than ever before (Cooper, 1998). These altered dynamics have been stated as the "triple-a engine" (Bridges, 2023; Cooper, 1998) of online pornography use leading to a steady increase across the world (Bridges, 2023; Price et al., 2016; Short et al., 2012). Exemplarily, in 2019, the lifetime prevalence of pornography use in United States (U.S.) adults was reported to be slightly above 70% (Grubbs, Kraus, & Perry, 2019), while three years later at 87% in women and 94% in men (Herbenick 2022). Today, viewing pornography is a common practice in the United States (Grubbs et al., 2023; Herbenick et al., 2020). However, the amount of conducted research on the subject might not sufficiently

represent the relevance of the phenomenon (Grubbs & Kraus, 2021). Especially, as a subset of individuals report problems with their pornography use, such as distress, impairment, and feeling addicted (Dickenson et al., 2018; Grubbs et al., 2019).

Classification Debate & Brief Pornography Screen

Although individuals have reported problematic pornography use (PPU) for decades, its accurate classification has been rigorously debated (Bőthe et al., 2022; Carnes, 1996; Grubbs & Kraus, 2021; Kraus & Sweeney, 2019; Reid & Kafka, 2014). Currently, PPU can be subsumed under the Compulsive Sexual Behavior Disorder (CSBD), which was formally included in the *11th Edition of the International Classification of Diseases* (ICD-11; Kraus et al., 2018; World Health Organization, 2019). However, a potential future shift in the classification – similar to gambling disorder- is discussed by numerous researchers (e.g., Corazza & Blanchard, 2018; Rumpf & Montag, 2022; Sassover & Weinstein, 2020). Alongside proposals of different classifications as Sexual Addiction (Carnes et al., 2014), Hypersexual Disorder (Reid & Kafka, 2014), or CSBD (Kraus et al., 2018), several PPU assessment tools have been developed and evaluated among clinical and community populations (Fernandez & Griffiths, 2021). This variety of often not-sufficiently validated assessments (Fernandez & Griffiths, 2021; Kraus et al., 2020) as well as the ongoing classification debate complicate the efforts to validly and reliably screen for potential PPU in empirical studies.

In response to these challenges, the Brief Pornography Screen (BPS; Kraus et al., 2020) was developed as a brief screening tool for detecting probable PPU. The BPS appears to be specifically promising, as it has been proposed as a unidimensional, cross-classification screening tool, including a clinical cut-off threshold, which would allow to differentiate between clinical and non-clinical individuals (Kraus et al., 2020). It has been initially validated across five clinical and non-clinical samples (Kraus et al., 2020). However, several needs for further validation research in order to demonstrate the reliability and validity of the

BPS across a diverse variety of populations were pointed out (Kraus et al., 2020). Four years after the development of the BPS, it remained unclear whether the BPS had met its initial validation aims to be a psychometrically sound PPU screening tool across populations. Without properly validated assessment tools though, high-quality empirical studies on PPU would remain compromised.

Psychological Distress Associations

PPU might not only be problematic by itself but may also implicate additional mental health problems. Early psychological pornography research has linked pornography use frequency to negative affect (Tylka, 2015). More recent research linked PPU to depression, and anxiety symptoms in different populations (Kraus et al., 2020; Okabe et al., 2021; Shirk et al., 2021). However, from pioneer correlational studies, little information on the underlying mechanisms of these associations can be derived. Specifically, pornography use frequency and masturbation frequency seem important PPU-associated variables (Chen et al., 2022; Prause, 2019) that may need to be considered in associational research. Furthermore, demographic variables, such as age, gender, and sexual orientation might play an important role in understanding PPU (Borgogna, Griffin, et al., 2022). In addition, I noticed an absence of properly controlled longitudinal studies, examining associations between PPU and symptoms of psychological distress.

Conducted Studies

Based on the presented literature and to address the outlined research gaps, I conducted three scientific studies. The first study was a scoping review of the promising BPS to determine its utility in screening for PPU as well as its reliability and validity across different populations. The second study was a cross-sectional U.S. general population study, providing current data on PPU (measured by the BPS) and its associations with psychological distress (i.e., anxiety and depression). Moreover, in this cross-sectional study, I considered demographics and frequencies of masturbation and pornography use and could examine

potential interaction effects between variables. The third study was a demographic-controlled longitudinal study in a large US sample, in which I conducted longitudinal analyses on the associations between PPU (measured by the BPS) and psychological distress.

Study Results

In this section, I present the content of the three studies of this dissertation. I will refer to each study separately as an extended abstract. Afterward, I will discuss their contributions to scientific progress in pornography use research, and their commonalities, and interrelations.

Scoping Review (Study 1)

Title: Screening for Problematic Pornography Use with the Brief Pornography Screen: A Scoping Review.

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Extended Abstract:

Objective: Alongside a debate about the correct classification of problematic sexual behavior, many different problematic pornography use (PPU) screening tools have been developed. Though, most of these tools lacked sufficient validation and did not include a clinical cut-off threshold to identify potential PPU individuals. Based on these challenges, the Brief Pornography Screen (BPS) has been developed and initially validated across five samples in 2020. It was proposed to be a short, robust, and psychometrically sound PPU screening tool,

capable of differentiating between clinical and non-clinical individuals, through a clinical cut-off threshold. In the initial BPS publication study, the researchers pointed out a need for further validation (i.e., reliability and validity) research in specific (i.e., sexually diverse, gender diverse, ethnically diverse, non-western, large, female, and clinical) samples. They also highlighted the importance of further validation research on the proposed BPS cut-off scores (BPS≥4, BPS≥6). Since 2020, the BPS has been used in a variety of countries. Therefore, four years after the initial validation study, we conducted the present review to scope the existing body of BPS validation research and to evaluate whether its initial aims and research recommendations have been meanwhile met. We also aimed to identify potential research gaps to direct future research. **Method:** A scoping review was undertaken. We conducted an extended database search in EBSCO, PubMed, and Scopus and made further search attempts (i.e., citation search and contacting the authors of the BPS validation study) to identify all published and unpublished work since 2020 in which the BPS was used. We included empirical studies, written in English language, which provided relevant validation data. **Results:** We identified 33 eligible papers that provided validation data from a total of 95 samples from 43 countries, in 21 languages, and from all warranted population groups. BPS reliability was demonstrated throughout samples and analyses. Only valid test-retest reliability data was identified to be still missing. BPS factor validity has been demonstrated throughout a variety of populations. Convergent validity was supported by associations with established assessments for problematic sexual behavior and with frequencies of pornography use and masturbation. Discriminant validity was supported by numerous weak or statistically insignificant correlations to theoretically unrelated constructs. Concurrent validity was supported by strong correlations with previously established PPU assessment tools. The cut-off BPS≥4 was assessed in 64 populations. We identified research in support of the proposed clinical cut-off values (BPS≥4 and BPS≥6). All tested clinical groups exceeded the threshold BPS≥4 and almost all of them also exceeded the threshold BPS≥6. Cut-off values were able to

differentiate between clinical or subclinical groups on the one hand and non-clinical groups on the other hand in different ways. Cut-off distinguished groups also differed significantly in related outcomes. Results indicate potential PPU being prevalent across diverse groups of people from diverse backgrounds (e.g., countries, cultures, languages, ethnicities, sexual orientations, gender identities). Especially in groups of young men, high BPS cut-off exceedance rates have been observed, suggesting the importance of considering sex/gender and age in PPU research. The BPS was frequently associated with measures of psychopathological symptoms (e.g., depression and anxiety) and with addictive features, highlighting the clinical relevance of PPU. **Conclusion:** Research since the year 2020 supports the BPS to be a valid and reliable PPU screening tool across diverse clinical and non-clinical populations. Further validation research is suggested on predictive validity in clinical studies, on test-retest reliability in longitudinal studies, and the sensitivity and specificity of the cut-off scores. We recommend also reconsidering and testing the cut-off threshold BPS≥5 since all clinical groups scored above BPS≥5. We recommend further psychometric testing using more diverse clinical and subclinical samples (i.e., gender, culture, and sexual orientation). We also recommend more research on associations with psychopathological symptoms (i.e., psychological distress), especially in longitudinal and experimental studies to approximate causality. We recommend researchers use the BPS in empirical studies to screen for PPU.

Nationally Representative Cross-sectional Study (Study 2)

Title: Problematic Pornography Use and Psychological Distress in the United States- a Nationally Representative Study.

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Publication status: This study has been accepted for publication in *Archives of Sexual Behavior* on August 2, 2025 (information updated on December 19, 2025).

Extended Abstract:

Objective: Pornography use is common in the United States and some individuals report their pornography use as problematic. Recent research has associated problematic pornography use (PPU) with psychological symptoms. In addition, higher pornography use frequency (PU-FQ), younger age, male sex, and a non-heterosexual orientation have been associated with more PPU. According to the Person-Affect-Cognition-Execution (I-PACE) model, psychopathological symptoms paired with the frequent execution of behavior may lead to the dysregulation of the behavior and further sustain the problematic behavior. In the context of PPU, especially psychological distress (i.e., depression and anxiety symptoms) and loneliness have been found to be associated with PPU. However, we noted an absence of literature considering relevant demographics while examining associations between pornography use frequency (PU-FQ), masturbation frequency (M-FQ), and psychological symptoms in predicting PPU. According to the I-PACE model, we particularly expected psychological symptoms to interact with frequencies of pornography use and masturbation in explaining PPU. **Method:** We conducted a nationally representative study in US men and women (*n*=2,773; 54% women). PPU was assessed by the Brief Pornography Screen (BPS), Psychological distress was assessed through depression symptoms measured by the Patient Health Questionnaire-9 (PHQ-9), and anxiety symptoms measured by the Generalized Anxiety Disorder 2 item (GAD-2). The University of California Los Angeles Loneliness Scale (UCLA-L) assessed loneliness. We conducted correlational analysis between demographics and study variables, and tested group differences between participants who

reported to use pornography and masturbation or exceeded the BPS cut-off threshold for potential PPU and those who did not. Furthermore, we conducted a hierarchical regression analysis to examine interactions between frequencies (PU-FQ, M-FQ), psychological distress (GAD-2 and PHQ-9), and UCLA-LA in predicting BPS, while considering demographics. **Results:** Assessed demographic variables were associated with frequencies, psychological symptoms, and PPU. The BPS correlated positively with PU-FQ (.30 in men, .37 in women), M-FQ (.26 in men; .31 in women), psychological distress (.35 in men; .28 in women), and UCLA-L (.33 in men; .23 in women). Potential PPU individuals (exceeding the BPS cut-off score) reported higher levels of psychological distress and loneliness than those who did not exceed the threshold. Participants reporting having used pornography or having masturbated during the past year reported higher levels of psychological distress and UCLA-L compared to those who reported not having used pornography or masturbated. Statistically significant interaction effects have been found between psychological distress and M-FQ as well as between loneliness and PU-FQ in explaining PPU. **Conclusion:** Our findings support the theoretical framework of the I-PACE model. Psychological symptoms interact with frequencies of masturbation and pornography use in explaining PPU. Lonely individuals who frequently use pornography and distressed individuals who frequently masturbate may be particularly vulnerable to PPU. These findings support the hypothesis that PPU resembles dysregulated coping behavior. However, due to the current cross-sectional study design, no conclusions on directionality or causality can be made. Therefore, longitudinal analyses examining the directionality of associations and research designed to test causality are recommended. We recommend considering demographic variables (especially age and gender) in such studies as these variables appear relevant in explaining PPU.

Longitudinal Study (Study 3)

Title: Problematic Pornography Use and Psychological Distress: A Longitudinal Study in a Large US Sample.

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Extended Abstract:

Objective: Problematic pornography use (PPU) is common in the United States and seems to be increasing worldwide. A past debate about the correct classification of problematic sexual behavior and PPU in specific complicated empirical research. Since the inclusion of the Compulsive Sexual Behavior Disorder in the *11th edition of the International Classification of Diseased* (ICD-11) and since the validation of the Brief Pornography Screen (BPS) across samples from more than 40 countries, these dynamics may have changed. Previous studies demonstrated that PPU is related to the experience of psychological distress (i.e., symptoms of anxiety and depression). However, most evidence is from cross-sectional studies, and little remains known about the directionality of this association over time. Similarly, little research has examined the trajectory of PPU over time. To meet these research gaps, this study aims to examine the trajectory of PPU (operationalized by the BPS) and its longitudinal associations with psychological distress (i.e., depression and anxiety). **Method**: We conducted a three-wave longitudinal study (n=4,464, $M_{(Age)}$=50, $SD_{(Age)}$=16.15, 46.4% women) among US

adults with 6 months between waves. PPU was assessed by the BPS (average ICC [2,k]=0.904 [95% CI: 0.894, 0.914, p<0.001], r[T1,T2]=0.748, r[T2,T3]=0.768, r[T1,T3]= 0.726). Psychological distress was assessed by the Patient Health Questionnaire-9 (depression) and the Generalized Anxiety Disorder- 2 items (anxiety), which we combined to one psychological distress compound (average ICC[2,k]=0.902 [95 % CI: 0.895, 0.909, p<0.001], r[T1,T2]= 0.755, r[T2,T3]= 0.778, r[T1,T3]=0.727). We examined descriptive Spearman correlations between study variables as well as a random-intercept autoregressive cross-lagged panel model (RI-CLPM), controlled for gender and age. **Results:** Between each six months, we found that BPS bivariate Spearmen intercorrelations were strong (ρ=.712, .726) and BPS autoregressive paths in the RI-CLPM were moderate (β=.370, .408). Surprisingly, the positive associations between BPS and psychological distress scores from descriptive correlations (between ρ=.267 and ρ=.395) were determined by a strong random-intercept correlation (r=.962), while all cross-lagged paths were small and negative (β=-.211, -.189, -.230, -.214). This suggested a robust trait-like between-person association between BPS and psychological distress with negligibly small time-dependent within-person inhibitory effects occurring. PPU as measured by the BPS appears time-consistent and robustly associated with psychological distress over time. **Conclusion:** PPU (operationalized by the BPS) appears stable over time. Furthermore, the positive association between psychological distress and PPU appears robust and reflects a time-consistent long-term, rather than a time-specific or short-term relationship. The results of this study suggest that individuals who report more PPU symptoms tend to experience more psychological distress, and vice versa. Moreover, there appear to be short-time inhibitory effects that lower the overall association between both variables in zero-order cross-sectional analyses. We posit that these short-term effects might reflect the application of pornography use as coping behavior and inhibitory aspects of depression symptoms, while overall manifesting PPU. The results of this study highlight the stable and close connection between psychological distress and PPU in U.S.

adults. We recommend researchers to examine this association by comparing individuals who – for a certain period – abstain from pornography and those who continue using it. We also recommend studies to test potential causality in relationships between variables.

Discussion

Summary

In the beginning of this dissertation, I acknowledged the importance of PPU research and the need for further examining associations between PPU and psychological symptoms. However, it appeared difficult to properly assess PPU, mainly because previously established screening tools seemed to lack sufficient validation research. Based on identified research gaps (e.g., identifying a well-validated PPU screening tool, examining associations between PPU and psychological symptoms on a nationally representative level, and in longitudinal designs, considering key demographics), I conducted three interrelated psychological studies (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025). The first study (Engelhardt, Maes, et al., 2025) was a scoping review on validation research on the BPS as the BPS appeared the most promising short PPU screening tool (Borgogna, Griffin, et al., 2022; Islam et al., 2022; Kraus et al., 2020). In the second, cross-sectional study (Engelhardt et al., in press), I examined associations between the BPS and psychological symptoms in the U.S. population from different perspectives. In the third, the longitudinal study (Engelhardt, Geppert, et al., 2025), I examined the apparently most relevant psychopathological BPS associations (anxiety and depression) across three waves. In this section, I will discuss the impact of this dissertation as well as the studies' commonalities and interrelationships.

Impact of this Dissertation

The present dissertation contributes to scientific progress in PPU research in several ways. It demonstrates the reliability and validity of the promising PPU screening tool BPS

across 95 samples (Engelhardt, Maes, et al., 2025), while further validating it in two studies (Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025). This progress is specifically relevant as PPU research was long handicapped by extensive methodological debates (Bőthe et al., 2022; Carnes, 1996; Grubbs & Kraus, 2021; Kraus & Sweeney, 2019; Reid & Kafka, 2014; Rumpf & Montag, 2022; Sassover & Weinstein, 2020) and insufficiently validated assessment tools (Fernandez & Griffiths, 2021; Kraus et al., 2020). In this regard, the present dissertation marks a significant milestone in behavioral addiction research by improving the psychometric assessment and understanding of PPU.

Furthermore, this dissertation provides updated statistics on the prevalence of PPU in the United States (Engelhardt et al., in press). It uncovers the widespread of PPU among U.S. adults (Engelhardt et al., in press) and informs about the vulnerability of specific groups, most significant young men (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025). This dissertation confirms and expends previous research demonstrating that anxiety and depression symptoms are positively linked to PPU (Engelhardt et al., n.d.) (Kraus et al., 2020; Okabe et al., 2021; Shirk et al., 2021). It also uncovers potential mechanisms of action for these associations, such as interaction effects between symptoms and behavior frequencies (Engelhardt et al., in press). Moreover, the findings of this dissertation suggests the robustness and consistency of PPU over time and uncovers a stable treat-like association with depression and anxiety symptoms (Engelhardt, Geppert, et al., 2025). The strength of this latent correlation (strong correlation of the random-intercepts) has not been uncovered in previous studies (Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025), since time-dependent inhibitory effects seem to attenuate cross-sectional associations (Engelhardt, Geppert, et al., 2025). These effects may reflect depressive inhibition and short-term effective coping, while long-term manifesting PPU. These findings have great potential for further investigation. The trait-like relationship between PPU and psychological symptoms may also lead clinicians to consider assessing and treating PPU in

depressed and anxious patients, while assessing and treating depression and anxiety in clinical PPU populations.

In sum, this dissertation significantly contributes to the scientific progress in behavioral addiction, and pornography use research. It advances psychometric testing, demonstrates the relevance of the PPU phenomenon in the U.S., uncovers potential mechanisms of action, and delivers important insights for researchers and clinicians.

Commonalities between Studies

The BPS was the central variable across all three studies of this dissertation (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025). It has been examined subsequently throughout these studies. Other variables relevant in each one of the studies are psychological distress and demographics (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025).

Brief Pornography Screen

The scoping review (Engelhardt, Maes, et al., 2025) was centered around the BPS. I examined the initial BPS publication Study (Kraus et al., 2020) and derived research questions for the examination of the current state of validation research on the BPS. I also scoped the existing evidence on the BPS cut-off scores (validation and exceedance rates) and associations with psychopathological symptoms. In the nationally representative (Engelhardt et al., in press) and longitudinal (Engelhardt, Geppert, et al., 2025) studies, the BPS remained the central construct. I examined its cross-sectional correlations in the nationally representative study and its associations across time in the longitudinal study (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025). In the longitudinal study, I also examined the consistency and stability of the BPS across one year and three waves (Engelhardt, Geppert, et al., 2025).

Psychological Distress

Moreover, psychological distress was assessed in all three dissertation studies. Justified by statistical testing (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025), I defined it as a compound of depression and anxiety symptoms. In the scoping review, the psychological symptom domains that seemed most relevant in scoped studies were depression and anxiety (Engelhardt, Maes, et al., 2025). Other researchers had already grouped both symptom domains as one compound variable (Borgogna, Kraus, et al., 2022; Kraus et al., 2020), which also appeared statistically reasonable for the cross-sectional and the longitudinal studies (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025). In the cross-sectional study, I could examine associations between the BPS and psychological distress on a nationally representative level (Engelhardt et al., in press); while in the longitudinal study, I could examine this association across three waves (Engelhardt, Geppert, et al., 2025).

Demographics

In the scoping review, I extracted demographic sample characteristics from previous studies that had utilized the BPS (Engelhardt, Maes, et al., 2025). In the cross-sectional study, I included the three demographic variables that appeared most relevant from the scoping review (i.e., age, gender, and sexual orientation) in analyses (Engelhardt et al., in press). Lastly, in the longitudinal study, I controlled analyses for the two demographic variables that appeared particularly relevant in the cross-sectional study (i.e., age and gender) (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025).

Further variables

Additional commonalities in variables were in the assessment of pornography use frequency and masturbation frequency between the scoping review and the cross-sectional study, as well as the assessment of BPS cut-off exceedance rates across all three studies of this dissertation (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025).

Interrelationships between Studies

The studies of this dissertation did not only share common variables but also interacted with each other. For instance, significant proportions of results and analyses were based on each other. Hereby, the scoping review was the foundation for the other two studies. As I examined the existing body of validation research on the BPS, I concluded that the BPS appears a valid and reliable PPU screening tool (Engelhardt, Maes, et al., 2025). Therefore, the scoping review justified the application of the BPS in the analyses of cross-sectional and longitudinal studies. Furthermore, the scoping review provided an overview of the current state of research that had assessed the BPS (Engelhardt, Maes, et al., 2025). From this research, I could derive insights and conclusions on how to conduct and adjust the other two studies. Moreover, I identified research gaps in BPS validation research (Engelhardt, Maes, et al., 2025). In response to these gaps, I complemented BPS validation research in the longitudinal study (Engelhardt, Geppert, et al., 2025) by providing missing data on test-retest reliability (Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025). In addition, the scoping review (Engelhardt, Maes, et al., 2025) helped to identify the relevant variables to assess in the nationally representative cross-sectional study (i.e., BPS, psychological distress, age, gender, sexual orientation, masturbation frequency, pornography use frequency, loneliness) and the cross-sectional study (Engelhardt et al., in press) helped identify the relevant variables for the longitudinal study (i.e., BPS, psychological distress, age, gender; Engelhardt, Geppert, et al., 2025). Frequencies of pornography use and masturbation seemed particularly relevant from the scoped literature as many studies had uncovered associations with the BPS (Engelhardt, Maes, et al., 2025). Moreover, the scoping review revealed that BPS cut-off exceedance rates were particularly high in younger and predominantly male populations (Engelhardt, Maes, et al., 2025). As age and gender seemed such important variables and due to the need to constantly update prevalence data, I included an assessment of BPS cut-off exceedance rates in different gender and age groups in the cross-sectional study (Engelhardt et al., in press).

However, the central association in this dissertation was the relationship between the BPS and psychological distress. While identifying the relevance of the constructs and potential covariates in the scoping review (Engelhardt, Maes, et al., 2025), cross-sectional and longitudinal studies allowed me to examine this association more in detail and from various perspectives (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025). In the cross-sectional study, I performed a group comparison of psychological distress outcomes between those individuals who exceeded the BPS clinical cut-off score and those who did not (Engelhardt et al., in press). In alignment with previous predictions, the exceedance group had higher scores on the assessed psychological symptoms. In addition, I performed cross-sectional correlational analyses to examine associations between the BPS, psychological symptoms, frequencies of pornography use and masturbation, and demographic variables. Lastly, I conducted a hierarchical regression analysis to examine potential interaction effects between frequencies and psychological symptoms in predicting BPS, while considering demographics (Engelhardt et al., in press). Through these cross-sectional analyses, I identified age and gender as specifically relevant demographic covariates, and I confirmed psychological distress to be a relevant BPS-associated symptom domain (Engelhardt et al., in press). Based on these results, I performed longitudinal testing on associations between psychological distress and the BPS across time (Engelhardt, Geppert, et al., 2025). In that regard, I analyzed cross-lagged paths between psychological distress and the BPS by examining a random-intercept panel model (Engelhardt, Geppert, et al., 2025). I not only included BPS and psychological distress associations in each of the three studies but from the scoping review up to the longitudinal study, the results of all three studies were consistently based on each other (Engelhardt et al., in press; Engelhardt, Geppert, et al., 2025; Engelhardt, Maes, et al., 2025).

Conclusion

In conclusion, this dissertation significantly contributes to the scientific progress in PPU research. It presents important data and uncovers relevant mechanisms informing both clinicians and researchers. The three interconnected studies share a leitmotif and therefore reflect this unified dissertation project. I sincerely thank everyone who enabled, participated, or supported this project.

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References to the three Studies from this Dissertation

Study 1: Scoping review on the Brief Pornography Screen:

Engelhardt, R., Maes, J., Way, B. M., Borgogna, N. C., & Kraus, S. W. (2025). Screening for Problematic Pornography Use with the Brief Pornography Screen: A Scoping Review. *Current Addiction Reports*, *12*(1), 22. https://doi.org/10.1007/s40429-025-00623-0

Study 2: Cross-sectional nationally representative study on problematic pornography use and psychological symptoms:

Engelhardt, R., Maes, J., Grubbs, J. B., Trommer, D., & Kraus, S. W. (in press). Problematic Pornography Use and Psychological Distress in the United States- a Nationally Representative Study. *Archives of Sexual Behavior*.

Study 3: Longitudinal study on problematic pornography use and psychological distress:

Engelhardt, R., Geppert, R., Grubbs, J. B., Von Oertzen, T., Trommer, D., Maes, J., & Kraus, S. W. (2025). Problematic pornography use and psychological distress: A longitudinal study in a large US sample. *Addictive Behaviors*, 108398. https://doi.org/10.1016/j.addbeh.2025.108398

Study 1:

Screening for Problematic Pornography Use with the Brief Pornography Screen: A Scoping Review

(Published in *Current Addiction Reports*)

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Abstract

Purpose of the review: Four years after the publication of the Brief Pornography Screen (BPS), this review was undertaken to identify the scope of validation research on this brief assessment tool for problematic pornography use (PPU) as well as to identify trends and current gaps in the literature.

Recent findings: A total of 33 studies, including 95 samples from 43 countries and 21 languages with potential BPS validation data were identified. These studies included data, which we analyzed according to gender identities, sexual orientations, and further demographic groups, as well as clinical, subclinical, and non-clinical groups.

Summary: Overall, results from 33 studies confirm the BPS as a valid and reliable assessment tool to identify PPU in clinical and non-clinical populations. Additional research evaluating the proposed clinical cut-off scores, test retest-reliability, as well as further psychometric testing in diverse clinical and subclinical samples from a variety of countries is warranted.

Keywords: Brief pornography screen; BPS; problematic pornography use; pornography addiction; screening tool; assessment

Introduction

Pornography use is becoming increasingly prevalent across the world [1–4]. Although most pornography users do not report problems, pornography use can evolve into problematic behavior for a subset of individuals [5,6]. Problematic pornography use (PPU) includes dysregulation and functional impairments [6,7]. Past research has been accompanied by a debate about the best classification of PPU, as discussed elsewhere [8–12].

Addressing the current debate and criticism of PPU assessment tools for not being sufficiently tested, lacking a unified framework or a clinical cut-off threshold or for assessing multiple discrepant symptom domains, the Brief Pornography Screen (BPS) was developed [13]. It was developed to be a short, psychometrically sound, and robust screening tool to identify probable PPU [13]. The research group evaluated its internal reliability, validity (construct, convergent, criterion, discriminant), and factor structure across five studies [13]. Furthermore, they examined the associations of the BPS with measures of psychopathology and established a clinical cut-off score (≥4). The suggested clinical cut-off score was established using a clinical sample of men, though the authors recommended further clinical evaluation of the BPS. They also discussed a clinical cut-off score (≥6) reflecting the need for clinical service. The researchers proposed the generalizability of the findings among clinical and non-clinical groups across different countries but acknowledged the need for further validation research (i.e., large, clinical, female, diverse sexual orientations and gender identities, international, non-western, and racially/ethnically diverse samples). Specifically, they mentioned a need for further research on the clinical cut-off scores [13]. Since the initial publication of the BPS, a growing body of research has evolved; assessing and validating the BPS in different samples [14–16].

Current Study

Four years after the initial publication [13], we sought to identify and synthesize the emerging empirical literature on the BPS, focusing on validation studies. That is, we sought to

1) identify the extent the BPS has been validated in diverse samples (i.e., large, female clinical and non-clinical, international, non-Western, gender diverse, racially/ethnically diverse, and sexually diverse), 2) if it has met its initial aims of reliability (i.e., internal consistency, test-retest reliability) and validity (i.e., it assessed any of the following: construct, convergent, criterion, discriminant, factor structure, cut-off scores, associations with psychopathology) as a PPU screening tool across samples, 3) evaluate research on the proposed BPS cut-off scores (≥4; ≥6), and 4) determine potential research gaps to direct future research.

Method

A scoping review was conducted following the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews [17,18].

Identification of Studies

We searched PubMed, EBSCO, and Scopus to identify published work in which the BPS was mentioned. Databases were searched on April 16, 2024. We searched full-text articles published since 2020 for variations of "Brief Pornography Screen," applying the search terms "brief AND porn* AND screen*" in fixed word order (to the extent the databases enabled these search options). To identify all relevant published and unpublished work, we made further efforts, expanding the search to databases of ongoing research (HSRProj and UKCRN Portfolio). In addition, we used Google Scholar to identify research that cited the initial BPS validation paper [13]. Furthermore, we contacted the authors of the initial validation paper, asking for unpublished or forthcoming data. Two contact attempts four weeks apart were made with the authors.

Inclusion Criteria and Selection of Studies

After the identification process, duplicates were removed in "Rayyan" [19]. Rayyan.ai is a web tool created to support researchers conducting systematic and scoping reviews. We applied the software to support the identification of duplicates. Identified duplicates were

manually checked and removed. Studies were screened for relevance by reviewing abstracts. Afterwards, full-text papers were assessed for eligibility based on the following inclusion criteria: (1) assessment included the BPS, (2) empirical research, (3) conducted or published not earlier than July 7, 2020, (4) published in English, and (5) assessment included some form of validation data (i.e., factor analysis, reliability analyses, relevant correlations to evaluate construct- and criterion validity, assessment of cut-off scores, or further potential validation data). Two separate reviewers conducted the screening and review process. Disagreements were solved by discussion based on inclusion criteria and full-text articles. The flow diagram (Figure 1) summarizes the systematic search process.

Data Extraction

All relevant information on study characteristics and research questions were collected and included in separate tables. We extracted information on authors, publication year, country, language, study design and setting, and key sample characteristics (see Table 1). We further extracted data on main languages, sample population, sample diversity, reliability, factor analyses, and application and validation of the BPS cut-off values (≥4 and ≥6), as well as other potentially relevant validation data and correlations (e.g., correlations with sexual behavior inventories; see Table 2).

We included the initial BPS validation paper [13] and its five subsamples in this review to map a complete picture of the validation history of the BPS from 2020. When not mentioned, we assumed the sample and the main language to be identical with the study country and the survey language, respectively. Since several studies included multiple samples, we distinguished between samples, as such, when they were either assessed in and reported as distinguish populations (e.g., populations from different countries) or when analyses between subgroups (e.g., male students vs. female students) were conducted and reported separately in a coherent way (e.g., separate Confirmatory Factor Analyses [CFA's] and separate correlational analysis). We did not report subsamples if they did not use the BPS

or did not contain any potentially relevant data for study inclusion. Due to many subsamples and to improve the traceability of citations in the result section, we will refer to subsamples of studies individually when appropriate, applying the nomenclature from Tables 1 and 2.

Data Analysis and Synthesis

After data extraction, we manually rounded the following values to improve comparability: mean age, standard deviation, internal consistency, effect strengths, correlations, and fit indices. To enhance the comparability of factor analyses across studies, we reported Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and its 90% confidence interval (CI). We synthesized data on the BPS cut-off values (4 and 6) in terms of assessment in the samples, in % of exceedance, and of potential evidence or counterevidence for the ability to distinguish between healthy and probable PPU individuals.

In synthesizing data, we focused on data reported as validation evidence, conducted clinical interviews, assessment of reliability or cut-off scores, and reported correlations that could be evidence or counterevidence for construct or criterion validity. To assure comparability and coherent interpretation of data, we did not focus on more complex analyses (e.g., multiple regression models with several covariates) if they were not explicitly mentioned as validation evidence. We also extracted demographic information, including gender identities, sex (as assigned at birth), and sexual orientation data as reported by the authors.

After synthesizing the data, we evaluated internal consistency values as acceptable if ≥.70, good if ≥.80, and excellent if ≥.90 [20]. Test-retest reliability was good if ≥.70 over several months [21]. Factor structure was evaluated as follows: CFI>.95 excellent fit; >.90 acceptable fit, TLI>.95 excellent fit; >.90 acceptable fit, RMSEA ≤.05 excellent fit; ≤.08 acceptable fit [22]. Mean difference effects were evaluated as “practically significant” (or meaningful in real-world settings) if >.41 [23]. Correlations were evaluated as weak if <.30,

as moderate if ≥.30 and <.70, and as strong if ≥.70 [24]. Accordingly, evidence was interpreted as supporting concurrent validity if r>.70, convergent validity if r≥.30 and <.70, and discriminant validity if r<.30.

Results

Thirty-three papers meeting the eligibility criteria were identified and included in the present review. Studies include cross-sectional, behavioral task, longitudinal, brain imaging designs, and one pilot clinical trial. The final papers include 95 samples from 43 countries and 21 languages with potential validation data on the BPS. Sample sizes range from n=13 [25] to n=82,243 [14]. In total, seven samples were smaller than n=100 [14,25–28] and 43 samples were larger than n=1000 [13–15,29–39]. Eight samples [13,29,30,33,37,38,40] were based on nationally representative data. Table 1 summarizes the study characteristics of the included studies in the order of identification. Table 2 presents the extracted validation data by sample country in alphabetic order.

Reliability

Reliability analyses were reported in 46 samples. Throughout these samples, internal consistency was assessed by 50 Cronbach alphas and nine McDonald's omega values. Accordingly, 41 Cronbach alpha values scored in the good range [13–16,29–47], eight as excellent [13,16,46,48–50], and one in an acceptable range [32], while seven McDonalds omega values scored as good [14,33,34,36,38] and two in an excellent range [25]. Composite reliability has been assessed in two samples [13,15], scoring in an excellent range [20]. Potential test-retest reliability data could only be derived from one longitudinal study in help-seeking men [35]. The BPS correlation between the six-month period was significant (p>.001) and scored at 0.47, which is below a good range [21,35].

Construct Validity

Data on construct validity of the BPS was derived from numerous factor analyses and correlational analyses in diverse populations. In addition to an initial principal component analysis [13] that indicated a single underlying PPU component of the BPS, 88 CFAs were conducted within different groups from 56 samples [13–16,32,40,41,43], including 21 language groups. Eighty-seven CFAs presented all fit indices at least in an acceptable range, while a substantial part in the excellent range. In one CFA (Sample 8) [41], the RMSEA was above the acceptable range, the CFI was in the excellent range, the TLI was in an acceptable range, and the RMSEA 90% CI in both acceptable and excellent ranges.

Further data supporting or contradicting construct validity was reported through correlational analyses. In support of concurrent/convergent validity, the BPS was shown to depict moderate correlations with other established assessment scales for problematic sexual behavior. For example, the BPS correlated moderately to the Sexual Addiction Screening Test-Revised [51] [13,52], the Compulsive Sexual Behavior Disorder Scale-19 [53] [37,44], the Compulsive Sexual Behavior Disorder Screen [38], and the Hypersexual Behavior Inventory [54] [13,30].

In support of concurrent/convergent validity, the BPS had moderate to high correlations with other PPU-related symptoms, including self-perceived PPU [15], self-perceived compulsivity [13], self-perceived addiction to pornography [14], disapproval of pornography use [34], withdrawal symptoms, tolerance [37], access efforts [13], statements of addiction [13], dysfunctional coping, and stimulus-specific inhibitory control [43]. However, it appeared statistically unrelated to approach bias for erotic stimuli in a behavioral task [55].

In addition to the initial finding of daily pornography users having significantly higher BPS scores than weekly users and weekly users having significantly higher scores than monthly users [13], the BPS has been correlated to frequency of pornography use in 19 samples [13,14,30,33,34,36,37,41,42,44]. Correlations were moderate in 18 samples [13,14,30,33,34,36,37,41,42,44] and statistically unrelated in one sample [41]. Furthermore,

the BPS had moderate correlations with masturbation frequency in four samples [13,14,35] and a small correlation in one sample [44]. Additional BPS correlations scored moderately with pornography use while masturbating frequency [30], small or statistically non-significantly with amount of pornography use [13], as well as small to moderately with pornography use duration (i.e., minutes spent using pornography per week [37], minutes spent using pornography per day [13], and time spent watching per session [14]).

In support of discriminant validity, the BPS was only weakly related or unrelated to obsessive-impulsive symptoms [13], frequency of sexual intercourse [30,44], loneliness [43], frequency of sexualized drug use [44], physical exercise [45], and emotional resilience [42]. In terms of correlations to impulsivity, studies report mixed findings. In Sample 1 [13], positive and negative urgency correlations with the BPS did not score statistically significant in women. However, in all other samples that assessed impulsivity domains, including in female-only groups, we observed statistically significant correlations of both constructs (Samples 4, 95, 85) [13,39,45]. Conversely, the impulsivity dimensions "lack of premeditation" and "lack of perseverance" appeared to be weakly or unrelated to the BPS in all samples, while "sensation seeking" was unrelated in US military veterans (Sample 1) [13] and Polish adults (Sample 4) [13], but moderately related in Chinese adults (Sample 85) [45].

The BPS was correlated to other psychological symptom domains. For example, it yielded moderate correlations with emotional/psychological distress in four groups of three samples (Samples 2, 3, 95) [13,39] and weak association in one group of one sample (Sample 95) [39]. Correlations with anxiety measures scored weakly in four samples, moderately in three samples of males, weakly in females in one sample, and statistically insignificant in two samples of female university students [15,41,43]. Correlations with depression measures were small in women and moderate in men and in a mixed-gender sample [15,43]. In addition, the BPS was moderately associated with attention deficit hyperactivity disorder symptoms [45]

and weakly associated with body dissociation [39]. It further appeared to be moderately correlated to self-reported feelings of problematic substance use, gambling, and gaming [36].

Five studies conducted clinical interviews in addition to BPS assessment. Four of these studies [25–28] interviewed for Compulsive Sexual Behavior Disorder (CSBD) according to ICD-11 CSBD diagnostic criteria [56] and one study [13] conducted interviews according to Kafka's Hypersexual Disorder proposal for Diagnostic and Statistical Manual of Mental Disorders 5 [57]. Four of these studies [13,26–28] demonstrated statistically significant group differences in BPS scores between the clinical groups and healthy control groups. These results may provide evidence for criterion validity, as they indicate the BPS scores distinguish between clinical and healthy individuals.

Throughout samples, the BPS generally yielded moderate to high correlations to other PPU assessment tools. In support of concurrent validity, it showed high correlations with the Problematic Pornography Consumption Scale [58] in three samples [14,32] and a moderate correlation in one sample [32]. It further demonstrated high correlations with the Cyber Pornography Use Inventory [13,33,59] and the Problematic Pornography Use Scale [13,60] and moderate correlations with the Pornography Craving Questionnaire [13,43,61].

Some findings provide potential evidence for predictive validity. In one study [49], BPS scores among sexual dysfunction and CSBD symptoms were used to distinguish between different profiles by latent profile analysis, resulting in 4 distinct profiles. These profiles were demonstrated to differ in several symptom domains. In other studies, BPS scores decreased after treatment with naltrexone or paroxetine with a statistically significant moderate effect [13] and after a mindfulness intervention in a clinical trial [25], though non-significantly.

Two outcomes may contradict assertions of predictive validity for the BPS. Researchers did not find a correlation between individual mean fractional anisotropy and BPS scores [27] or gray matter volume [26] in regarded brain regions. Though, BPS scores differed with statistical significance between the CSBD group and the healthy control group

in both studies. Further data in support of criterion validity can be derived from research on the clinical cut-off scores of the BPS.

Clinical Cut-Off Scores

The BPS clinical cut-off score (≥4) has been assessed in 64 samples. Exceedance rates vary from 7.01% in international women [14] to 73.83% in Chinese men during the Covid-19 measurements [46]. Analyses in 12 samples provide potential validation evidence for the cut-off value (≥4), which may reflect a need for further clinical investigation [13], while analyses in five samples provide additional evidence for the cut-off value (≥6), which may reflect a need for treatment [13].

In seven clinical/subclinical groups, BPS mean scores were assessed and exceeded the clinical cut-off score (≥4). Group differences were statistically significant when tested against healthy controls [13,15,26–28,35]. In one sample of subclinical women [52], about three-fourths of participants exceeded the BPS cut-off (≥4). In addition, the BPS mean score of three of the four clinical samples reached or exceeded the cut-off value (≥6) [13,26–28].

In one study, the BPS score of a treatment-seeking sample [35] was tested for its statistical difference from the BPS cut-off (≥4). It was demonstrated that the score was higher (*M*=6.75, *SD*=2.96) and significantly different from BPS=4 in the treatment-seeking group. Participants were then assigned to one of three groups according to their PPU symptoms and again tested against the BPS cut-off (≥4.0). The "[only] self-perceived" group scored significantly lower on the BPS, while the "impaired control," and the "PPU" group scored significantly higher, numerically exceeding the BPS cut-off (≥6.0).

In six samples, further statistical methods were used to test for group differences between groups defined through the BPS cut-off (≥4.0) and other PPU-related domains [14,31,32,37,50,62]. Results indicate the BPS cut-off groups scored significantly higher on the Problematic Pornography Use Consumption Scale [31,58], the Problematic Pornography Use Scale [60,62], the Sexual Compulsivity Scale [31,63], the General Health Questionnaire-

12 [31,64], and the Pornography Craving Questionnaire [31,61], as well as in domains of online sexual activities [31,62] and addiction-related symptoms (withdrawal, tolerance [32,37], salience, relapse, mood, and conflict [32]). The probable PPU groups also spent significantly more time using pornography weekly [31], endorsed more "critical" attitudes toward condom use [50], used pornography earlier [14], reported higher pornography use frequency [14,37], higher masturbation frequency, spent more time using pornography per session, reported self-perceived addiction, indicated increased moral disapproval, and having rather sought treatment for PPU, as well as being rather under treatment for PPU [14].

Sample Diversity: Gender

Validation data was derived from 45 mixed samples of men, women, and gender-diverse individuals [14,34,36,47], as well as from 19 mixed samples of men and women [13–15,25,29,30,33,37,39,43,44,46,48–50], 18 samples of men only [13,16,25–28,31,32,35,40–42,62], nine samples of women only [16,41,42,52,55], and four samples with unclear gender composition [38,45].

Reliability analyses have been conducted in samples of only men [16,25,31,32,35,40–42], only women [16,41,42], and mixed samples with [14,34,36,47] and without [13,15,29,30,33,39,43–46,48–50] gender-diverse individuals. Results demonstrated all internal consistency measures (i.e., Cronbach alpha, McDonalds omega, composite reliability) to score within an acceptable range, most of them scoring in a good, and some in an excellent range.

Data on factorial validity can be found in male, female, gender-diverse, and mixed groups. All CFA's conducted in female groups [14,16,41] and mixed groups [13–15,39] scored in an acceptable or excellent range. In male groups, 10 out of 11 CFAs scored in an acceptable or excellent range [14,16,32,40,41]. In addition, an international study [14] assessed BPS factor structure separately in groups defined by gender. Results indicated CFAs

acceptable fit in men (*n*=32,549), excellent fit in women (*n*=46,874), and acceptable fit in gender-diverse individuals (*n*=2,783).

The clinical cut-off score (≥4) has been assessed in groups of male, female, and gender-diverse, as well as in mixed-gender samples. We observed high cut-off exceedance rates of ≥50% outside clinical groups in some male-only groups [40,45]. Across countries, 29% of men, 7% of women, and 18% of gender-diverse individuals exceeded the clinical cut-off score [14].

Correlations with other scales and constructs in support of criterion and construct validity have been conducted across all three gender groups. In support of criterion validity, correlations with other established PPU scales in mixed samples have been found [13,14,33] as well as in male-only [32,35] and female-only groups [13]. Further correlations in potential support of construct validity in mixed [13–15,30,33,34,36,37,39,43,44], exclusively male [41], and exclusively female [41,42,52] groups have also been demonstrated.

Sample Diversity: Cultural, Ethnical, Racial

The examined studies include BPS validation data from 43 countries in 21 language groups and from six continents: Africa (e.g., Sample 58) [14], Asia (e.g., Sample 22) [31], Australia (e.g., Sample 25) [14], Europe (e.g., Sample 84) [44], North America (e.g., Sample 75) [42], and South America (e.g., Sample 30) [14]. In addition to typical Western and Eastern cultural spheres, studies have been conducted in Arab countries [14] and Israel [14,48,49]. In addition to diversity of country and language, psychometrics of the BPS were separately examined in different racial/ethnic groups, including Black, White, Latin/Hispanic, and Asian American and Pacific Islander university students [41]. Reliability has been assessed and demonstrated in samples from seven different countries from three continents [13,15,31,38,41,43,46,48] as well as internationally across 42 countries [14] and in all mentioned ethnic groups [41]. In support of construct validity, the factor structure of the BPS was assessed in samples from 36 countries [13,14,16,32,40,41,43] as well as across 42

countries [14] and in all mentioned ethnic groups [41]. Analyses also confirmed the single-factor structure and resulted in acceptable fit in all groups, except for Black male university students (Sample 8) [41]. Further correlational analyses in potential support for construct or criterion validity have been assessed in samples from six different countries [13,15,32,34,38,43] and across 42 countries [14] as well as in mentioned ethnic groups [41]. The BPS cut-off value (≥4) has been assessed in samples from 42 countries [14,41,44,46] and in all ethnic groups [41]. Validation analyses in support of the cut-off scores can be derived from samples in four different countries [13,15,26–28,31,32,37], as well as across 42 countries and 26 languages [14].

Sample Diversity: Sexual Orientation

BPS validation analyses have been conducted in populations of various sexual orientations. A total of 75 samples [14,16,29–32,34,35,38–46,48,49] explicitly included participants of diverse sexual orientations. Overall included sexual orientations were heterosexual, bisexual, homosexual (gay, lesbian), homoflexible, heteroflexible, asexual, pansexual, transsexual, queer, questioning, and other. Reliability analyses have been conducted in 33 of these samples, and among 50 of these samples, factor analyses have been performed. Overall demonstrating good reliability and unidimensional structure [14,16,29,31,32,34,35,38–46,48,49].

Results from two studies are significant to mention: First, Borgogna et al. [16] conducted reliability and factor analyses separately in participants of heterosexual and non-heterosexual orientations. Fit indices of heterosexual and sexually diverse samples were in an excellent range. Cronbach alpha of heterosexual groups scored in the good range and sexually diverse groups in the excellent range. Second, Bőthe et al. [14] assessed factor structure separately in large groups of participants of different sexual orientations across 42 countries. CFA results support unidimensional factor structure in heterosexual (*n*=56,125), homosexual (*n*=4,607), queer and pansexual (*n*=2,926), homo and heteroflexible (*n*=6,734), asexual

(*n*=1,064), questioning (*n*=1,951), bisexual (*n*=7,688), and other (*n*=807) individuals. Internationally, across sexual orientations, BPS cut-off exceedance rates were numerically the highest in homosexual (22.61%) individuals. Validation data on the cut-off scores can be derived from international cross-cultural, cross-sexual-orientation-analyses [14] and three additional studies [31,32,35] that included sexually diverse orientations. Further potential evidence for criterion and construct validity, such as correlations with other PPU or problematic sexual behavior inventories and psychopathology, was identified in 23 samples of mixed sexual orientations [14,30,32,34,35,38,41–45,49].

Sample Diversity: Clinical, Non-clinical & Subclinical Samples

The identified studies include five clinical samples of male Polish patients [13,25–28] with verified diagnoses (CSBD or Hypersexual Disorder), four subclinical (i.e., treatment-seeking) samples, three samples of Chinese men [32,35,62], and one sample of Polish women [52].

Clinical and subclinical samples included validation evidence for acceptable to excellent reliability [25,32,35]. In favor of criterion validity, we identified validation data supporting the clinical cut-off scores in several clinical and subclinical samples [13,26,27,32,35,52,62]. Additional analyses potentially supporting construct and criterion validity have been identified in five clinical and subclinical samples [13,25,32,35,52]. Evidence includes correlations with the Problematic Pornography Consumption Scale-18 [32], the Sexual Addiction Screening Test-Revised [52], the reduction of BPS scores through pharmacological treatment [13], and mindfulness intervention [25], and longitudinal associations between the BPS and the Problematic Pornography Use Consumption scale [35]. However, data on factor structure or discriminant validity of the BPS could neither be derived from clinical nor subclinical populations.

Discussion

Summary

The purpose of this review was to identify and synthesize the emerging body of empirical research on the validation of the BPS since 2020. Specifically, we sought to map the extent to which the BPS has met its initial aims and research recommendations [13], as well as to determine potential research gaps and direct future research. Initial research recommendations included the validation of reliability, validity findings, evaluation of the clinical cut-off values (≥4; ≥6), and associations with psychopathology [13]. Kraus et al. [13] mentioned a need for validation research, especially in the following populations: Large, female, clinical and non-clinical, international, non-western, gender-diverse, ethnically diverse, and sexually diverse. We identified validation research in all mentioned populations. However, some data is still warranted, especially in more (sexually, culturally, and gender) diverse help-seeking populations, as we will lay out in the following sections.

Reliability

Internal consistency analyses were conducted across continents, countries, cultures, genders, sexual orientations, races/ethnicities, clinical/subclinical, and non-clinical samples, revealing overall good internal consistency of the BPS across populations. Only one study [35] provided a correlation over two time points that could be interpreted as test-retest reliability. Results indicate the association between both time points to be below a good range [21]. However, participants seem to have undergone some PPU intervention between both time points, as they were recruited via a self-help platform [35]. In addition, the authors reported a high attrition rate and acknowledged, “Some participants reported they felt their problems had not been reduced in the past 6 months, and thus did not want to participate in the survey again” [35, p.544]. Furthermore, little is known regarding the internal consistency of PPU across time and a delta time of 6 months may be too long to assess test-retest reliability of a clinical assessment tool [65]. Therefore, we tend to interpret these results with

caution. The test-retest reliability of the BPS [13] has not yet been sufficiently met, whereas the high internal consistency of the BPS has been well established.

Construct validity

In support of construct validity, the BPS unidimensional structure was demonstrated throughout continents, countries, and diverse cultural, gender, ethnic, and sexual orientation samples. While factor structure examinations in clinical or subclinical samples require further examination, we would assume the unidimensional structure would continue to demonstrate adequate fit. A sound alternative factor structure would be unlikely, given the BPS is a five-item instrument. However, future researchers are encouraged to test measurement invariance of the unidimensional structure between groups to identify measurement disparities.

In support of convergent validity, the BPS has been shown to correlate moderately with assessments for CSBD [37,38,43], Hypersexual Disorder [13,30,37], Sexual Addiction [13,52], and related symptom domains in different samples [13–15,34,37,43]. Moderate correlations with an assessment of craving for pornography [61] [13,43] may also represent evidence for convergent validity, as pornography craving may be a PPU-related symptom rather than the exact PPU criterion [6,7]. Other support of convergent validity is correlations to measures of the extent of pornography use and masturbation (e.g., frequency) are shown to score moderately in most samples [13,14,30,34,36,37,41,42,44]. This appears in alignment with previous research [66] and with some researchers arguing that high-frequency pornography use may be a relevant feature of PPU [57].

In support of discriminant validity, the BPS was shown to be divergent (unrelated or weakly related) to less conceptually relevant constructs (e.g., emotional resilience) in several samples [13,30,42,43,45]. In support of discriminant validity [13], we found most impulsivity domains were unrelated or only weakly related to the BPS, with some exceptions (i.e., positive and negative urgency) [39,45]. Due to PPU being currently understood as a type of

CSBD, defined as a "consistent pattern of failure to control intense repetitive sexual urges" [56,67], associations with positive and negative urgency are consistent with construct validity.

We found several correlational analyses with different psychopathological symptom domains in numerous samples [13,15,36,39,41,43,45] and addictive features [32,37]. Clinical profiles distinguished by the BPS were also related to outcomes in several other psychopathological symptom domains [49].

Criterion Validity & Cut-Offs

We extracted data on criterion validity from culturally, gender- and sexually- diverse samples across continents, countries, and ethnic groups, as well as from clinical, subclinical, and non-clinical populations. In support of criterion validity, the BPS scores had high correlations to other PPU assessment tools [58–60] in several samples [13,14,32,33,35].

One core research recommendation of Kraus et al. was more research to be conducted on the proposed clinical cut-off scores [13]. The clinical cut-off score (≥4) has been assessed in 64 populations across continents, countries, as well as diverse cultural, gender, ethnic, and sexual orientation samples. Results indicate that potential PPU appears prevalent in populations across cultures, countries, and continents. Especially in populations of predominantly men (e.g., male university students) concerningly high rates of potential PPU were reported [14,39,46], while culture and external circumstances may be contributing factors [14,46].

Validation research on the clinical cut-off scores provides support for criterion validity. All clinical groups identified by clinical interviews scored above the cut-off (≥4) [13,26–28] and most ≥6.0 [13,27,28]. In several analyses, BPS scores and cut-offs differentiated between clinical (or subclinical) and non-clinical populations [13,15,26–28,32,35,62]. BPS-distinguished groups also differed significantly on other PPU-related outcomes [14,46,50,62]. However, clinical and subclinical samples were widely

homogeneous, all conducted in China or Poland, often only including male or heterosexual participants.

Some evidence may suggest predictive validity for the BPS. Clinical interventions seemed to reduce BPS scores [13,25]. However, an expected association with approach bias for erotic stimuli in a behavioral task study was not found (r=.14, p=.14, n=121) [54]. Researchers argued that approach bias for erotic stimuli may be related to additional PPU features, measured by the multifactorial PPUS [60] rather than by the one-factorial BPS [55]. In addition, in two brain imagining studies the BPS scores did not correlate with expected brain regions, but they were able to differentiate between the clinical and the subclinical groups [26,27]. However, due to relatively small sample sizes, those results should be interpreted cautiously. Recent evidence from review data suggests imaging studies may require thousands of participants to produce replicable results [68]. More longitudinal, experimental, and brain imaging data in large samples is needed to confirm these results and provide further clarification around its clinical utility for clinical practice.

Limitations

This study presents with limitations and strengths. Specifically, we focused on research only after the BPS validation study [13], while there was a previous version of the BPS already in use before 2020 [e.g., 69]. In addition, the focus of articles published in English resulted in the exclusion of two Polish records [70,71] and one record from Peru [72] that may have provided additional validation evidence.

Interpretations of results from some samples may be limited, due to small sample size [e.g., 25]. Furthermore, there may be overlap between participants from some samples. Two US samples [34,36] and two Polish samples [30,38] may specifically represent the same populations. However, as each study conducted different analyses, providing different validation data, we listed and analyzed them separately.

A limitation on comparability of results is some studies only selected pornography using participants [e.g., 33], while the application of such a selection criterion is not clear in others [e.g., 37]. Another limitation in comparability, may be due to different ways of assessing and defining men and women. Some studies have assessed sex according to their birth certificate [e.g., 39], while others may have focused on gender identity [e.g., 14]. Hence, there may be different categorizations of some participants' gender identities that do not align with their sex according to their birth certificate.

Another limitation is that in comprehending validation data on clinical cut-off scores, we focused on the thresholds ≥4 and ≥6, even though in the initial study [13], the ROC curve analysis resulted in thresholds (≥4; ≥5). We decided so, because Kraus et al. suggested those cut-offs, also mentioning in their discussion section that clinical individuals scored "well above 6" [13, p.267]. In applying ≥5, all four measured clinical sample mean scores would have exceeded the threshold [13,26–28]. This suggests a better sensitivity of the ≥5 cut-off than the ≥6 cut-off. However, the trade-off in specificity remains unknown.

There are further limitations in interpreting validity research (i.e., convergent vs. concurrent validity). For instance, we posit that correlations with problematic sexual behavior inventories are in support of convergent validity, rather than for concurrent validity as CSBD, Hypersexual Disorder, and Sexual Addiction assessments assess not the same criterion (PPU), but problematic sexual behaviors as the broader dimension [6,7,38,51,53,54]. Contrary, Kraus et al. listed a BPS correlation (r=.66) with the Hypersexual Behavior Inventory as evidence for criterion validity [13]. Though, the Hypersexual Behavior Inventory measures hypersexual behavior in general, including other forms of sexual behavior, such as sex with a partner [54], which seems not to be the same criterion as PPU (i.e., face validity). But Reid et al. reported that most "hypersexual behavior" is PPU [73]. Accordingly, in most participants, the Hypersexual Behavior Inventory and the BPS results may reflect the same criterion.

Research Recommendations

We recommend more BPS validation research on discriminant and predictive validity in clinical and help-seeking samples. In sampling help-seeking populations, approaches such as those in Chen et al. [32,35] may be helpful, as individuals who searched for help on a relevant website were asked to participate. This approach may also provide warranted longitudinal data on the BPS after treatment interventions.

Longitudinal data on the BPS is needed to examine test-retest reliability. Short time frames of a few weeks between time one and time two may be better able to provide evidence on test-retest reliability [65]. Associations with psychopathological symptoms or potentially comorbid disorders need more longitudinal and experimental exploration to draw causal conclusions. To further examine results from brain imaging and behavioral task studies, we recommend the replication in larger samples (*n*'s >1000). We also recommend applying and further examining the cut-off (≥4). We note that the scoped research evidence supports the cut-off score (≥4) to separate PPU individuals from healthy controls, while individuals in clinical context may exceed the cut-off ≥5 and most of them also cut off ≥6. We recommend large studies designed to replicate and validate the sensitivity and specificity of cut-off ≥4 [13]. Additionally, we recommend similar studies on the cut-offs ≥5 and ≥6 as this may further enhance the utility of the BPS. Lastly, we recommend research in more diverse clinical and help-seeking populations (i.e., female, non-heterosexual, culturally diverse), as well as from a wider variety of countries, particularly Africa, the Middle East, and South America.

Conclusions

Overall, the BPS has been shown to assess a unidimensional PPU symptom domain. Initial results on reliability and validity were confirmed by most of the research since 2020. We specifically acknowledge internal consistency to appear robust in diverse populations and factor structure to appear robust in diverse non-clinical populations. The reviewed literature supports the BPS scores and cut-offs as indicators to distinguish clinical from non-clinical

populations. As suggested in the initial BPS validation study [13], we acknowledge that the BPS has been validated in all recommended (i.e., large, female, clinical, and non-clinical, non-western, gender diverse, ethnically diverse, and sexually diverse) populations. However, some research, especially in more diverse clinical and help-seeking populations from various countries, is still needed.

In conclusion, four years after the initial publication of the BPS, we acknowledge most of the currently available research to be in support of the generalizability of the findings from Kraus et al. [13], summarizing the BPS as a psychometrically sound and robust screening tool to identify PPU. We recommend researchers utilize the BPS to screen for PPU and conduct research to meet the identified research gaps.

Table 1: Study Characteristics of Included Studies in order of study identification

Study Number	Reference	Study Country	Included Samples	Sample Country	Key Sample Characteristic	Design	Specification
Study 1	Kraus et al., 2020 [13]	USA / Poland	Sample 1	USA	Military veterans	Cross-sectional, self-report	Purposive sample
			Sample 2	USA	Citizens[1]	Cross-sectional, self-report	Derived from nationally representative sample
			Sample 3	USA	Citizens	Cross-sectional, self-report	Derived from nationally representative sample
			Sample 4	Poland	Adults	Cross-sectional, self-report	Voluntary response sample
			Sample 5	Poland	Clinical men	Cross-sectional, self-report	Includes clinical group and control group
Study 2	Borgogna et al., 2024, in press [40]	USA	Sample 6	USA	AAPI[2] male students	Cross-sectional, self-report	Purposive sample
			Sample 7	USA	AAPI female students	Cross-sectional, self-report	Purposive sample
			Sample 8	USA	Black male students	Cross-sectional, self-report	Purposive sample
			Sample 9	USA	Black female students	Cross-sectional, self-report	Purposive sample
			Sample 10	USA	Latin male students	Cross-sectional, self-report	Purposive sample
			Sample 11	USA	Latin female students	Cross-sectional, self-report	Purposive sample
			Sample 12	USA	White male students	Cross-sectional, self-report	Purposive sample
			Sample 13	USA	White female students	Cross-sectional, self-report	Purposive sample
Study 3	Kowalewska et al., 2022 [51]	Poland	Sample 14	Poland	Women	Cross-sectional, self-report	Subclinical sample
Study 4	Wizła et al., 2022 [29]	Poland / USA	Sample 15	Poland	Citizens	Cross-sectional, self-report	Convenience sample
			Sample 16	Poland	Adults	Cross-sectional, self-report	Nationally representative sample
Study 5	Lewczuk et al., 2023 [30]	Poland / USA	Sample 17	Poland	Citizens	Cross-sectional, self-report	Nationally representative sample
Study 6	Borgogna et al., 2022 [16]	USA	Sample 18	USA	Heterosexual men	Cross-sectional, self-report	Purposive sample
			Sample 19	USA	Heterosexual women	Cross-sectional, self-report	Purposive sample

			Sample 20	USA	Non-heterosexual men	Cross-sectional, self-report	Purposive sample
			Sample 21	USA	Non-heterosexual women	Cross-sectional, self-report	Purposive sample
Study 7	Jiang et al., 2022 [31]	China, Canada	Sample 22	China	Adolescents	Cross-sectional, self-report	Subclinical sample
Study 8	Böthe et al., 2024 [14]	International (42 countries)	Sample 23	International	International sample	Cross-sectional, self-report	Non-probability sample
							Non-probability sample
			Sample 24	Algeria	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 25	Australia	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 26	Austria	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 27	Bangladesh	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 28	Belgium	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 29	Bolivia	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 30	Brazil	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 31	Canada	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 32	Chile	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 33	China	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 34	Colombia	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 35	Croatia	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 36	Czech Republic	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 37	Ecuador	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 38	France	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 39	Germany	Citizens	Cross-sectional, self-report	Non-probability sample

Sample 40	Gibraltar	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 41	Hungary	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 42	India	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 43	Iraq	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 44	Ireland	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 45	Israel	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 46	Italy	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 47	Japan	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 48	Lithuania	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 49	Malaysia	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 50	Mexico	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 51	New Zealand	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 52	North Macedonia	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 53	Panama	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 54	Peru	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 55	Poland	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 56	Portugal	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 57	Slovakia	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 58	South Africa	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 59	South Korea	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 60	Spain	Citizens	Cross-sectional, self-report	Non-probability sample
Sample 61	Switzerland	Citizens	Cross-sectional, self-report	Non-probability sample

			Sample 62	Taiwan	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 63	Turkey	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 64	United Kingdom	Citizens	Cross-sectional, self-report	Non-probability sample
			Sample 65	USA	Citizens	Cross-sectional, self-report	Non-probability sample
Study 9	Chen et al., 2021 [32]	China, Hungary, Canada, USA	Sample 66	China	Community men	Cross-sectional, self-report	Community sample
			Sample 67	China	Subclinical men	Cross-sectional, self-report	Subclinical sample
Study 10	Sklenarik et al., 2020 [54]	USA, Poland	Sample 68	USA	Female university students	Behavioral task study	Non-probability sample
Study 11	Holas et al., 2020 [25]	Poland, USA	Sample 69	Poland	Clinical men	Clinical trial	Clinical sample, pilot study
Study 12	Grubbs et al., 2020 [33]	USA	Sample 70	USA	Citizens	Cross-sectional, self-report	Derived from nationally representative sample
Study 13	Draps et al., 2020 [26]	Poland, France, USA	Sample 71	Poland	Clinical men	Brain imaging study	Clinical sample
Study 14	Borgogna et al., 2021 [39]	USA	Sample 72	USA	Male veterans and non-veterans	Cross-sectional, self-report	Derived from nationally representative sample
Study 15	Grubbs et al., 2022 [34]	USA	Sample 73	USA	Citizens	Cross-sectional, self-report	Non-probability sample
Study 16	Borgogna et al., 2024 [41]	USA	Sample 74	USA	Male university students	Cross-sectional, self-report	Convenience sample
			Sample 75	USA	Female university students	Cross-sectional, self-report	Convenience sample
Study 17	Chen et al., 2022 [35]	China, USA, Canada	Sample 76	China	Subclinical men	Longitudinal Study, self-report	Subclinical sample
Study 18	Islam et al., 2022 [15]	Bangladesh, Canada, USA	Sample 77	Bangladesh	Adults	Cross-sectional, self-report	Purposive sample
Study 19	Draps et al., 2021 [27]	Poland, USA	Sample 78	Poland	Men	Controlled brain imaging study	Includes clinical group and control group

Study 20	Bibi et al., 2022 [42]	Pakistan, USA	Sample 79	Pakistan	Adults	Cross-sectional, self-report	Convenience sample
Study 21	Gewirtz-Meydan & Godboud, 2023 [47]	Israel, Canada	Sample 80	Israel	Childhood sexual abuse survivors	Cross-sectional, self-report	Convenience sample
Study 22	Draps et al., 2021 [28]	Poland, France, USA	Sample 81	Poland	Men	Behavioral task study	Includes clinical group & control group
Study 23	Gewirtz-Meydan, 2024 [48]	Israel	Sample 82	Israel	Adults	Cross-sectional, self-report	Convenience sample
Study 24	Grubbs & Kraus, 2023 [36]	USA	Sample 83	USA	Citizens	Cross-sectional, self-report	Non-probability sample
Study 25	Lewczuk et al., 2023 [43]	Poland	Sample 84	Poland	Adult cisgender sexual minority individuals	Cross-sectional, self-report	Voluntary response sample
Study 26	Zhang et al., 2022 [44]	China, Canada	Sample 85	China	Adults	Cross-sectional, self-report	Voluntary response sample
Study 27	Lewczuk et al., 2022 [37]	Poland, USA	Sample 86	Poland	Citizens	Cross-sectional, self-report	Nationally representative sample
Study 28	Chen et al., 2023 [60]	China	Sample 87	China	Men	Cross-sectional, self-report	Includes subclinical group & control group
Study 29	Jiang et al., 2022 [45]	China	Sample 88	China	Adults	Cross-sectional, self-report	Pandemic non-probability sample
			Sample 89	China	Adults	Cross-sectional, self-report	Post-pandemic non-probability sample
Study 30	Grubbs et al., 2023 [38]	International (6 countries)	Sample 90	Malaysia	University students	Cross-sectional, self-report	Convenience sample
			Sample 91	USA	Adults	Cross-sectional, self-report	Probability sample
			Sample 92	Poland	Citizens	Cross-sectional, self-report	Nationally-representative
Study 31	Etsitty, 2022 [46]	USA	Sample 93	USA	Adults	Cross-sectional, self-report	Voluntary response sample, thesis
Study 32	Way, 2022 [49]	USA	Sample 94	USA	University students	Cross-sectional, self-report	Convenience sample, thesis
Study 33	Engelhardt et al., 2024 [39]	USA, Germany	Sample 95	USA	University students	Cross-sectional, self-report	Convenience sample, unpublished

Note: [1]If no specific sample characteristics other than country name were available, we named the sample population as "citizens," [2]AAPI=Asian American /Pacific Islander

Table 2: Extracted Validation Data by Sample in Order of Sample Country

Country / BPS Main Languages (%)	Sample Population / Included diversity	*n* / M_{age} (*SD*)	Reliability Data	Results from Factor Analyses	Cut-off Application / Validation	Other Validation Data / Potentially relevant correlations	Sample Nr.
Algeria / Arabic (29.17%), French (29.17%), English (25.00%)	Citizens / men and women of diverse sexual orientations	24 / 35 (14.6)			**Cut-off (4) applied:** 50.00% of participants reached or exceeded.		**Sample 24**
Australia / English (97.81%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	639 / 41 (16.2)		**CFA conducted:** CFI=0.996 TLI=0.993 RMSEA=0.090 [0.060, 0.123]	**Cut-off (4) applied:** 16.30% reached or exceed.		**Sample 25**
Austria / German (79.22%), Hungarian (12.20%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	746 / 33 (11.8)		**CFA conducted:** CFI=0.997 TLI= 0.995 RMSEA=0.046 [0.012, 0.079]	**Cut-off (4) applied:** 9.87% reached or exceed.		**Sample 26**
Bangladesh / Bangla (100%)	Adults / men and women	6023 / 23 (5.0)	α=.86 composite reliability=.93	**CFA conducted:** CFI=0.999 TLI=0.997 RMSEA=0.041 [0.032, 0.051]	**Cut-off (4) validation:** BPS scores of self-perceived PPU individuals were tested against BPS scores of other participants. Results: Self-perceived PPU individuals had statistically significantly higher BPS scores: 4.62 (2.59) vs. 1.53 (2.18) t/F=1427.98***. The mean score of the self-perceived PPU group exceeded the cut-off score (4).	**Construct validity:** Correlation with self-perceived PPU in men (.41**) and in women (.45**), depressive symptoms in men (.43**) and in women (.22**), anxiety symptoms in men (.38**) and in women (.19**).	**Sample 77**
Bangladesh / Bangla (87.94%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	373 / 23 (4.7)			**Cut-off (4) applied:** 29.54% reached or exceeded.		**Sample 27**
Belgium / Dutch (73.14%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	644 / 40 (13.9)		**CFA conducted:** CFI=0.999 TLI=0.998 RMSEA= 0.039 [0.000, 0.077]	**Cut-off (4) applied:** 16.50% reached or exceeded.		**Sample 28**

Bolivia / Spanish-Latin American (97.40%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	385 / 29 (10.2)			**Cut-off (4) applied:** 28.49% reached or exceeded.		**Sample 29**
Brazil / Portuguese-Brazil (98.49%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	3579 / 43 (12.3)		**CFA conducted:** CFI=0.997 TLI=0.995 RMSEA=0.069 [0.056, 0.082]	**Cut-off (4) applied:** 24.90% reached or exceeded.		**Sample 30**
Canada / English (49.51%), French (48.41%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2541 / 35 (13.7)		**CFA conducted:** CFI=0.997 TLI=0.995 RMSEA=0.049 [0.034, 0.065]	**Cut-off (4) applied:** 13.64% reached or exceeded.		**Sample 31**
Chile / Spanish - Latin American (97.87%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1173 / 28 (9.1)		**CFA conducted:** CFI=0.999 TLI=0.998 RMSEA=0.035 [0.007, 0.061]	**Cut-off (4) applied:** 23.36% reached or exceeded.		**Sample 32**
China / Mandarin (100%)	Treatment-seeking adults [follow up] / men of diverse sexual orientations	8845 [972] / 26 (7.8) [26 (4.7)]	α(T1)=.86 α(T2)=.89 **test-retest-reliability:** correlation between T1 & T2=(T1+6 months) at 0.47 (p>.001)		**Cut-off (4) validation:** Time 1 sample (n=8,845) reported significantly higher scores than the cut-off (4) (t=87.31, p<.01). **Cut-off (6) validation:** Time 1 sample (n=8,845) reported a numerically higher mean score on the BPS than cut-off (6) (M=6.75, SD=2.96). **Further validation:** Researchers distinguished between three groups according to their PPU symptoms: 1) self-perceived PPU, 2) impaired-control, and 3) PPU group. Results: Groups were statistically distinguishable in areas of PPU-related symptoms; the self-perceived group scored significantly below the **BPS cut-off (4)**: 3.33 vs. 4, t=−12.53, p<.01; the impaired control group scored above **BPS cut-off (6)**: 7.15 vs. 4, t=91.01, p<.01 and the PPU group scored far above **BPS**	**Criterion validity:** Correlation between T1 BPS and T1 Problematic Pornography Use Consumption Scale (.70***), and between T2 BPS and T2 Problematic Pornography Use Consumption Scale (.78***), correlation between T1 BPS and T2 Problematic Pornography Use Consumption Scale (.46***).	**Sample 76**

					cut-off (6): 8.88 vs. 4, t=148.40, *p*<.01.		
China / Mandarin (100%)	Treatment-seeking individuals / men of diverse sexual orientations	4651 / 23 (4.3)	α=.74	**CFA conducted:** CFI=0.982 TLI=0.964 RMSEA=0.072 [0.069, 0.080]	**Cut-off (4) validation:** Sample selection by BPS cut-off: all participants reached or exceeded the clinical cut-off score were included. When tested against two community samples, the group above the cut-off had significantly higher means in measures of withdrawal, tolerance, salience, relapse, mood, and conflict.	**Criterion validity:** Correlation with Problematic Pornography Consumption Scale-18 (.61***).	**Sample 67**
China / Mandarin (100%)	Treatment-seeking adolescents / men of diverse sexual orientations	3486 / 17 (1.2)	α=.86		**Cut-off (4) application/validation:** BPS cut-off and Pornography Use Consumption Scale scores were utilized to distinguish between groups of help-seeking adolescents. Groups were distinguishable (1<2<3) in the following domains: Problematic Pornography Use Consumption Scale scores (n2=.82**), BPS scores (n2=.49**), weekly time spent on pornography (*p*<.001), General Health Questionnaire-12 (n2=.15***), online sexual activities (*p*<.001), Sexual Compulsivity Scale (n2=.34***), Pornography Craving Questionnaire (.36***).		**Sample 22**

China / Mandarin - simplified (99.42%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2428 / 28 (10.3)		**CFA conducted:** CFI=0.999 TLI=0.998 RMSEA=0.057 [0.042, 0.073]	**Cut-off (4) applied:** 33.92% reached or exceeded.		**Sample 33**
China / Mandarin (100%)	Adult community members / men of diverse sexual orientations	695 / 25 (7.2)	α=.89	**CFA conducted:** CFI=0.999 TLI =0.997 RMSEA=0.042 [0.000, 0.045]		**Criterion validity:** Correlation with Problematic Pornography Consumption Scale-18 (.81***).	**Sample 66**
China / Mandarin (100%)	Adults / diverse sexual orientations	600 / 32 (12.4)	α=.85			**Construct validity:** Correlations with impulsivity (.41***), negative urgency (.39***), positive urgency (.43***), lack of premeditation (.03), lack of perseverance (-.13**), sensation seeking (.44***), attention deficit hyperactivity disorder (.36***), and physical exercise (-.14***).	**Sample 85**
China / Mandarin (100%)	Treatment-seeking adults [and healthy control group] / men	578 [525] / 22 (5.2) [24 (4.5)]			**Cut-off (4) applied:** The BPS cut-off (4) was used to identify a subclinical PPU sample from help-seeking male individuals. **Cut-off (4) validation**: Subclinical sample was tested against control community sample. Results: The subclinical sample differed significantly from control community sample, having higher mean scores on the Problematic Pornography Use Scale (Cohens d=-1.84***) and on scores of measured Online Sexual Activities (Cohens d=-1.05***).		**Sample 87**
China / Mandarin (100%)	Post-Pandemic sample (October 2021) / men and women of diverse sexual orientations	504 / 29 (6.3)	α=.90		**Cut-off (4) applied:** 40.28% of participants, 49.41% of men and 31.08% of women reached or exceeded.		**Sample 89**

China / Mandarin (100%)	Pandemic sample (April 2020) / men and women of diverse sexual orientations	496 / 29 (6.8)	α=.88		**Cut-off (4) applied:** 61.69% of participants, 73.83% of men and 48.75% of women reached or exceeded.	**Sample 88**
Colombia / Spanish-Latin American 99.06%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1913 / 26 (10.0)		**CFA conducted:** CFI=0.998 TLI=0.996 RMSEA=0.052 [0.035, 0.072]	**Cut-off (4) applied:** 19.09% reached or exceeded.	**Sample 34**
Croatia / Croatian (99.00%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2390 / 29 (8.8)		**CFA conducted:** CFI=0.994 TLI=0.987 RMSEA=0.090 [0.074, 0.106]	**Cut-off (4) applied:** 12.21% reached or exceeded.	**Sample 35**
Czech Republic / Czech (96.04%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1640 / 47 (16.9)		**CFA conducted:** CFI=0.996 TLI=0.992 RMSEA=0.048 [0.027, 0.071]	**Cut-off (4) applied:** 9.52% reached or exceeded.	**Sample 36**
Ecuador / Spanish-Latin American (94.93%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	276 / 30 (12.0)			**Cut-off (4) applied:** 29.34% reached or exceeded.	**Sample 37**
France / French (94.26%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1706 / 33 (13.2)		**CFA conducted:** CFI=0.998 TLI=0.997 RMSEA=0.040 [0.021, 0.061]	**Cut-off (4) applied:** 19.10% reached or exceeded.	**Sample 38**
Germany / German (85.81%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	3271 / 42 (15.3)		**CFA conducted:** CFI=0.997 TLI=0.995 RMSEA=0.046 [0.032, 0.061]	**Cut-off (4) applied:** 9.38% reached or exceeded.	**Sample 39**
Gibraltar / English (89.06%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	64 / 40 (14.7)			**Cut-off (4) applied:** 15.25% reached or exceeded.	**Sample 40**

Hungary / Hungarian (90.34%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	11200 / 36 (12.1)		**CFA conducted:** CFI=0.997 TLI=0.994 RMSEA=0.053 [0.046, 0.060]	**Cut-off (4) applied:** 15.84% reached or exceeded.		**Sample 41**
India / English (90.72%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	194 / 30 (10.0)			**Cut-off (4) applied:** 33.52% reached or exceeded.		**Sample 42**
International from 42 countries / English (17.02%), Hungarian (13.30%), Polish (12.58%), Spanish-Latin America (10.85%) (Multi-language: 26 languages)	International sample / men, women, and gender-diverse individuals of diverse sexual orientations	82243 / 32 (12.5)	α=.86 ω=.87	**Several CFA's conducted**: **CFA (all)**: CFI=0.997, TLI=0.994, RMSEA=0.061 [0.058, 0.064] **CFA (men):** CFI=0.998; TLI=0.995; RMSEA=0.055 [0.051, 0.059] **CFA (women):** CFI=0.996, TLI=0.992, RMSEA=0.044 [0.041, 0.048] **CFA (gender-diverse):** CFI=0.998, TLI=0.995, RMSEA=0.052 [0.038, 0.068] **CFA (heterosexual):** CFI=0.997, TLI=0.994, RMSEA=0.060 [0.057, 0.063] **CFA (homosexual):** CFI=0.998, TLI=0.995, RMSEA=0.050 [0.040, 0.062] **CFA (bisexual):** CFI=0.995; TLI=0.991; RMSEA=0.064 [0.056, 0.073] **CFA (queer and pansexual):** CFI=0.996; TLI=0.992, RMSEA=0.056 [0.042, 0.071] **CFA (homo- and heteroflexible)**: CFI=0.997,	**Cut-off (4) applied:** 16.57% of participants, 28.92% of men, 7.01% of women, 18.06% of gender-diverse, 16.52% of heterosexual, 22.61% of homosexual, 15.78% of bisexual, 12.60% of queer and pansexual, 15.71% of homo- and heteroflexible, 9.01% of asexual, 20.15% of questioning, and 13.42% of other individuals reached or exceeded. **Cut-off (4) validated:** Mann-Whitney U-tests performed between groups below cut-off (*n*=54072) and reached or exceeded cut-off (*n*=12364). Results: The group above the cut-off reported earlier age of first time pornography use (Cohens d=.25***), higher pornography use frequency (Cohens d=.74***), more time spend watching pornography per session (Cohens d=.37***), higher masturbation frequency (Cohens d=.61***), greater self-perceived addiction to pornography use (Cohens d=1.16***), more moral disapproval (Cohens d=.47***), having sought treatment for PPU (Cramer´s V=.55***), and being under treatment for PPU (Cramer´s V=.55***).	**Criterion validity:** Associations with Problematic Pornography Consumption Scale (.73***) and Problematic Pornography Consumption Scale-6 (.70***). **Construct validity:** Correlations with PU-FQ (.51***), time spent watching per session (.23***), self-perceived addiction to pornography (.65***), and masturbation frequency (.35***).	**Sample 23**

TLI=0.993;
RMSEA=0.060
[0.050, 0.069]
CFA
(asexual):
CFI=0.997,
TLI=0.994,
RMSEA=0.044
[0.018, 0.072]
CFA
(questioning):
CFI=0.997,
TLI=0.994,
RMSEA=0.056
[0.039, 0.075]
CFA (other):
CFI=0.995,
TLI=0.989,
RMSEA=0.067
[0.040, 0.098]

CFA (Croatian language): CFI=0.995, TLI=0.989, RMSEA=0.085 [0.070, 0.101]
CFA (Czech language): CFI=0.996, TLI=0.991, RMSEA=0.053 [0.032, 0.076]
CFA (English language): CFI=0.998, TLI=0.997, RMSEA=0.052 [0.045, 0.058]
CFA (French language): CFI=0.997, TLI=0.995, RMSEA=0.049 [0.037-0.062]
CFA (German language): CFI=0.997; TLI=0.995, RMSEA=0.045 [0.031, 0.059]
CFA (Hebrew language): CFI=0.999, TLI=0.998, RMSEA=0.048 [0.026, 0.073]
CFA (Hungarian language): CFI=0.997, TLI=0.994, RMSEA=0.051 [0.044-0.059]
CFA (Italian language): CFI=0.997, TLI=0.993, RMSEA=0.045 [0.030, 0.062]
CFA (Korean language): CFI=0.999, TLI=0.998, RMSEA=0.031 [0.005, 0.055]
CFA (Lithuanian language): CFI=0.995, TLI=0.990, RMSEA=0.065 [0.048, 0.083]
CFA (Macedonian language): CFI=0.994, TLI=0.988,

RMSEA=0.066 [0.045, 0.089]

CFA (Mandarin language–simplified): CFI=0.999, TLI=0.998, RMSEA=0.054 [0.040, 0.071]

CFA (Mandarin language–traditional): CFI=0.996, TLI=0.993, RMSEA=0.076 [0.062, 0.091]

CFA (Polish language): CFI=0.998, TLI=0.995, RMSEA=0.039 [0.031, 0.047]

CFA (Brazilian Portuguese language): CFI=0.999, TLI=0.997, RMSEA=0.051 [0.039, 0.065]

CFA (Portuguese language–Portugal): CFI=0.995, TLI=0.990, RMSEA=0.052 [0.035-0.070]

CFA (Slovak language): CFI=0.998, TLI=0.996, RMSEA=0.043 [0.027, 0.062]

CFA (Spanish language–Latin America): CFI= 0.997, TLI=0.994, RMSEA=0.056 [0.048, 0.064]

CFA (Spanish language–Spain): CFI=0.998, TLI=0.997, RMSEA=0.042 [0.026, 0.060]

CFA (Turkish language): CFI=0.995, TLI=0.990, RMSEA=0.084 [0.058, 0.113]

Iraq / Arabic (89.9%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	99 / 36 (14.3)			**Cut-off (4) applied:** 38.04% reached or exceeded.		**Sample 43**
Ireland / English (95.59%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1702 / 33 (13.9)		**CFA conducted:** CFI=0.999 TLI=0.997 RMSEA=0.043 [0.02, 0.064]	**Cut-off (4) applied:** 14.86% reached or exceeded.		**Sample 44**
Israel / Hebrew (97.23%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1334 / 37 (11.7)		**CFA conducted:** CFI=0.999 TLI=0.997 RMSEA=0.055 [0.033, 0.079]	**Cut-off (4) applied:** 13.75% reached or exceeded.		**Sample 45**
Israel / Hebrew (100%)	Non-clinical adults / men and women of diverse sexual orientations	806 / 26 (6.2)	α=.95			**Potentially construct/criterion validit**y: BPS scores were used among sexual dysfunction and CSBD symptom scores to distinguish between different profiles by latent profile analysis. Results: Four distinct profiles were identified. Profiles differed in childhood abuse, post-traumatic stress disorder symptoms, anxiety, depression, and sexual motives; the clinical profile with severest symptoms, "hypersexual porn users," had BPS scores of +2.35 *SD* above mean.	**Sample 82**
Israel / Hebrew (100%)	Adult childhood sexual abuse survivors / men and women of diverse sexual orientations	393 / 31 (6.2)	α=.95				**Sample 80**
Italy / Italian (97.38%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2401 / 27 (8.0)		**CFA conducted:** CFI=0.996 TLI=0.993 RMSEA=0.047 [0.031, 0.064]	**Cut-off (4) applied:** 9.68% reached or exceeded.		**Sample 46**

Japan / Japanese (81.32%), English (14.06%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	562 / 38 (12.4)		**CFA conducted:** CFI=0.996 TLI=0.991 RMSEA=0.062 [0.029, 0.098]	**Cut-off (4) applied:** 14.31% reached or exceeded.		**Sample 47**
Lithuania / Lithuanian (99.01%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2015 / 34 (11.0)		**CFA conducted:** CFI=0.995 TLI=0.989 RMSEA=0.068 [0.051, 0.087]	**Cut-off (4) applied:** 11.23% reached or exceeded.		**Sample 48**
Malaysia / English (100%)	Adult English-speaking university students / sexual diverse orientations	375 / 21 (1.5)	α=.83 ω=.84			**Construct validity:** Correlation with Compulsive Sexual Behavior Disorder Screen (.46***).	**Sample 90**
Malaysia / English (97.26%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1170 / 27 (8.9)		**CFA conducted:** CFI=0.996 TLI=0.993 RMSEA=0.085 [0.064, 0.109]	**Cut-off (4) applied:** 33.24% reached or exceeded.		**Sample 49**
Mexico / Spanish-Latin American (98.60%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2137 / 32 (11.9)		**CFA conducted:** CFI=0.996 TLI=0.993 RMSEA=0.053 [0.036, 0.071]	**Cut-off (4) applied:** 15.54% reached or exceeded.		**Sample 50**
New Zealand English (99.58%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2834 / 37 (14.5)		**CFA conducted:** CFI=0.997 TLI=0.993 RMSEA=0.062 [0.048, 0.077]	**Cut-off (4) applied:** 14.13% reached or exceeded.		**Sample 51**
North Macedonia / Macedonian (98.16%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1251 / 30 (10.2)		**CFA conducted:** CFI=0.994 TLI=0.987 RMSEA=0.068 [0.047, 0.092]	**Cut-off (4) applied:** 11.29% reached or exceeded.		**Sample 52**
Pakistan / English (100%)	Adults / men and women of diverse sexual orientations	280 / 25 (5.3)	α=.89	**CFA conducted**: CFI/ TLI>0.90 RMSEA<0.08 [0.08, 0.10]		**Construct validity:** Correlations with Pornography Craving Questionnaire (.42**), Hypersexual Behavior Inventory-19-Dysfunctional coping (.40**), Hypersexual Behavior Inventory-19-Stimulus-specific inhibitory control	**Sample 79**

						(.50**), loneliness (.06*), depression (.33**), and anxiety (.07*).	
Panama / Spanish-Latin American (94.59%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	333 / 36 (13.4)			**Cut-off (4) applied:** 19.42% reached or exceeded.		**Sample 53**
Peru / Spanish-Latin American (99.55%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2672 / 32 (11.0)		**CFA conducted:** CFI=0.997 TLI=0.994 RMSEA=0.057 [0.043, 0.073]	**Cut-off (4) applied:** 20.86% reached or exceeded.		**Sample 54**
Poland / Polish (98.94%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	9892 / 27 (6.1)		**CFA conducted:** CFI=0.998 TLI=0.995 RMSEA=0.039 [0.031, 0.047]	**Cut-off (4) applied:** 9.09% reached or exceeded.		**Sample 55**
Poland / Polish (100%)	Nationally representative adults / men and women	1541 / 43 (14.4)	α=.84		**Cut-off (4) applied:** 22.84% of participants, 33.24% of men, and 12.92% of women reached or exceeded. **Cut-Off (4) validated:** Participants above the cut-off (4) had significantly more withdrawal symptoms (Cohens d=.86***), tolerance symptoms (Cohens d=.91***), and more frequent pornography use (Cohens d=1.06***).	**Construct validity:** Correlations with PU-FQ (.49***), pornography use duration (.26***), CSBD-19 (.50***), withdrawal symptoms (.41***), and tolerance (.46***).	**Sample 86**
Poland / Polish (100%)	Nationally representative adults / men and women of diverse sexual orientations	1526 / 43 (14.4)	α=.84		**Cut-off (4) applied:** 22.94% of participants, 33.33% of men and 12.97% of women reached or exceeded.		**Sample 16**

Poland / Polish (100%)	Nationally representative adults / men and women of diverse sexual orientations	1036 / 43 (14.2)	α=.88			**Construct validity:** Correlations with PU-FQ (men: .39**, women: .42**, all: .47**), masturbation frequency (all: .36**; men: .30**, women: .34**), pornography use while masturbating (all: .49**, men: .41**, women: .46), and Hypersexual Behavior Inventory (all: .61**, men: .63**, women: .57**). Correlations with frequency of sexual intercourse (all: .00, men -.09*, women: .12**).	**Sample 17**
Poland / Polish (100%)	Nationally representative citizens / diverse sexual orientations	1036 / 43 (14.2)	α=.88 ω=.88			**Construct validity:** Correlation with Compulsive Sexual Behavior Disorder Screen (.37***).	**Sample 92**
Poland / Polish (100%)	Citizens / men and women of diverse sexual orientations	807 / 22 (5.6)	α=.84		**Cut-off (4) applied:** 23.17% of participants, 40.66% of men and 12.55% of women reached or exceeded.		**Sample 15**
Poland / Polish (100%)	Adults / men and women	703 / 26 (6.1)	α=.89 α(men)=.88 α(women)=.85	**CFA conducted:** CFI=1.00 TLI=1.00 RMSEA=0.00		**Construct validity (women):** Correlations with amount of pornography use (.07), Sexual Addiction Screening Test-Revised (.43**), Obsessive Compulsive Inventory-Revised (.17**), impulsivity dimensions: negative urgency (0.22**), lack of premeditation (.06), lack of perseverance (.14**), sensation seeking (-.06), positive urgency (.12**). **Construct validity (men):** Correlations with amount of pornography use (.17*), Sexual Addiction Screening Test-Revised (.61**), Obsessive–Compulsive Inventory-Revised (.25**), negative urgency (.29**), lack of premeditation (.14), lack of	**Sample 4**

						perseverance (.15), sensation seeking (-.004), and positive urgency (.27**).	
Poland / Polish (100%)	White treatment-seeking adults / women	674 / 29 (8.1)			**Cut-off (4) applied:** 73.3% of participants reached or exceeded.	**Construct validity:** Correlation with Sexual Addiction Screening Test-Revised (.59***).	**Sample 14**
Poland / Polish (100%)	Sexual Minority adults / men and women of diverse sexual orientations	198 / 27 (7.8)	α=.84			**Construct validity:** Correlations with CSBD-19 (.45**), PU-FQ (.31**), masturbation frequency (.28**), frequency of sexualized drug use (.00), and frequency of sexual intercourse (-.10).	**Sample 84**

Poland / Polish (100%)	Clinical adults [& healthy control group] / heterosexual men	105 [191] / 33 (7.4) [26 (6.1)]	**Cut-off (4, 6) identification /validation:** Clinical interviews were conducted to identify clinical PPU sample; BPS mean scores of clinical and non-clinical samples were tested. Classification quality of groups was assessed by ROC curve. **Cut-off (6) validation:** The average BPS score for treatment-seeking men (7.50, *SD*=2.58) was significantly (Cohens d=1.38***) higher than in non-treatment-seeking men (3.56, *SD*=3.12) [and higher than cut-off (6)]. **Cut-off (4,6) identification:** Classification quality of a priori selected group of patients was tested against control group. The ROC curve captured an area of 82.2% of the 5 test items (SE=0.02; $p<0.001$), characterized by 95% confidence intervals with limits of 77.5% and 86.9%. **Cut-off (4):** Sensitivity=58.42%, specificity=90.48%, positive predictive value=91.74%; negative predictive value 54.60%; accuracy 69.83%.	**Clinical interviews:** Clinical group met four out of five diagnostic criteria for hypersexual disorder as proposed by Kafka (2010) for DSM-5. **Potentially construct validity:** Comparison of BPS scores of the clinical sample before and after two months of pharmacotherapy with naltrexone or paroxetine by t-test. Results: BPS scores were lower following treatment (Cohen's d=1.80***).	**Sample 5**
Poland / Polish (100%)	CSBD individuals [healthy controls] / heterosexual men	74 [66] / 34 (7.8) [33(7.4)]	**Cut-off (4,6) validation:** CSBD individuals were identified by clinical interviews. Mean BPS score of CSBD group exceeded cut-offs (4,6) (7.61, *SD*=2.36) and was tested against a healthy control group's mean BPS score (1.77, *SD*=1.98). Results: The difference was significant at $p<.001$.		**Sample 81**

Poland / Polish (100%)	CSBD individuals [healthy controls] / heterosexual men	36 [31] / 31 (6.0) [32 (7.1)]			**Cut-off (4 & 6) validation:** Clinical interviews were conducted to determine CSBD individuals. Results: CSBD individuals' mean BPS score (6.00, *SD*=2.85) was tested against the mean BPS score of healthy controls (1.73, *SD*=1.93). The group difference was significant at $p<.001$.	**Criterion validity:** There was no significant correlation between individual mean fractional anisotropy in the regarded regions and BPS scores.	**Sample 78**
Poland / Polish (100%)	CSBD individuals [healthy controls] / heterosexual men	26 [25] / 34 (4.3) [35 (6.2)]			**Cut-off (4) validation:** CSBD individuals were identified by clinical interviews. BPS scores were tested vs. healthy controls. Result: Mean BPS scores were above cut-off (4) and significantly ($p>.001$) higher in CSBD individuals (5.93, *SD*=2.91) vs. mean score in healthy control (1.52, *SD*=1.92).	**Construct validity:** Tested gray matter volume between CSBD individuals and healthy controls with BPS scores. Correlations between brain regions and BPS scores were not statistically significant.	**Sample 71**
Poland / Polish (100%)	White clinical adults / men	13 / 33 (5.7)	ω(T1)=.93 ω(T2)=.93			**Potentially criterion validity:** BPS scores ($n=10$) decreased from T1 (baseline) to T2 (follow-up) after a mindfulness-based intervention (effect size $r=-.40$) - medium effect ($p=.075$).	**Sample 69**
Portugal / Portuguese-Portugal (96.64%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2262 / 31 (10.3)		**CFA conducted:** CFI=0.995 TLI=0.990 RMSEA=0.056 [0.039, 0.074]	**Cut-off (4) applied:** 7.27% reached or exceeded.		**Sample 56**
Slovakia / Slovak (92.68%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1134 / 28 (9.2)		**CFA conducted:** CFI=0.999 TLI=0.997 RMSEA=0.036 [0.006, 0.063]	**Cut-off (4) applied:** 18.09% reached or exceeded.		**Sample 57**
South Africa / English (99.68%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1849 / 30 (14.2)		**CFA conducted:** CFI=0.998 TLI=0.995 RMSEA=0.068 [0.051, 0.087]	**Cut-off (4) applied:** 24.10% reached or exceeded.		**Sample 58**

South Korea / Korean (97.40%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1464 / 26 (7.1)		**CFA conducted:** CFI=0.998 TLI=0.996 RMSEA=0.044 [0.023, 0.066]	**Cut-off (4) applied:** 21.06% reached or exceeded.		**Sample 59**
Spain / Spanish-Spain (94.93%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2327 / 25 (7.3)		**CFA conducted:** CFI=0.996 TLI=0.992 RMSEA=0.063 [0.047, 0.080]	**Cut-off (4) applied:** 15.31% reached or exceeded.		**Sample 60**
Switzerland / French (83.04%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1144 / 29 (11.2)		**CFA conducted:** CFI=0.998 TLI=0.996 RMSEA=0.042 [0.017, 0.068]	**Cut-off (4) applied:** 15.16% reached or exceeded.		**Sample 61**
Taiwan / Mandarin-traditional (99.66%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2668 / 31(8.0)		**CFA conducted:** CFI=0.997 TLI=0.993 RMSEA=0.074 [0.060, 0.090]	**Cut-off (4) applied:** 28.26% reached or exceeded.		**Sample 62**
Turkey / Turkish (97.20%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	820 / 30 (9.7)		**CFA conducted:** CFI=0.995 TLI=0.991 RMSEA=0.080 [0.053, 0.109]	**Cut-off (4) applied:** 25.40% reached or exceeded.		**Sample 63**
United Kingdom / English (73.94%), Polish (12.68%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	1412 / 34 (13.8)		**CFA conducted:** CFI=0.998 TLI=0.997 RMSEA=0.040 [0.019, 0.064]	**Cut-off (4) applied:** 11.88% reached or exceeded.		**Sample 64**
USA / English (100%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	4363 / 50 (16.2)	α=.88 ω=.88			**Construct validity:** Correlations with PU-FQ (.37***) and disapproval of pornography use (.41***).	**Sample 73**
USA / English (100%)	Citizens / men, women, and gender-diverse individuals	4363 / 50 (16.2)	α=.88 ω=.88			**Construct validity:** Correlations with self-reported feelings of addiction to alcohol (.57**), nicotine (.39**), prescription drug misuse (.54**), tetrahydrocannabinol, (.60**), illicit drug use (.52**), gambling (.62**),	**Sample 83**

						gaming (.56**), and PU-FQ (.35**).	
USA / English (96.21%)	Citizens / men, women, and gender-diverse individuals of diverse sexual orientations	2398 / 32 (14.7)		**CFA conducted:** CFI=0.998 TLI=0.996 RMSEA=0.054 [0.039, 0.071]	**Cut-off (4) applied:** 17.04% reached or exceeded.		**Sample 65**
USA / English (100%)	Random US adults / diverse sexual orientations	1601 / 50 (17.3)	α=.87 ω=.87			**Construct validity:** Correlation with Compulsive Sexual Behavior Disorder Screen (.50***).	**Sample 91**
USA / English (100%)	University students / men and women of diverse sexual orientations	1525 / 20 (3.9)	α(all)=.87 α(men)=.87 α(women)=.86	**Multi-group CFA conducte**d CFI=0.981 TLI=0.979 RMSEA=0.053 [0.037, 0.068]	**Cut-off (4) applied:** 29.60% of participants, 43.70% of men, and 20.30% of women reached or exceeded.	**Construct validity (men):** Correlations with mental distress (.30***), body dissociation (.26***), and negative urgency (.37***). **Construct validity (women):** Correlations with mental distress (.18***), body dissociation (.22**), and negative urgency (.26***).	**Sample 95**
USA / English (100%)	Nationally representative adults / men and women	1424 / 44 (16.7)	α=.88 ω=.88			**Construct validity:** Correlations with PU-FQ (.34***) and Cyber Pornography Use inventory-4 (.79***).	**Sample 70**
USA / English (100%)	Nationally representative adults / men and women	1058 / 45 (16.7)	α=.90	**CFA conducted:** CFI= 1.00 TLI=1.00, RMSEA < 0.001		**Construct validity:** Correlations with statements of addiction (.47*** to .62***), PU-FQ (.39***), masturbation frequency (.40***), daily minutes spent using pornography (.23***), and psychological distress (.34***).	**Sample 2**
USA / English (100%)	Adults / men, women, and gender-diverse-individuals	877 / unknown	α=.84				**Sample 93**

USA / English (100%)	Nationally representative veterans and non-veterans / men of diverse sexual orientations	844 / 50 (16.7)	α=.89	**Two CFA's conducted CFA (non-veteran):** CFI=0.996, TLI=0.992, RMSEA=0.028 [0.000, 0.065] **CFA (veteran):** CFI=0.997, TLI=0.993, RMSEA=0.032 [0.000, 0.111]			**Sample 72**
USA / English (100%)	Citizens / heterosexual men	747 / unknown	α=.89	**CFA conducted:** CFI=0.998 TLI=0.996 RMSEA=0.020 [0.000, 0.057]			**Sample 18**
USA / English (100%)	White university students / women of diverse sexual orientations	602 / 20 (4.1)	α=.86	**CFA conducted:** CFI=0.973 TLI=0.947 RMSEA=0.073 [0.043, 0.107]	**Cut-off (4) applied:** 16.10% of participants reached or exceeded.	**Construct validity**: Correlations: anxiety (.18***) and PU-FQ (.30***)	**Sample 13**
USA / English (100%)	University students / heterosexual men and women	601 / 20 (3.2)	α=.90		**Cut-off applied:** 33.80% of participants reached or exceeded. **Cut-off validated:** The group reaching or exceeding the BPS cut-off (4) had more "critical" attitudes toward condom use (Cohens d=-0.42***).		**Sample 94**
USA / English (100%)	Citizens / heterosexual women	487 / unknown	α=.88	**CFA conducted:** CFI=1.00 TLI=1.02 RMSEA=0.000 [0.000, 0.044]			**Sample 19**
USA / English (100%)	Nationally representative adults / men and women	470 / 45 (15.9)	α=.91	**CFA conducted:** CFI=0.99 TLI=0.98 RMSEA=0.03		**Criterion validity:** Correlation with Cyber Pornography Use Inventory-9 (72***). **Convergent validity:** Correlations with perceived compulsivity (r=.75***), access efforts (.64***), emotional distress (.47***), PU-FQ (.47***), masturbation frequency (.43***), daily minutes of pornography use (.33***), and psychological distress (.33***).	**Sample 3**

USA / English (100%)	White university students / men of diverse sexual orientations	432 / 21 (4.3)	α=.87	**CFA conducted:** CFI=0.993 TLI=0.985 RMSEA=0.048 [0.000, 0.092]	**Cut-off (4) applied:** 42.10% of participants reached or exceeded.	**Construct validity:** Correlations with anxiety (.27***) and PU-FQ (.31***).	**Sample 12**
USA / English (100%)	University students / women of diverse sexual orientations	407 / 19 (1.8)	α=.85		**Cut-off (4) applied:** 14.50% of participants reached or exceeded.	**Construct validity:** Correlation with PU-FQ (.41***) and with emotional resilience (-.15*).	**Sample 75**
USA / English (100%)	Latin university students / women of diverse sexual orientations	372 / 20 (3.1)	α=.85	**CFA conducted:** CFI=1.00 TLI=1.00 RMSEA=0.000 [0.000, 0.000]	**Cut-off (4) applied:** 19.60% of participants reached or exceeded.	**Construct validity:** Correlations: anxiety (.10), PU-FQ (.40***).	**Sample 11**
USA / English (100%)	AAPI university students / women of diverse sexual orientations	303 / 19 (2.6)	α=.83	**CFA conducted:** CFI=0.972 TLI=0.943 RMSEA=0.081 [0.035, 0.129]	**Cut-off (4) applied:** 20.10% of participants reached or exceeded.	**Construct validity:** Correlations with anxiety (.08), PU-FQ (.47***).	**Sample 7**
USA / English (100%)	AAPI university students / men of diverse sexual orientations	268 / 19 (2.1)	α=.87	**CFA conducted:** CFI=0.979 TLI=0.985 RMSEA=0.084 [0.035, 0.136]	**Cut-off (4) applied:** 52,60% of participants reached or exceeded.	**Construct validity:** Correlations with anxiety (.35***) and PU-FQ (.34***).	**Sample 6**
USA / English (100%)	University students / men of diverse sexual orientations	251 / 20 (3.0)	α=.86		**Cut-off (4) applied:** 45.00% of participants reached or exceeded.	**Construct validity:** Correlation with PU-FQ (.41***) and emotional resilience (-.04).	**Sample 74**

USA / English (100%)	Returning military veterans / men and women	220 / 35 (9.2)	α=.89 composite reliability=.92	**PCA conducted:** PCA suggests 5 item solution and one PPU component with eigenvalue<1.	**Cut-off (6) validation:** 9 out of 180 men (5%) indicated an interest in treatment for PPU. Their average BPS score was 6.67 (*SD*=2.95).	**Construct validity:** Gender-adjusted ANOVA with BPS scores & PU-FQ was conducted. Result: Significant effect (*n2*=.12***). Daily pornography users had significantly higher BPS scores than weekly users and weekly users had significantly higher scores than monthly users. **Criterion validity (women):** Correlations with Problematic Pornography Use Scale (.77**), Hypersexual Behavior Inventory (.66**), and Pornography Craving Questionnaire (.32**). **Criterion validity (men):** Correlations with Problematic Pornography Use Scale (.75**), Hypersexual Behavior Inventory (.60**), and Pornography Craving Questionnaire (.45**). **Discriminant validity (women):** (Statistically insignificant) correlations with impulsivity dimensions negative urgency (.29), lack of premeditation (.11), lack of perseverance (.18), sensation seeking (-.02), and positive urgency (.22). **Discriminant validity (men):** Correlations with impulsivity dimensions negative urgency (.30**), lack of premeditation (-.03), lack of perseverance (.11), sensation seeking (.05), and positive urgency (.22**).	**Sample 1**

USA / English (100%)	Latin university students / men of diverse sexual orientations	208 / 20 (3.8)	α=.88	**CFA conducted:** CFI=0.987 TLI=0.974 RMSEA=0.066 [0.000, 0.129]	**Cut-off (4) applied:** 49.00% of participants reached or exceeded.	**Construct validity:** Correlations: anxiety (.30***) and PU-FQ (.46***).	**Sample 10**
USA / English (100%)	Black university students / women of diverse sexual orientations	189 / 20 (4.4)	α=.86	**CFA conducted:** CFI=0.971 TLI=0.943 RMSEA=0.085 [0.019, 0.149]	**Cut-off (4) applied:** 24.30% of participants reached or exceeded.	**Construct validity:** Correlations: anxiety (.15*) and PU-FQ (.43***).	**Sample 9**
USA / English (100%)	University students / heterosexual women	166 / 19 (1.1)				**Construct validity:** BPS scores were not significantly correlated with approach bias scores for erotic stimuli, .14, (*p*=.14) [*n*=121].	**Sample 68**
USA / English (100%)	Citizens / non-heterosexual women of diverse sexual orientations	104 / unknown	α=.91	**CFA conducted**: CFI=0.996 TLI=0.992 RMSEA=0.033 [0.000, 0.143]			**Sample 21**
USA / English (100%)	Black university students / men of diverse sexual orientations	101 / 21 (5.4)	α=.88	**CFA conducted:** CFI=0.950 TLI=0.901 RMSEA=0.123 [0.038, 0.209]	**Cut-off (4) applied:** 55.40% of participants reached or exceeded.	**Construct validity:** Correlations with anxiety (.17) and PU-FQ (.19).	**Sample 8**
USA / English (100%)	Citizens / non-heterosexual men of diverse sexual orientations	101 / unknown	α=.90	**CFA conducted:** CFI=1.00 TLI=1.05 RMSEA=0.000 [0.000, 0.000]			**Sample 20**

Note: *p<.05, **p<.01, ***p<.001
PU-FQ=pornography use frequency, PPU=problematic pornography use, CSBD=Compulsive Sexual Behavior Disorder
We maintained the study authors interpretation for construct/criterion validity and if none was given, we reported associations with PPU assessment instruments under the domain of criterion and other potentially relevant associations under the domain of construct validity.

Key References

Papers of particular interest, published recently, have been highlighted as:

• Important

•• Very important

•• Bőthe B, Nagy L, Koós M, Demetrovics Z, Potenza MN, International Sex Survey Consortium, et al. Problematic pornography use across countries, genders, and sexual orientations: Insights from the International Sex Survey and comparison of different assessment tools. Addiction 2024;119:928–50. https://doi.org/10.1111/add.16431. This study includes BPS validation data from across 42 countries and 26 languages. It assessed the factor structure in different gender and sexual orientation groups as well as throughout a variety of countries. It provides evidence for concurrent and convergent validity in a sample of over 82,000 participants.

• Islam MdS, Tasnim R, Sujan MdSH, Bőthe B, Ferdous MostZ, Sikder MdT, et al. Validation and Evaluation of the Psychometric Properties of the Bangla Version of the Brief Pornography Screen in Men and Women. Int J Ment Health Addict 2022. https://doi.org/10.1007/s11469-022-00903-0. This study includes a variety of validation data from a large diverse sample in Bangladesh.

• Borgogna NC, Griffin KR, Grubbs JB, Kraus SW. Understanding Differences in Problematic Pornography Use: Considerations for Gender and Sexual Orientation. J Sex Med 2022;19:1290–302. https://doi.org/10.1016/j.jsxm.2022.05.144. This study assessed factor structure and internal consistency of the BPS in different groups according to gender and sexual orientation.

• Jiang X, Wu Y, Zhang K, Bőthe B, Hong Y, Chen L. Symptoms of problematic pornography use among help-seeking male adolescents: Latent profile and network analysis. J Behav Addict 2022;11:912–27. https://doi.org/10.1556/2006.2022.00065. This study assessed the BPS in a large sample of subclinical adolescent Chinese men. It provides evidence for internal consistency and the Cut-Off value (4) of the BPS.

• Chen L, Jiang X, Luo X, Kraus SW, Bőthe B. The role of impaired control in screening problematic pornography use: Evidence from cross-sectional and longitudinal studies in a large help-seeking male sample. Psychol Addict Behav 2022;36:537–46. https://doi.org/10.1037/adb0000714. This study includes a large sample of subclinical Chinese men with validation evidence for the reliability, the clinical cut-offs, and criterion validity of the BPS.

• Borgogna NC, Way BM, Kraus SW. Multicultural Considerations for the Psychometrics of the Brief Pornography Screen. Cyberpsychology Behav Soc Netw 2024;27:318–27. https://doi.org/10.1089/cyber.2023.0493. This study validated the BPS in diverse race and gender groups.

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Study 2:

Problematic Pornography Use and Psychological Distress in the United States- a Nationally Representative Study.

(Currently in press at *Archives of Sexual Behavior*)

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Study Summary

Objective: Pornography use is common in the United States and some individuals report their pornography use as problematic. Recent research has associated problematic pornography use (PPU) with psychological symptoms. In addition, higher pornography use frequency (PU-FQ), younger age, male sex, and a non-heterosexual orientation have been associated with more PPU. According to the Person-Affect-Cognition-Execution (I-PACE) model, psychopathological symptoms paired with the frequent execution of behavior may lead to the dysregulation of the behavior and further sustain the problematic behavior. In the context of PPU, especially psychological distress (i.e., depression and anxiety symptoms) and loneliness have been found to be associated with PPU. However, we noted an absence of literature considering relevant demographics while examining associations between pornography use frequency (PU-FQ), masturbation frequency (M-FQ), and psychological symptoms in predicting PPU. According to the I-PACE model, we particularly expected psychological symptoms to interact with frequencies of pornography use and masturbation in explaining PPU.

Method: We conducted a nationally representative study in US men and women (*n*=2,773; 54% women). PPU was assessed by the Brief Pornography Screen (BPS), Psychological distress was assessed through depression symptoms measured by the Patient Health Questionnaire-9 (PHQ-9), and anxiety symptoms measured by the Generalized Anxiety Disorder 2 item (GAD-2). The University of California Los Angeles Loneliness Scale (UCLA-L) assessed loneliness. We conducted correlational analysis between demographics and study variables, and tested group differences between participants who reported to use pornography and masturbation or exceeded the BPS cut-off threshold for potential PPU and

those who did not. Furthermore, we conducted a hierarchical regression analysis to examine interactions between frequencies (PU-FQ, M-FQ), psychological distress (GAD-2 and PHQ-9), and UCLA-LA in predicting BPS, while considering demographics.

Results: Assessed demographic variables were associated with frequencies, psychological symptoms, and PPU. The BPS correlated positively with PU-FQ (.30 in men, .37 in women), M-FQ (.26 in men; .31 in women), psychological distress (.35 in men; .28 in women), and UCLA-L (.33 in men; .23 in women). Potential PPU individuals (exceeding the BPS cut-off score) reported higher levels of psychological distress and loneliness than those who did not exceed the threshold. Participants reporting having used pornography or having masturbated during the past year reported higher levels of psychological distress and UCLA-L compared to those who reported not having used pornography or masturbated. Statistically significant interaction effects have been found between psychological distress and M-FQ as well as between loneliness and PU-FQ in explaining PPU.

Conclusion: Our findings support the theoretical framework of the I-PACE model. Psychological symptoms interact with frequencies of masturbation and pornography use in explaining PPU. Lonely individuals who frequently use pornography and distressed individuals who frequently masturbate may be particularly vulnerable to PPU. These findings support the hypothesis that PPU resembles dysregulated coping behavior. However, due to the current cross-sectional study design, no conclusions on directionality or causality can be made. Therefore, longitudinal analyses examining the directionality of associations and research designed to test causality are recommended. We recommend considering demographic variables (especially age and gender) in such studies as these variables appear relevant in explaining PPU.

Study 3:

Problematic Pornography Use and Psychological Distress:

A Longitudinal Study in a Large US Sample.

(Published in *Addictive Behaviors*)

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Abstract

Problematic pornography use (PPU) has been positively associated with psychological distress (i.e., anxiety and depression) in numerous cross-sectional studies. In the present study, we examined the trajectory of PPU and its association with psychological distress over time. We conducted a one-year, three-wave longitudinal study among US adults (n=4363, 46.4% women, $M_{(Age)}$=50, $SD_{(Age)}$=16.15) and examined changes in PPU and psychological distress. Specifically, we assessed bivariate correlations and a random-intercept autoregressive cross-lagged panel model. PPU was assessed by the Brief Pornography Screen (BPS), and psychological distress was assessed by the Generalized Anxiety Disorder–2 (GAD-2) and the Patient Health Questionnaire-9 (PHQ-9). Between each six-month period, we found that BPS bivariate intercorrelations were strong (ρ=.712, .726) and BPS autoregressive paths remained moderate (β=.370, .408). Surprisingly, the positive associations between BPS and psychological distress scores from descriptive correlations were determined by a strong random-intercept correlation (r=.962), while cross-lagged paths remained small and negative (β=-.189, -.211, -.214, -.230, respectively). This suggested a robust trait-like between-person association between PPU and psychological distress, with negligibly small time-dependent within-person inhibitory effects occurring. PPU appears time-consistent (e.g., most participants remained in their initial clinical category) and robustly associated with psychological distress over time. We speculate that inhibitory within-person effects may possibly reflect short-term coping behavior and depressive drive inhibition, while in the long term, further manifesting PPU.

Keywords: problematic pornography use, pornography, depression, anxiety, longitudinal, addictive behavior, compulsive behavior

Supplemental material:
https://osf.io/download/6818706aa22513e1ba3cbe37/?view_only=1256e61174cf4fb49ac6aaf82f26b9b1

1. Introduction

1.1 Problematic Pornography Use (PPU)

Pornography use is common in the United States (Grubbs et al., 2023; Grubbs & Kraus, 2022; Herbenick et al., 2020) and appears to be increasing worldwide (Alexandraki et al., 2018; Lewczuk et al., 2022; Price et al., 2016; Short et al., 2012). Some individuals report problems with their pornography use, such as dysregulation and negative consequences stemming from use (Fernandez & Griffiths, 2021; Grubbs et al., 2023; Grubbs & Kraus, 2021). Younger age (Islam et al., 2022; Lim et al., 2017; Shirk et al., 2021) and being male (Bőthe et al., 2021, 2024; Islam et al., 2022; Okabe et al., 2021) are related to higher rates of problematic pornography use (PPU).

There has been a longstanding debate about the classification of problematic sexual behavior, such as PPU (Carnes, 1996; Gola et al., 2022; Kraus & Sweeney, 2019; Reid & Kafka, 2014). Prior to 2018, none of the major diagnostic manuals for psychopathology provided a diagnosis that accounted for excessive or compulsive sexual behavior, such as PPU (Sungur & Gündüz, 2014). This changed with the publication of the *11th edition of the International Statistical Classification of Diseases and Related Health Problems* (ICD-11). PPU may now be classified and therefore subsumed under the Compulsive Sexual Behavior Disorder (CSBD) diagnosis (Bőthe et al., 2022; WHO, 2024). CSBD is defined as a persistent pattern of failure to control strong and repetitive sexual urges and behaviors, causing a significant amount of distress or functional impairment (WHO, 2024). Following this conceptualization and Kraus et al. (2020), we defined PPU as the experience of significant dysregulation of pornography use, causing negative consequences.

1.2 Trajectory of PPU

Little research seems available examining the trajectory of PPU over time. The limited existing literature varies in conceptualizations of PPU and appears contradictory. For instance, one five-year-five-waves study on different problematic behaviors in the general population

and potential problematic gamblers (Konkolÿ Thege et al., 2015) found that problematic behaviors (including sexual behavior) seemed to decrease over time. In another general population study, looking at PPU specifically, researchers (Koós et al., 2022a) found that PPU, measured by the Problematic Pornography Consumption Scale (Bőthe et al., 2018) was consistent (more precisely, no statistically significant changes) in a three-wave study within one year (Koós et al., 2022a). However, similar to a study using the Brief Pornography Screen (BPS), this study was conducted during COVID-19 restrictions (Koós et al., 2022a), which may (Chen et al., 2022) or may not (Grubbs et al., 2022) impact the generalizability of the results. Another one-year-four-waves study applying the Cyber Pornography Use Inventory-4 found strong intercorrelations of the scale between all four waves (Grubbs et al., 2020).

In accordance with these findings, and as CSBD (including PPU) is commonly understood as a "consistent pattern of failure to control intense repetitive sexual urges" (Kraus et al., 2018; WHO, 2024), we would expect PPU, in the absence of treatment, to remain relatively consistent over time. Therefore, we posited that examining the trajectory of PPU over time constitutes an important research aim that remains unanswered in the addiction literature.

1.3 Psychological Distress and PPU

Recent cross-sectional studies have reported associations between PPU and psychological distress (Bibi et al., 2022; Borgogna et al., 2022, 2024; Islam et al., 2022; Kraus et al., 2020; Rimti et al., 2024). Psychological distress includes symptoms of anxiety and depression. These symptom domains were often combined into a single construct as both symptom domains seemed to statistically represent the same underlying construct in different studies (Borgogna et al., 2022; Engelhardt et al., in press; Kraus et al., 2020). Therefore, in this study, we defined psychological distress as the experience of anxiety and depression symptoms (i.e., global distress). However, from previously conducted cross-sectional studies, no conclusions on the directionality of this association can be derived.

We found only two longitudinal studies assessing a different conceptualization of PPU and its relation to psychological distress. Both applied the Cyber Pornography Use Inventory: In the first one-year-two-wave study, psychological distress at one-year follow-up was predicted by the Cyber Pornography Use Inventory-9 at baseline while considering baseline distress in structural equation modeling. The beta-weight scored at .40 (Grubbs et al., 2015). In the other longitudinal study, pornography use frequency and Cyber Pornography Use Inventory-4 scores were positively associated with depression symptoms across five waves. However, this study was conducted during the COVID-19 restrictions, which may have impacted the results to an unknown extent (Grubbs et al., 2022).

1.4 Theoretical Considerations

Potential predictions on the direction of associations between psychological distress (i.e., anxiety and depression) and PPU could be derived from the theoretical framework of the Interaction of Person-Affect-Cognition-Execution (I-PACE) model, which describes the development and sustainability of problematic behaviors (Brand et al., 2016, 2019). Psychopathological symptoms are described as predisposing conditions to develop and sustain problematic behavior. Additionally, problematic behavior is described as stabilizing and intensifying psychopathological symptoms (Brand et al., 2016, 2019). Adjusted for PPU and psychological distress, we expect mutual positive relationships between both variables over time.

To expect increased psychological distress as a consequence of dysregulated PPU also seems in alignment with prior neurobiological literature. That is, as frequent pornography use in PPU individuals may be accompanied by frequent phasic dopamine spikes in mesolimbic reward pathways (Giuliano & Allard, 2001; Melis & Argiolas, 1995), we would expect tonic dopamine concentration in mesolimbic reward pathways to decrease (Dreyer et al., 2010; Grace, 2000), which in turn may result in decreased general motivation and mood (Belujon &

Grace, 2017; Brom et al., 2014, 2014; Diehl & Gershon, 1992; Graf et al., 2019; Niv, 2007; Phillips et al., 2008).

Increased PPU as a consequence of psychological distress is also posited to be in alignment with the notion that individuals with PPU may cope with uncomfortable emotions through their pornography use (Bibi et al., 2022; Gewirtz-Meydan, 2024; Testa et al., 2024). Pornography use for coping with depression and anxiety symptoms may lead to more dysregulation (Brand et al., 2016, 2019; Grace, 2000). These potential interactions and their underlying mechanisms need to be examined in longitudinal designs, which constitutes the second rationale for conducting this one-year longitudinal study.

1.5 Potential Covariates

Men and women often report different PPU patterns (Bőthe et al., 2021, 2024; Islam et al., 2022; Rimti et al., 2024). Differences between men and women in their experiences of psychological distress have also been reported (Altemus et al., 2014). In addition, sex differences within the association between both variables may be present (Borgogna et al., 2024; Engelhardt et al., in press; Islam et al., 2022). Individuals of different ages (Ballester-Arnal et al., 2023; Islam et al., 2022) also differ in their sexual behavior and experiences of PPU (Islam et al., 2022; Okabe et al., 2021; Shirk et al., 2021). Younger people report using pornography more frequently and self-report more experiences of PPU (Islam et al., 2022; Okabe et al., 2021; Shirk et al., 2021). Younger people, relative to older adults, also report more experiences of psychological distress (Hale & Cochran, 1992). Therefore, research examining the association between PPU and psychological distress may need to consider both demographics as possible covariates in their longitudinal models.

1.6 Current study

The current study aims to examine the trajectory of PPU as well as its association with psychological distress (PD) employing a longitudinal framework. Specifically, we conducted a one-year, 3-wave study and examined bivariate correlations, changes in clinical

PPU thresholds, and a random-intercept cross-lagged panel model (RICPLM; age- and gender-controlled). We hypothesized PPU to be relatively consistent over time (i.e., positive high to moderate correlations and autoregressive paths, few changes in cut-off exceedance groups). We also expected cross-lagged paths between PPU and PD to be positive and statistically significant.

2. Methods

2.1 Participants and Procedure

This study utilizes an archival longitudinal dataset by Grubbs & Kraus (2022) that was recruited via YouGov. It was composed of a census-matched sample of American adults (N=2,806) combined with an oversample of sport-wagering American adults (N=1,557) (Grubbs & Kraus, 2022). Thus, the final sample consisted of 4,363 adult US participants, born between 1926 and 2003 ($M_{(age)}$=50; $SD_{(Age)}$=16.15; 46.4% women). There were no univariate outliers in regard to age, following the Tukey criterion. We did, however, find some multivariate outliers when considering all relevant variables at once. Since we use robust estimators for fitting our model, we assume that the risk of distortion due to the multivariate outliers should be tolerable (Finney & DiStefano2006; West et al., 1995; Yuan & Bentler, 2000). We combined two samples to achieve maximal statistical power, which marks a general aim throughout the subsequent analyses in this study. Detailed sample characteristics can be derived from *Table 1*. We examined three waves, conducted between March 17th and April 6th, 2022 (T1), between September 26th and October 17th, 2022 (T2), and between March 29th and April 12th, 2023 (T3). Ethical approval for this study was obtained from Bowling Green State University and the University of Nevada, Las Vegas (2024-403). Informed consent was obtained within the survey for anonymized participant information to be published.

2.2 Measures

2.2.1 Problematic Pornography Use. Problematic pornography use was assessed using the Brief Pornography Screen (BPS) – a five-item questionnaire measuring PPU symptoms over a period of the past six months. The BPS was developed in response to a debate about the correct classification of PPU, as various existing PPU screening tools lacked a unified theoretical framework or were not sufficiently validated with clinical or community-based samples (Fernandez & Griffiths, 2021; Kraus et al., 2020; Kraus & Sweeney, 2019). Its main focus is on capturing the experience of dysregulated pornography use (Kraus et al., 2020). The BPS has been validated in numerous clinical and non-clinical populations and recently, even in a study of 42 countries/21 languages (Bőthe et al., 2024; Engelhardt et al., 2025), justifying its application in the present study.

Presently, researchers employing the BPS have relied on cross-sectional approaches; in an extensive literature search on April 16th, 2024, Engelhardt et al. (2025) found only one longitudinal study (Chen et al., 2022) using the BPS at multiple (i.e., two over a twelve-month period) time points. Because this study focused on the differences between self-perceived impaired-control and dysregulated PPU during COVID-restrictions, little information was provided around the longitudinal consistency of the BPS or PPU in general (Chen et al., 2022).

Response options for items such as "You find it difficult to resist strong urges to use pornography" range from 0 "never" to 2 "very often." The clinical cut-off threshold for potential PPU is set at BPS≥4 (Kraus et al., 2020). In this study, internal consistency was $\alpha_{(T1)}$=.880, $\alpha_{(T2)}$=.876, and $\alpha_{(T3)}$=.881. Test-retest reliability, measured as the average two-way interclass correlation coefficient, was .904 (95% CI: .894, .914, p<.001) with Pearson correlation coefficients between time points being at $r_{(T1,T2)}$=.748, $r_{(T2,T3)}$=.768, and $r_{(T1,T3)}$=.726.

2.2.2 Psychological Distress. Psychological distress was assessed by the Patient Health Questionnaire-9 (Kroenke et al., 2001) and the Generalized Anxiety Disorder-2 (Plummer et

al., 2016; Staples et al., 2019). We combined both measures to one psychological distress compound due to a preparatory principal component analysis (resulting in single component according to Kaiser's criterion with eigenvalue$_{(T1)}$=6.50 [variance account: 59.09%], eigenvalue$_{(T2)}$=6.47 [variance account: 58.78%], eigenvalue$_{(T3)}$=6.47 [variance account 58.80%]), internal consistency analysis ($\alpha_{(T1)}$=.929, $\alpha_{(T2)}$=.928, $\alpha_{(T3)}$=.928), and measurement invariance analysis of measurements across time (Table A in supplemental material), all indicating them to reflect the same construct.

Based on these results and similar to previous studies (Borgogna et al., 2022; Kraus et al., 2020), we interpreted this compound as psychological distress (PD). The PHQ-9 includes nine items, and the GAD-2 includes two items, asking participants how often they have been bothered by problems like "feeling down, depressed, or helpless" (PHQ-9) or "Feeling nervous, anxious, frightened, worried, or on edge" (GAD-2). Both scales assess symptoms within the prior two weeks. Response options range from 0 "not at all" to 3 "nearly every day" (Kroenke et al., 2001; Plummer et al., 2016; Sapra et al., 2020; Williams, 2014). Test-retest reliability, measured as the average two-way interclass correlation coefficient, was .902 (95% CI: .895, .909, p<.001) with Pearson correlation coefficients between time points being at $r_{(T1,T2)}$=.755, $r_{(T2,T3)}$=.778, and $r_{(T1,T3)}$=.727.

2.3 Data Analysis

We conducted reliability analyses as well as preparatory principal component analysis, tests on variable distributions, an analysis of pattern changes in BPS cut-off exceedance rates, and bivariate correlational analyses between study variables in IBM SPSS Statistics Version 28.0.1.0. Due to a floor effect in the BPS, we applied the non-parametric Spearman's τ coefficient for correlations. In bivariate correlational analysis, we included every participant who completed both measures at a given time point. In the analysis of BPS cut-off pattern changes, we included only those participants who completed the BPS at all three points.

In the RI-CLPM (Random Intercept Cross-Lagged Panel Model), Gender was dummy-coded; we used “male” as the reference category. Age was assessed via the variable birth year, which we z-standardized before adding it to the model. We tested for measurement invariance across waves and fitted a RI-CLPM in *R Statistics Version 4.3.3* with *lavaan package 0.6-17*. Measurement invariance testing indicated strict invariance of measurements across waves (Table A in supplemental material). Since measurement invariance assumed rather homogeneous factor loadings, we aggregated the respective items to sum-scores, which we then also z-standardized to enhance comparability.

Missing data increased across study waves, with up to 67% missingness in later assessments (see Table E in the supplemental material for detailed missingness rates). To handle missing data, we used Full Information Maximum Likelihood Estimation (FIML). After the model fit was estimated by full information maximum likelihood (FIML) method, it was evaluated by Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Standardized Root Mean Squared Residual (SRMR), and Root-Mean-Square Error of Approximation (RMSEA) according to standard guidelines from Kline et al. (2016). The full R-script is included in the supplemental material. In estimating the RICPLM, we followed procedures of Mackinnon et al. (Mackinnon et al., 2022), estimating one random intercept (RI) per construct, and modelling effects of the sociodemographic covariates on both RI and each within variable. We chose the RI-CLPM approach over traditional cross-lagged panel models, due to its ability to differentiate reciprocal psychological variable interferences from trait-like dynamics (Lucas, 2023). Relevant paths are displayed in Figure 1, the comprehensive model is displayed in Figure A in the supplemental material.

3. Results

3.1 Changes in BPS Cut-Off Exceedance

Patterns of consistency in BPS cut-off (≥4) exceedance rates are displayed in Table 2. Most participants initially scored below the BPS clinical cut-off score for potential PPU and

consistently remained below the threshold (66.8%). An additional 14.0% of participants scored and remained above the threshold. Thus, in total, 80.8% of participants showed a consistent pattern across the one-year period of this study, while 6.4% seemed to develop and 6.8% seemed to remit from potential PPU. An inconsistent pattern was observed in 5.9% of participants.

3.2 Correlational Analysis

Results from Spearman correlational analyses (Table 3) revealed strong positive correlations of the BPS between T1 and T2 (ρ=.726*)* as well as between T2 and T3 (ρ=.712*)*, while the one-year correlation between T1 and T3 scored positive and in a moderate to strong range (ρ=.681*)*. Cross-sectional correlations between BPS and PD scored positive and in a moderate range (ρ=.329-.395) for each wave, while correlations between the waves were positive and in a small to moderate range (ρ=.267-.316).

3.3 Random-Intercept Cross-Lagged Panel Model (RI-CPLM)

The RI-CPLM indicated overall acceptable fit for the data at p<.001 ($\chi^2(26)$= 376.218) with CFI=.961, TLI=.950, SRMR=.047, and RMSEA=.056 (90% confidence interval=.051, .061). Additionally, standardized residuals were examined to assess local model fit. No standardized residuals greater than 0.10 were observed, suggesting good local fit. A model summary including relevant covariances, autoregressive, and cross-lagged paths between study variables is displayed in Figure 1. An additional graphic of the comprehensive model (including all latent and manifest variables) as well as a table with regression weights of the covariates are included in the supplemental material (Table B). Younger age positively impacted BPS and PD. Diverse, or male gender, positively influenced BPS, and female, or diverse gender, positively influenced PD. Since these variables were adjusted, the current results from the RI-CLPM depict effects beyond those of age and gender.

The correlation between the two random intercepts of PD and the BPS was strongly positive (r=.962) and statistically significant at p<.001. This reflects a strong time-consistent

person-level association between the BPS and PD. It also suggests that regardless of changes across time, individuals who score higher on the BPS score higher on the applied measures of psychological distress (i.e., PHQ and GAD-2) and vice versa.

In the RI-CLPM, the initial correlation between BPS and PD at T1 was moderately negative (r=-.234) and statistically significant at p<.05. This suggests a small negative within-person association between PD and the BPS at T1. However, the correlation between the random intercepts, which was positive and substantial, should also be considered. Therefore, the within-person correlation at T1 might only represent a smaller initial association between both variables compared to their overall association between persons.

Autoregressive paths were positive and in a moderate range for the BPS (β=.370, .408) and for PD (β=.415, .466). They were statistically significant at p<.001. Autoregressive paths reflect the stability within each construct over time. These results point to good predictability of each variable's score at a given time by its score at an earlier time.

Contrary to our expectation, cross-lagged paths between BPS and PD scored in a small negative range. This suggests that above the strong time-consistent association between BPS and PD, a within-person increase in BPS scores at T1 predicted a slight decrease in PD scores at T2 (β=-.211), accordingly, an increase at T2 predicted a slight decrease at T3 (β=-.230). Similarly, a within-person increase in PD scores at T1 predicted a slight decrease in BPS scores at T2 (β=-.189), accordingly, an increase at T2 predicted a slight decrease at T3 (β=-.214). It is worth mentioning that these effects must be regarded in relation to the strong between-person association between BPS and PD, meaning that these within-person effects are additional effects to a stable, time-consistent, positive association. These small time-dependent effects do not outweigh the overall strong time-consistent association between the BPS and PD. In this model, cross-lagged paths compete with both the stable time-independent association between the random-intercepts and the autoregressive paths.

4. Discussion

4.1 Summary

The purpose of this study was to examine the consistency of PPU and its association with psychological distress over 12 months. Therefore, we conducted a three-wave-one-year longitudinal study and examined changes in clinical PPU thresholds, bivariate correlations, and demographic-adjusted autoregressive and cross-lagged paths of both variables. Overall, we found that PPU and PD were relatively stable constructs by themselves. They also appear to be positively and stably related to each other in a trait-like manner, while the initial association and small time-specific inhibitory effects decrease this overall positive association.

4.2 PPU Trajectory

In alignment with our expectations, PPU intercorrelations between both six-month periods were positive and strong, and the one-year correlation scored positive and in a moderate to strong range. PPU cut-off exceedance rates stayed consistent in most participants, meaning that most participants who scored below the clinical threshold for potential PPU at the beginning of the study stayed below the cut-off until the end of the study, and that those who initially scored above the threshold remained above it throughout the time scope of this study. In the demographic-adjusted RICPLM, all PPU auto-regression weights were positive and in a moderate range. This suggests that PPU at one point in time was a modest predictor for PPU six months later. In summary, our results point to the consistency of PPU as it is operationalized by the BPS. Our findings also seem to align with a previous study in which PPU measured by the Problematic Pornography Consumption Scale (Bőthe et al., 2018) was found to be consistent over a one-year period (Koós et al., 2022a) as well as with the conceptualization of compulsive sexual behavior as a “consistent pattern” (Kraus et al., 2018; WHO, 2024). The current results suggested that PPU did not significantly decrease over time, as has been found for different problematic behaviors, including problematic sexual behaviors, in a previous study (Konkolÿ Thege et al., 2015). The difference might be

explained by pornography use reflecting a distinct behavior from other problematic behaviors, and because of its exceptional anonymity, affordability, and accessibility (Bridges, 2023).

4.3 Associations

The analyses from this study suggest that on a between-person level, PPU symptoms and symptoms of psychological distress are strongly, time-consistently, and positively associated. This means that individuals who generally experience PPU also generally experience psychological distress and vice versa. This relationship appears trait-like. However, against our expectations, we did not find positive cross-lagged effects between the PPU and PD. These findings require careful interpretation as the overall association between both variables was positive in the current study, consistent with previous studies (Bibi et al., 2022; Islam et al., 2022; Kraus et al., 2020; Rimti et al., 2024). Moreover, these findings should be interpreted in relation to the strong positive association between the random intercepts, meaning that individuals who generally experience more PPU also experience more PD and vice versa.

Initially, we hypothesized that more psychological distress would lead to more dysregulation of pornography use over time because we posited that psychological distress may increase coping (through pornography use) and intensify dysregulation. This assertion would have supported the I-PACE model (Brand et al., 2016, 2019) and previous literature (Bibi et al., 2022; Gewirtz-Meydan, 2024; Testa et al., 2024). Such a finding would have also supported prior work, suggesting that more dysregulated pornography use would lead to more psychological distress due to the potential desensitization of dopaminergic reward pathways (Dreyer et al., 2010; Giuliano & Allard, 2001; Grace, 2000; Melis & Argiolas, 1995, 1995). Although we expected these effects to appear on a within-person level, they did not. Instead, we found that the within-person level (initial correlation and cross-lagged paths) displayed short-term inhibitory effects between the variables. Possible explanations could include that the negative effects from PD on PPU may be due to specific depression-related symptoms

such as the inhibition of drive or sexual interest (Frohlich & Meston, 2002; Kasch et al., 2002; Uher et al., 2014), or pornography use has a short-term coping strategy for psychological distress (Koós et al., 2022b; Testa, 2024). Previous studies on depressive individuals have indicated increased general behavioral activation and increased behavioral inhibition (Kasch et al., 2002). In the context of sexual interest, a study on women suffering from depression indicated an inhibition of sexual arousal, pleasure, and satisfaction (Frohlich & Meston, 2002). However, contrary, those depressed women still depicted an increased desire for masturbation (Frohlich & Meston, 2002). In addition, the experience of anxiety might be a contributing factor to an unknown extent, as 2 out of 11 PD items focus on anxiety and not depression. It remains uncertain how these aspects interact with each other, and further research is clearly warranted. In this context, it is important to note that the negative effects were only small and time-dependent, while across time, the effects were construct-like and positive. An alternative explanation for these small negative effects might be the relative efficacy of short-term coping with psychological distress through pornography use (Cardoso et al., 2022; Koós et al., 2022b, Testa et al., 2024). Coping with unpleasant emotions has been previously demonstrated as a common motivation for pornography use (Cardoso et al., 2022; Testa et al., 2024). The mere fact that individuals report pornography use as an emotion regulation strategy indicates at least some efficacy as a coping strategy. At the same time, this coping style appears to be associated with more PPU (Cardoso et al., 2022; Koós et al., 2022b, Testa et al., 2024). Applying these considerations to the current findings, the time-dependent (i.e., within-person) effects may represent a relative short-term efficacy of coping with PD through increased pornography use. The construct-like time-consistent (i.e., between-person) effects, on the other hand, might represent the long-term manifestation of PPU. However, these interpretations are speculative and require further examination. Overall, the findings of this study suggest PPU and PD to be positively and time-consistently related (i.e., positive bivariate correlations across waves and strong positive between-person correlation in

RI-CLPM), which seems to align with the results from previous longitudinal studies (Grubbs et al., 2015, 2022). Further work is needed to identify the factors that lead to the development and maintenance of PPU over time.

4.4 Limitations

The strengths of the current study should be interpreted in light of its limitations. As this study relies on self-report data, response and recall bias may be present to an unknown extent. A limitation in the interpretation of the results of this study is due to the study design: Since it is correlational (albeit longitudinal), no final conclusions on causality should be drawn. Another limitation in interpretation is due to this study being based not on a clinical PPU but rather on a general population and a subclinical gambling sample. The high rates of psychiatric disorders and PPU severity commonly found in clinical or help-seeking PPU populations (Bőthe et al., 2019; Mestre-Bach et al., 2024; Stefanovics et al., 2024) may have yielded different results compared to those in this sample.

A further limitation is the imputation of missing data using linear regression. This procedure has the potential to inflate correlations. To adjust for this potential effect, we also estimated an additional model without data imputation (see Figure B in supplemental material), which did not change the overall results (i.e., strongly positive correlation of the random intercepts and small negative cross-lagged paths). Thus, we would interpret these findings as relatively stable. The decision for data imputation caused varying *ns* across the other analyses of this study, which constitutes an additional limitation. Most significantly, in the analysis of BPS cut-off exceedance patterns, the sample was substantially smaller compared to the RI-CLPM. However, this procedure enabled us to keep statistical power as high as possible in each analysis. Similarly, the approach of combining two samples enhanced the overall statistical power but limited the representativeness that a focus on only the general population sample would have provided.

Furthermore, RI-CLPMs have been criticized in their application in addiction research because of a potential underrepresentation of between-person effects and an overrepresentation of within-person effects (Littlefield et al., 2022). These critiques seem to even strengthen the interpretation of this study that the main determinant for associations between PPU and PD is trait-like on a between-person level, while small cross-lagged effects might be rather negligible.

Another limitation is the reliance on screening instruments, which due to their conceptualizations assess symptoms retrospectively and across varying time spans: While the BPS assesses symptoms over the past six months (Kraus et al., 2020), the PHQ-9 and the GAD-2 assess symptoms over the past two weeks (Kroenke et al., 2001; Sapra et al., 2020). Though, as both variables indicated a comparable time consistency, the application of both instruments appears justified. Lastly, the interpretation of BPS cut-off exceedance rates can be criticized. Even though the cut-off value appears well validated (Bőthe et al., 2024; Engelhardt et al., 2025; Kraus et al., 2020), the BPS assesses potential PPU as a continuum (Kraus et al., 2020). The analysis of changes in cut-off patterns is sensitive to smaller changes around the cut-off and less sensitive to larger changes in the ranges either above or below the cut-off. Thus, these pattern changes should be regarded rather as an indication of overall trends than as an exact representation of changes in clinical PPU.

Another limitation is the focus on PPU, without considering pornography use and masturbation frequency. While PPU might not always be an expression of high-frequency pornography use and masturbation (Bőthe et al., 2020), both variables might be relevant in understanding PPU and its interactions with psychological symptoms (Cardoso et al., 2022, 2023). For instance, high-frequency pornography use paired with masturbation might desensitize dopaminergic-reward circuits, while abstaining might result in higher tonic dopamine concentrations, potentially impacting the experience of PD (Belujon & Grace, 2017; Graf et al., 2019; Melis & Argiolas, 1995; Niv, 2007).

4.5 Recommendations

We encourage replication of the current study with community samples. Specifically, we recommend further longitudinal testing within longer time spans as well as testing with varying measurements to explore associations between different expressions of PPU and PD across the lifespan; this is particularly relevant given the concerns of rising PPU among young adults (Ballester-Arnal et al., 2023). More precisely, additional PPU scales (e.g., the Problematic Pornography Consumption Scale; Bőthe et al., 2018) should be applied. The BPS focuses on dysregulation in the sense that it highlights the urge to use pornography (i.e., craving), while other scales include additional possible aspects of PPU, such as tolerance and withdrawal symptoms (Bőthe et al., 2018), which might also relate to psychological distress. Our results indicate that especially the urge/dysregulation aspects of PPU relate to psychological distress in the described way. Further scales that assess the broader construct of CSBD (e.g., the Compulsive Sexual Behavior Disorder Scale; Bőthe et al., 2020) could be applied to expand the current results. Given that PPU is the most commonly reported behavior among those seeking treatment for problematic sexual behaviors (Reid et al., 2012), we would anticipate comparable outcomes for CSBD.

Moreover, we recommend future studies applying an Ecological Momentary Assessment (EMA) approach (Shiffman et al., 2008) to examine short-term (daily) interactions between pornography use instances and psychological symptoms. We further recommend replication in clinical and help-seeking populations, as well as experimental designs and intervention studies testing whether there are PD differences between pornography using and pornography abstaining subgroups. For example, examining the current results within those abstaining from pornography use as a part of treatment should be explored.

The consistency of PPU throughout the waves of this study may serve as information to clinicians that, on a population level, when not treated, PPU may persist or may even

further manifest itself. Furthermore, increased PPU seems to be associated with consistently enhanced levels of psychological distress and vice versa. As this relation appears to be robust and strong in the long term, clinicians may want to consider PPU in depressed patients and the role of depressive symptoms in fluctuations of PPU symptoms among help-seeking patients. Furthermore, as the negative cross-lagged paths (potentially coping and depression-related inhibition effects) may partly mask the strength of the underlying strong long-term association, patients may lack the awareness that dysregulated pornography use may impact their overall depressive symptoms and vice versa. Clinicians should inform their patients about a potential relationship between PPU and PD, even when, in the short term, this relationship may appear less salient.

5. Conclusions

In summary, we found that PPU was stable over time, with strong positive correlations across time points. We further identified the tendency of potential PPU and potential non-PPU individuals to largely stay within their group over a one-year period. These findings speak to the consistency of PPU as measured by the BPS. Moreover, we found the positive association with PD to be a rather time-consistent long-term association between individuals than a time-specific short-term association within an individual. The long-term relation between both variables appears robust and positive, suggesting that individuals who report more PPU symptoms tend to experience more psychological distress as well, and vice versa. Yet, there appear to be additional short-term inhibitory effects that seem to lower the overall association between both variables in cross-sectional settings. We posit that these short-term effects may be due to pornography use being applied as coping behavior, possibly due to the inhibitory aspects of depression symptoms. However, in the long term, increased dysregulation and increased psychological distress may lead to further manifestation of PPU, which might be associated with a long-term increase in both outcomes.

Table 1.
Demographic Statistics of Sample (n=4,363).

	n total ***(n sample 1 / n sample 2)***	***% total*** ***(% sample 1 / % sample 2)***
Gender		
Man	2243(1283/960)	51.4(45.7/61.7)
Woman	2026(1490/536)	46.4(53.1/34.4)
Non-binary	60(24/36)	1.4(0.9/2.3)
Other	34(9/25)	0.8(0.3/1.6)
Sexual Orientation		
Heterosexual	3666(2366/1300)	84.0(84.3/83.5)
Bisexual	212(155/57)	4.9(5.5/3.7)
Gay	141(104/37)	3.2(3.7/2.4)
Lesbian	65(37/28)	1.5(1.3/1.8)
Pansexual	47(38/9)	1.1(1.4/0.6)
Asexual	43(32/11)	1.0(1.1/0.7)
Other	189(74/115)	4.3(2.6/7.4)
Marital Status		
Married	2158(1232/926)	49.5(43.9/59.5)
Separated	71(40/31)	1.6(1.4/2.0)
Divorced	484(363/121)	11.1(12.9/7.8)
Widowed	195(151/44)	4.5(5.4/2.8)
Never married	1188(825/363)	27.2(29.4/23.3)
Domestic / civil partnership	267(195/72)	6.1(6.9/4.6)
Education		
No High school	125(103/22)	2.9(3.7/1.4)
High school	1171(914/257)	26.8(32.6/16.5)
Some college	836(550/286)	19.2(19.6/18.4)
2-year college	460(281/179)	10.5(10.0/11.5)
4-year college	1088(587/501)	24.9(20.9/32.2)
Post-graduate	683(371/312)	15.7(13.2/20.0)
Ethnicity		
White	2911(1851/1060)	66.7(66.0/68.1)
Black	525(351/174)	12.0(12.5/11.2)
Hispanic	494(367/127)	11.3(13.1/8.2)
Asian	140(81/59)	3.2(2.9/3.8)
Native American	71(23/48)	1.6(0.8/3.1)
Middle Eastern	22(4/18)	0.5(0.1/1.2)
Two or more races	104(65/39)	2.4(2.3/2.5)
Other	96(64/32)	2.2(2.3/2.1)

Note: Sample 1 = census-matched sample of American adults , sample 2 = sport-wagering American adults. Age: 18-96 years (Mean=50, SD= 16.15). Additional sample statistics on sexual behavior variables can be derived from Table C in the supplemental material.

Table 2.
Changes in PPU cut-off (BPS≥4) exceedance groups over time (n=1,111).*

Over 12 months	***n***	**%**	T1-T2-T3
Never, no PPU	742	66.8	0-0-0
PPU Consistent	156	14.0	1-1-1
PPU Remitted	76	6.8	1-0-0 / 1-1-0
PPU Developed (over time)	71	6.4	0-1-1 / 0-0-1
PPU Inconsistent (over time)	66	5.9	1-0-1 / 0-1-0
Total	1111	100	all

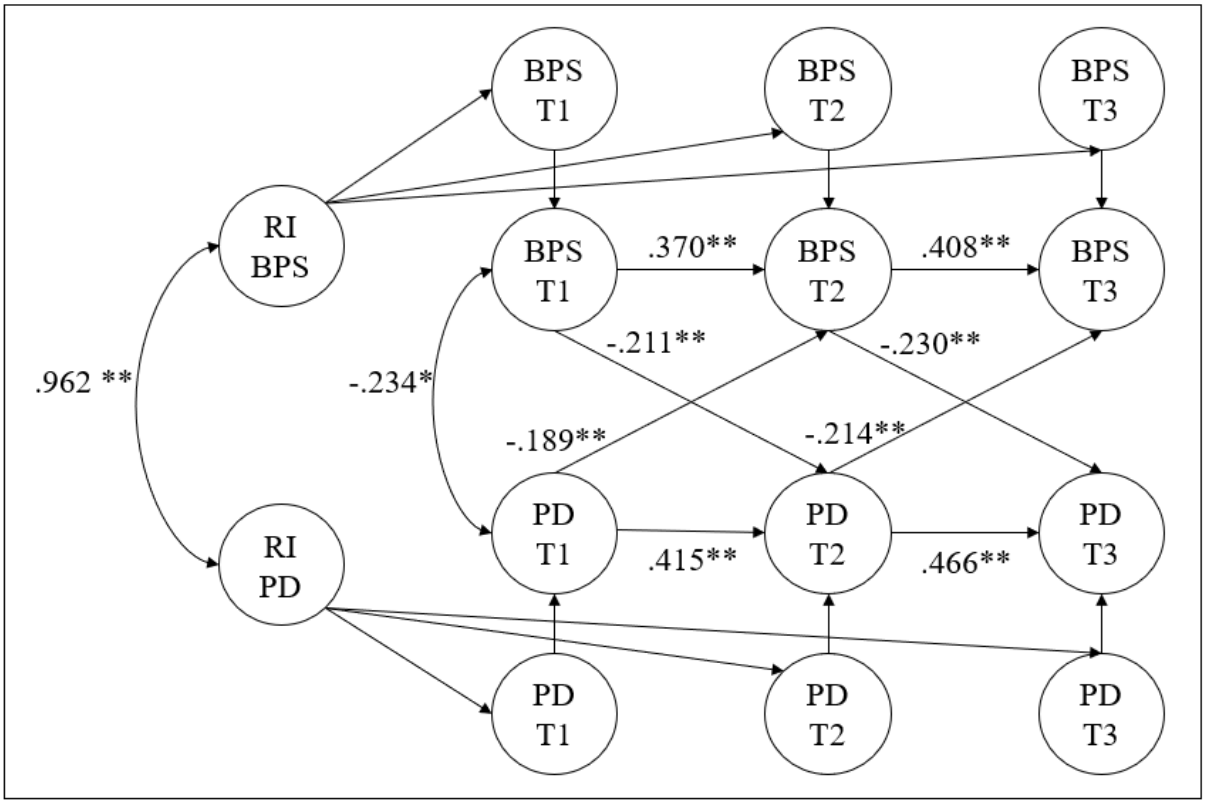
*Note: *The sample size in this analysis was significantly smaller than in the primary analysis of this study due to the necessity to exclude each participant who had not completed all BPS items at any given wave.*

Table 3. *Spearman's τ Correlations across Study Variables.*

	BPS (T1)	**BPS (T2)**	**BPS (T3)**	**PD (T1)**	**PD (T2)**	**PD (T3)**
BPS[1] (T1)	1	.726*	.681*	.395*	.316*	.267*
BPS (T2)		1	.712*	.312*	.379*	.271*
BPS (T3)			1	.278*	.300*	.329*
PD[2] (T1)				1	.753*	.725*
PD (T2)					1	.761*
PD (T3)						1

*Note: [1]Brief Pornography Screen, [2]Psychological Distress, *p<.001. N values range (n=1174-4347) according to measurement completion at given time points. Exact variable measurement statistics can be derived from Table D in the supplemental material.*

Figure 1. *Path Analysis from Random-Intercept Cross-Lagged Panel Model (n*=4,363).



*Note: *p<.01, **p<.001, RI=Random-Intercept, BPS=Brief Pornography Screen, PD=Psychological Distress (i.e., PHQ-9 and GAD-2), paths without assigned value are fixed at 1; the comprehensive model (Figure A) and a table displaying the regression weights of demographic control variables (Table B) are included in the supplemental material.*

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