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Problematic online behaviors constitute related yet distinct conditions: A cross-sectional study

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ABSTRACT

This study tested the Spectrum hypothesis of problematic online behaviors (POBs) which posits that POBs (e.g., online gaming, gambling, sexual activities, and social networking) constitute distinct, yet related constructs. To overcome the limitations of previous research, we recruited a representative sample of young men and capitalized on a common assessment approach (Fifth version of the Diagnostic and Statistical Manual of Mental Disorders [DSM-5] and Eleventh version of the International Classification of Diseases [ICD-11] frameworks). The study was a single-center, observational study with a cross-sectional design (n = 2620). All targeted behaviors were assessed using the proposed criteria of the DSM-5 and the ICD-11. The correlation analysis showed that online activities were weakly correlated ($0.01 \leq r \leq 0.19$), suggesting that when people engage in one specific online activity to a problematic extent, they do not necessarily engage in several online activities in an excessive way. Using a network analysis, we showed that various POBs might reflect distinct constructs. The community detection analysis identified four communities of items corresponding to each POB. Our robust methodology and sampling strategy suggests that the construct of "Internet addiction" could be misleading. This epistemological shift might be necessary to develop adequate clinical care and public health measures to address POBs.

1. Introduction

There is growing evidence that the use of digital technologies (Internet, smartphone) can be excessive and dysfunctional, with detrimental consequences such as psychological distress, health problems, and functional impairment (Fineberg et al., 2022; Saunders et al., 2017). As a result, the number of people experiencing negative consequences or seeking treatment because of problematic online behaviors (POBs) has been increasing in the last two decades (Reed et al., 2022). Here we consider POBs as reflecting a pattern of engagement in an online activity that is potentially excessive or dysregulated and associated to negative consequences. Yet, the scientific debate about their conceptualization and classification, as well as their legitimacy as mental conditions, is still ongoing (Reed et al., 2022; van Rooij et al., 2018).

Two specific forms of POBs, online gaming, and gambling are considered official diagnoses of disorders due to addictive behaviors in the International Classification of Diseases (ICD-11). Before ICD-11 was released, "Internet Gaming Disorder" was listed as a "condition for further study" in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). Other problematic online behaviors are not officially recognized in nosological manuals, although there have been attempts to consider problematic use of social networks and problematic online pornography as recognized psychiatric conditions (Fineberg et al., 2022).

An ongoing debate is whether POBs constitute tenable and independent constructs. Research has long focused on a broad "Internet

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addiction" construct (Griffiths, 2000; Shaffer, Hall, & Vander Bilt, 2000; Starcevic & Aboujaoude, 2017; Starcevic & Billieux, 2017), without considering the specific online activities. The very term "Internet addiction" has been considered misleading, as the Internet is a delivery mechanism for potentially addictive activities and not an addictive product per se (Flayelle et al., 2023; Starcevic & Aboujaoude, 2017).

It has been hypothesized that POBs constitute a spectrum of related yet distinct entities characterized by both unique and shared etiology and risk factors (Baggio et al., 2018; Starcevic & Billieux, 2017). To our knowledge, this "Spectrum hypothesis" has been tested in three different studies (Baggio et al., 2018; Baggio et al., 2022; Rozgonjuk, Schivinski, Pontes, & Montag, 2021), which used network analysis to show that POBs indeed constituted distinct constructs.

Network analysis is a data-driven approach that conceptualizes disorders as symptoms directly related to one another, i.e., the network (Schmittmann et al., 2013). The network consists of nodes and edges. Nodes represent the elements of a construct (in this study: symptoms). This approach is conceptually different from the classic latent variable approach, in which items or symptoms reflect latent constructs and do not interact directly (Guyon, Falissard, & Kop, 2017). The latent variable approach assumes that, after accounting for the common variance explained by the latent factors, the residuals of the items are largely uncorrelated or independent. This means that the primary relationships between items are due to the common underlying factors rather than to direct interactions between the items themselves. In network analysis, items are assumed to constitute the construct. The relationship between two nodes is represented by an edge. A strong edge between two nodes means that these two symptoms are likely to co-occur. This approach is particularly useful for studying the relationships between disorders (Cramer, Waldorp, van der Maas, & Borsboom, 2010). Indeed, the network approach can test the extent to which constructs are distinct from each other and whether and to what extent they overlap. This approach challenges the latent variable approach in 1) identification of important items, 2) identification of items clustering (Cramer et al., 2010), and 3) statistical assumption, the network analysis having no assumption of local independence between items, as required in factor analyses (Guyon et al., 2017). For these reasons, the network analysis is particularly suited to test the Spectrum hypothesis of POBs (for a more detailed account of network analysis, see Borsboom & Cramer, 2013; Epskamp, Borsboom, & Fried, 2018).

Previous studies having capitalized on network analysis to analyze the relationships between POBs all have a major limitation, that is, the various scales used to assess POBs are not comparable in terms of item wording and content, which might have played a role in the finding that various POBs were separate entities. The first study that investigated the Spectrum hypothesis (Baggio et al., 2018) only focused on two types of POBs (gaming, gambling) and two broader umbrella constructs (problematic Internet and smartphone use), using distinct questionnaires with a different number of items not assessing the same symptoms. A second study (Baggio et al., 2022) similarly used an online study in which questionnaires with different numbers of items covered a variety of symptoms which were not strictly compatible. Gaming was assessed in this study with a 10-item questionnaire, cyberchondria, cybersex and shopping with a 12-item questionnaire (with similar items for cybersex and shopping), while social networking was assessed with an 18-item questionnaire and gambling with a 9-item questionnaire. Another limitation of these two studies was that they were conducted in self-selected, non-representative samples, limiting their generalizability. A third study, conducted by Rozgonjuk, Schivinski, Pontes, & Montag (2021) used a convenient sample of gamers who were self-selected through online advertisements.

The aim of the study was to further examine the Spectrum hypothesis by overcoming the limitations of previous research. To this end, we test whether POBs (online gaming, gambling, sexual activities, and social networking) constitute distinct yet related constructs (the Spectrum hypothesis) in a representative sample of male community participants. To overcome the weaknesses of previous research, a similar assessment method was applied to each POB. For this purpose, it was decided to conjointly capitalize on the criteria proposed in the two dominant diagnostic frameworks available, that is the ICD-11 (WHO, 2018, 2024) and DSM-5 (APA, 2013), and to adapt them in the context of each type of POBs targeted in our study. Reproducing previous results using such an approach would reinforce the robustness of the evidence supporting the Spectrum hypothesis of online addictive behaviors.

Our hypothesis was that individual symptoms of POBs would cluster in distinct constructs. The alternative hypothesis, supporting an umbrella "Internet addiction" construct, was that symptoms of POBs would not cluster in distinct constructs or that there would be clustering around distinct symptoms (e.g., preoccupation, withdrawal). The two scenarios are depicted in Fig. 1. In this Figure, Model A depicts a situation confirming the Spectrum hypothesis (symptoms of a POB cluster together, while symptoms of different POBs are weakly related). In contrast, Model B depicts a situation in favor of an umbrella "Internet addiction" construct (symptoms from different POBs are interconnected and do not cluster in separate constructs). The situation depicted in Model A calls for abandoning the "Internet addiction" construct and focusing instead on specific POBs, while the situation depicted in Model B would indicate that a broad construct of "Internet addiction" is tenable and the Spectrum hypothesis not necessarily valid.

2. Materials and methods

2.1. Design and setting

The study was a single-center, observational, Swiss study with a cross-sectional design. Data were collected in the French-speaking army recruitment center between February 2019 and March 2020. In Switzerland, all young men aged around 20 are assessed to determine their eligibility for military, civil, or no service. The study took place at the beginning of the army recruitment process, i.e., the participants were not yet enrolled in the army. Since there is no pre-selection, the present sample is thus representative of the young Swiss male population living in the French-speaking part of the country. The study was conducted independently from the army.

2.2. Sample and procedures

All young Swiss men at the French-speaking army recruitment center in Switzerland were considered for study participation. Women were not included in the study because army recruitment in Switzerland is optional for females. Participants were eligible if they had engaged in at least one online behavior in the previous twelve months. They were excluded if they were unable or unwilling to provide informed consent.

During the conscription, all conscripts of the French-speaking army center were invited to participate in the study while they attended a mandatory prevention workshop held by the Centre for Excessive Gambling, Lausanne University Hospitals. Conscripts received a consent form. If they agreed to participate, they were invited to complete the 10-min paper-and-pencil questionnaire. Data collection took place before participation in the prevention workshop, so the workshop did not influence participants' responses. Data were collected anonymously. The Geneva's cantonal ethics committee approved the study protocol on February 11, 2019 (no. 2018–02105). Participants were free to refuse to participate or to withdraw at any time, in accordance with the Swiss Federal Law on Human Research. The study team was available to address any concerns, and the prevention workshop held after data collection provided resources for participants to get support if they volunteered for it. The study was not pre-registered, but to guarantee reproducibility, all data, codes, and materials are available from the Open Science Framework: https://osf.io/bvpxf.

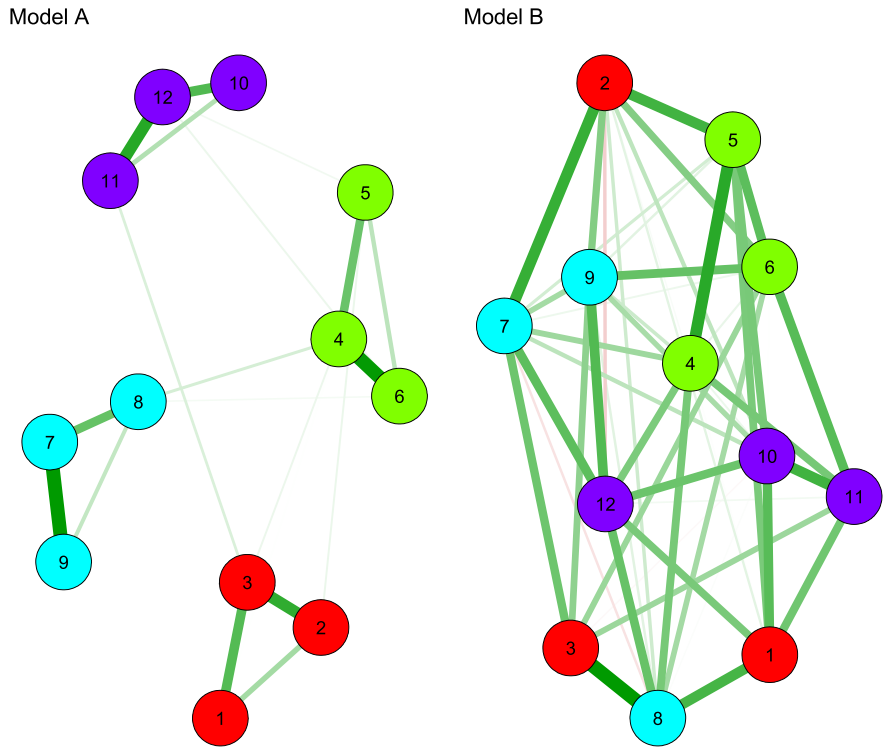

Fig. 1. Examples of networks for hypothesis testing.
Each number corresponds to a symptom. Each color corresponds to a specific problematic online behavior (POB). Thicker edges indicate stronger relationships between symptoms. Green edges indicate a positive relationship between symptoms and red edges indicate a negative relationship between symptoms.
Model A supports the Spectrum hypothesis: Symptoms of each POB are clustered into distinct communities. Model B supports an umbrella Internet addiction construct, with symptoms not clustered in distinct communities of POBs. These simulated networks have been produced using the freely available code from a previous study (Billieux & Fournier, 2023).

2.3. Measures

Four representative, potentially addictive online behaviors were assessed: online gaming, online gambling, social networking, and online sexual activities. Participants first answered whether they engaged in the corresponding online behavior in the previous twelve months (detailed questions are available in the Supplementary Material 1). The presence of each online behavior was assessed as no = 0 and yes = 1. Participants then responded to items assessing DSM-5 criteria (nine criteria) and ICD-11 criteria (three criteria).

DSM framework. The following approach was used for measuring problematic online behaviors based on the DSM framework (https://www.psychiatry.org/psychiatrists/practice/dsm): (1) problematic online gambling was measured with the gambling disorder criteria provided in DSM-5[1]; (2) problematic online gaming was measured with the Internet Gaming Disorder criteria provided in Section 3 of DSM-5 (section on emerging conditions); and (3) problematic social networking and problematic sexual online activities were measured by adapting these activities to the Internet Gaming Disorder criteria proposed in Section 3 of DSM-5.

ICD framework. The following approach was used for measuring problematic online behaviors based on the ICD framework (WHO, 2024): (1) problematic online gambling and gaming were measured with the gambling disorder and gaming disorder clinical guidelines provided in ICD-11, (2) problematic social networking and problematic sexual online activities were measured by adapting the gaming disorder criteria proposed in ICD-11 to these activities. Following the DSM-5 and ICD-11diagnostic approaches, all criteria are scored based on binary answers (no = 0, yes = 1).

Table 1 summarizes various DSM-5 and ICD-11 criteria. All items used in the current study can be retrieved in the Supplementary material 1, also available on the Open Science Framework: https://osf.io/bvpxf.

2.4. Statistical analyses

As in the previous works investigating the Spectrum hypothesis (Baggio et al., 2018; Baggio et al., 2022; Rozgonjuk, Schivinski, Pontes, & Montag, 2021), the statistical analysis selected to test our hypothesis was network analysis. To date, no power analysis is available for network analysis. Since small sample sizes are likely to produce sparse networks, a consequent sample size is needed. Based on the results of a previous simulation study (Epskamp, Kruis, & Marsman, 2017), n = 500 (with 50 participants per node/variable) appeared as a minimum to provide reliable and replicable results.

After calculating descriptive statistics (percentages, correlations) for the prevalence of online behaviors, we conducted the network analysis. First, we estimated the symptom network with the IsingFit model, designed for binary variables (van Borkulo et al., 2014) and a penalty parameter, using the graphical LASSO algorithm (eLasso) (Friedman, Hastie, & Tibshirani, 2008; van Borkulo et al., 2014). The model computes pairwise conditional associations between nodes, with a penalty

[1] In the DSM-5, gambling disorder criteria are slightly different that those of Internet gaming disorder. For gambling disorder, the "continued use" and "loss of interest" criteria are not present, and instead two other criteria are used: "chasing" and "borrowing money".

Table 1
DSM-5 and ICD-11 diagnostic criteria.

DSM-5 criteria for Internet gaming disorder (and gambling disorder)
1. Preoccupation (think about previous/next use, dominant activity in daily life)
2. Withdrawal (e.g., irritability, anxiety)
3. Unsuccessful attempts to control use
4. Tolerance (need to spend increasing amounts of time in the activity)
5. Use to escape or relieve negative mood
6. Jeopardized/lost a significant relationship/job/education because of use
7. Deceived family, therapists, others because of use
8. Loss of interest in previous hobbies/entertainment (for gambling disorder, this criterion is replaced by "chasing")
9. Continued excessive use despite psychosocial problems (for gambling disorder, this criterion is replaced by "borrowing money")
ICD-11
1. Impaired control over use (e.g., onset, frequency, intensity, duration, termination, context)
2. Increasing priority given to the activity (takes precedence over other life interests and daily activities)
3. Continuation/escalation of use despite negative consequences (significant impairment in personal, family, social, educational, occupation, or other areas of functioning).

weight to shrink small coefficients to zero. Therefore, the edges connecting the symptoms for a few respondents are set to zero and only the associations between symptoms for a sufficient number of respondents are strong enough to be included in the model. This analytical procedure involves the computation of a logistic regression, regressing each variable iteratively on all other variables, similarly to what is done when using partial correlations matrices. This procedure excludes the relationship between two variables if it is due to other variables (McFarland, 2020). The LASSO selection identifies the set of neighbors for each node. It is based on L_1-regularization and use the extended Bayesian Information Criterion (EBIC) to penalize solutions involving more variables and neighbors. We used the hyperparameter $\gamma = 0.25$, as suggested in a previous study presenting a method for constructing networks from binary data (van Borkulo et al., 2014). We applied the AND-rule to determine the final set of edges (the two regression coefficients computed between two nodes, β_{jk} and β_{kj} should be nonzero) (van Borkulo et al., 2014).

Second, to investigate whether symptoms of different POBs were separate from one another and identify symptom clustering, we applied community detection analysis based on the Spinglass algorithm. This algorithm identifies densely connected subgraphs and handles negative edges' weights.

Third, usual accuracy checks were performed, including edge-weight accuracy using bootstrapped confidence intervals of estimated edge-weights and the correlation stability coefficient (CS-coefficient) for the nodes' and edges' strengths (Epskamp et al., 2017). We used 10,000 iterations without replacement, with non-parametric bootstrap for edge-weight accuracy and case-dropping bootstrap for the correlation stability coefficient (Epskamp et al., 2017). We also tested node predictability using mixed graphical models. The node predictability indicates how well a given node is predicted by all remaining network nodes. We report the accuracy of each node with the correct classification percentage. These analyses are presented in the Supplementary material 2 and they suggest that the accuracy and stability of the networks were acceptable.

Separate networks were computed for DSM-5 and ICD-11 symptoms. Pairwise deletion was used in case of missing values. Patterns of missing values are shown in Supplementary materials 3 (DSM-5 data) and 4 (ICD-11 data). As a sensitivity analysis, we computed networks using listwise deletion, which yielded similar results to those presented in this study. When potential POBs were absent, corresponding questionnaire items were coded zero, as was done in a previous comparable study (Baggio et al., 2022). For readers who are interested in the comparison between the latent factor approach and the network analysis, we report the results of confirmatory factor analyses in Supplementary Material 5. Analyses were run with R version R 4.3.1 (package bootnet 1.5.3, igraph 1.5.0, mgm 1.2–13, and lavaan 0.6–16).

3. Results

A total of 2729 young men were eligible for study participation, of which 109 declined participation (response rate: 96.0%). The final sample included 2620 participants aged on average, 19.6 ± 1.8 years.

The presence of each surveyed online behavior and correlations between them are reported in Table 2. Most participants engaged in social networking (99.5%), cybersex (83.5%), and gaming (82.6%). Gambling was less frequent (19.3%). Correlations between online behaviors were of small magnitude, ranging between 0.01 and 0.19.

The symptom networks based on the DSM-5 and ICD-11 criteria are depicted in Figs. 2 and 3. For both DSM-5 and ICD-11, the community detection analysis identified four communities of items, corresponding to each POB. This analysis lends no support to the alternative hypothesis that symptoms of POBs cluster in a way that justifies the umbrella construct of "Internet addiction".

Tables 3 and 4 show the percentage of positive edges (number of positive edges divided by the number of possible edges) for DSM-5 and ICD-11 criteria. For DSM-5, each POB had a large proportion of within-community edges (ranging between 58.3% and 77.8%), meaning that items were well connected within each POB. On the contrary, the proportions of between-community edges were smaller (ranging from 2.5% to 11.1% between pairs of POBs), meaning that items were weakly correlated between different POBs. For the ICD-11, communities for each POB were fully connected (within-community edges = 100%) and proportions of between-communities edges ranged between 11.1% and 44.4%.

4. Discussion

This study further tested the Spectrum hypothesis to ascertain whether POBs constituted distinct constructs. Overcoming the limitations of previous studies, we relied on a common assessment approach for all POBs considered (the DSM-5 and ICD-11 frameworks) and recruited a representative sample of Swiss young males. Our results reproduced those of past studies (Baggio et al., 2018; Baggio et al., 2022; Rozgonjuk, Schivinski, Pontes, & Montag, 2021) with a more robust methodology, further supporting the Spectrum hypothesis (Starcevic & Billieux, 2017).

The correlation analysis showed that online activities were weakly

Table 2
Proportion of each online behavior and tetrachoric correlations between online behaviors.

	Users, % (n)	Gaming	Social networks	Cybersex
Gaming	82.6 (2164)	–		
Social networks	99.5 (2602)	0.02	–	
Cybersex	83.5 (2165)	0.19	0.05	–
Gambling	19.3 (503)	0.13	0.01	0.08

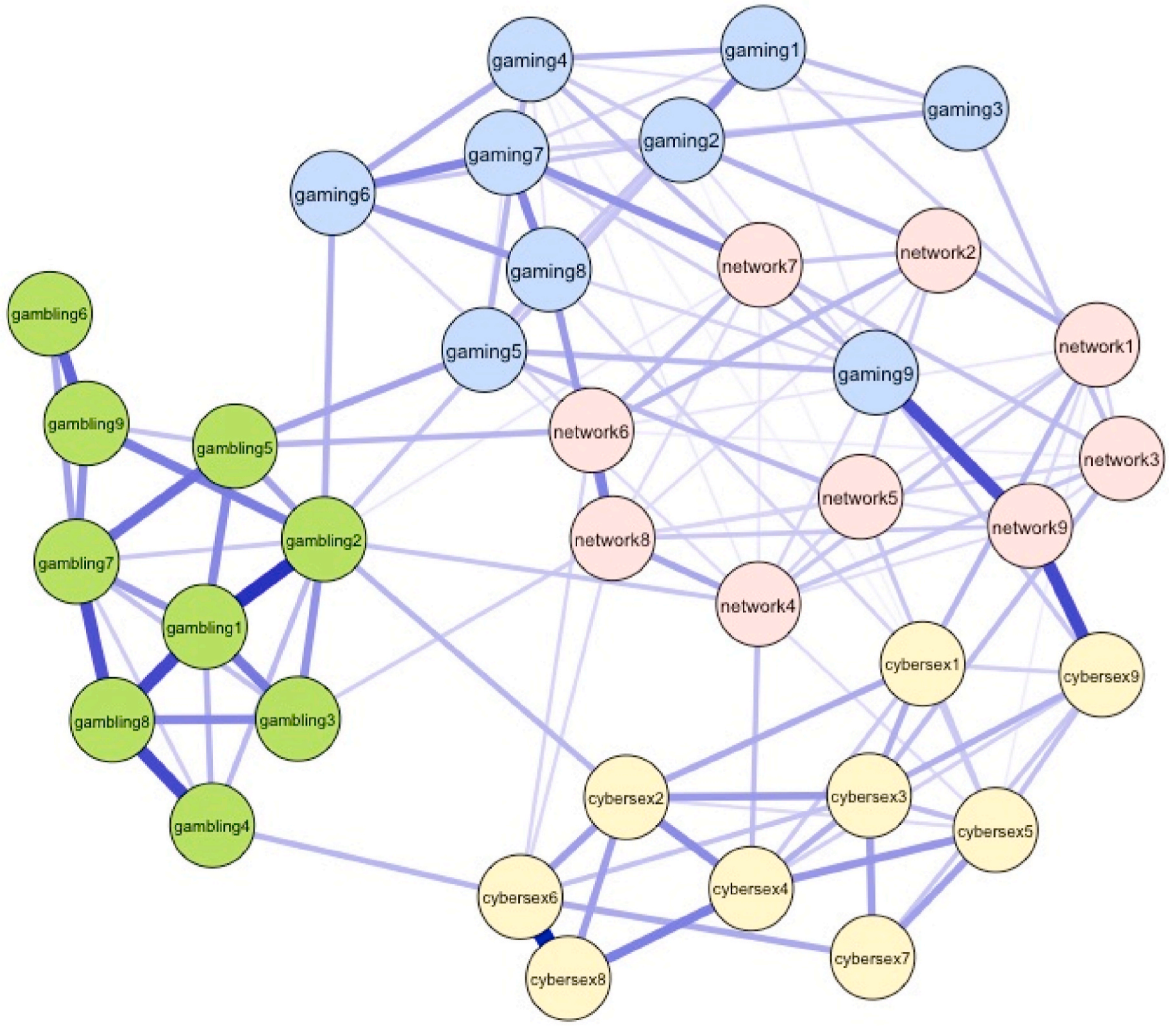

Fig. 2. Network for DSM-5 criteria.
For each problematic online behavior: number 1 corresponds to the symptom "preoccupation", number 2 corresponds to "withdrawal", number 3 corresponds to "unsuccessful attempts to control use", number 4 corresponds to "tolerance", number 5 corresponds to "use to escape or relieve negative mood", number 6 corresponds to "jeopardized/lost a significant relationship/job/education because of use", number 7 corresponds to "deceived family, therapists, others because of use", number 8 corresponds to "loss of interest in previous hobbies/entertainment" (or "chasing" for gambling), and number 9 corresponds to "continued excessive use despite psychosocial problems" (or "borrowing money" for gambling).
Thicker edges indicate stronger relationships between symptoms. Blue edges indicate a positive relationship between symptoms (symptoms are likely to co-occur) and red edges indicate a negative relationship between symptoms (symptoms are not likely to co-occur).

correlated (correlations ranging between 0.01 and 0.19). It suggested that when people engaged in one specific online activity, they did not necessarily engage in several other online activities. This is in line with previous findings obtained from different types of samples (Baggio et al., 2022; Rozgonjuk, Schivinski, Pontes, & Montag, 2021). In the Australian general population, Baggio et al. (2022) found that correlations between problematic online activities, including gaming, cyberchondria, cybersex, online shopping, social networking sites, and online gambling, were all positive but of small magnitude (ranging from 0.051 to 0.236). In an international online sample of English-speaking gamers, Rozgonjuk, Schivinski, Pontes, and Montag (2021) found correlations ranging between 0.193 and 0.389 for problematic online gaming, gambling, shopping, pornography, and social networking. Therefore, these correlations ranged from small to medium. Taken together, these findings support the view that POBs should be considered as distinct conditions and not grouped in a broad and questionable construct of "Internet addiction" (Starcevic & Aboujaoude, 2017).

Crucially, the network analysis showed that various POBs considered (online gaming, gambling, sexual activities, and social networking) reflect distinct constructs (communities of symptoms), with strong relationships between symptoms of the same POB (i.e., within-community edges) and a moderate strength of relationships between symptoms of different POBs (i.e., between-community edges). These findings are consistent with the results of previous studies (Baggio et al., 2018; Baggio et al., 2022; Rozgonjuk, Schivinski, Pontes, & Montag, 2021). In a study focusing on the Australian general population, the network analysis identified six communities of items corresponding to the six POBs investigated (Baggio et al., 2022). This study showed strong relationships between the items reflecting each POB, but weaker relationships between the items reflecting different POBs, which was similar to what we found in our study. In a study investigating English-speaking gamers, Rozgonjuk and colleagues (2021) found weak associations across different POBs, while associations were strong between items of a specific POB, except for gaming. Therefore, our findings further support the relevance and validity of the Spectrum hypothesis (Starcevic & Billieux, 2017) while overcoming the main limitations of previous studies (i.e., absence of common assessment approach to POBs, non-representative samples). There was no support for the alternative

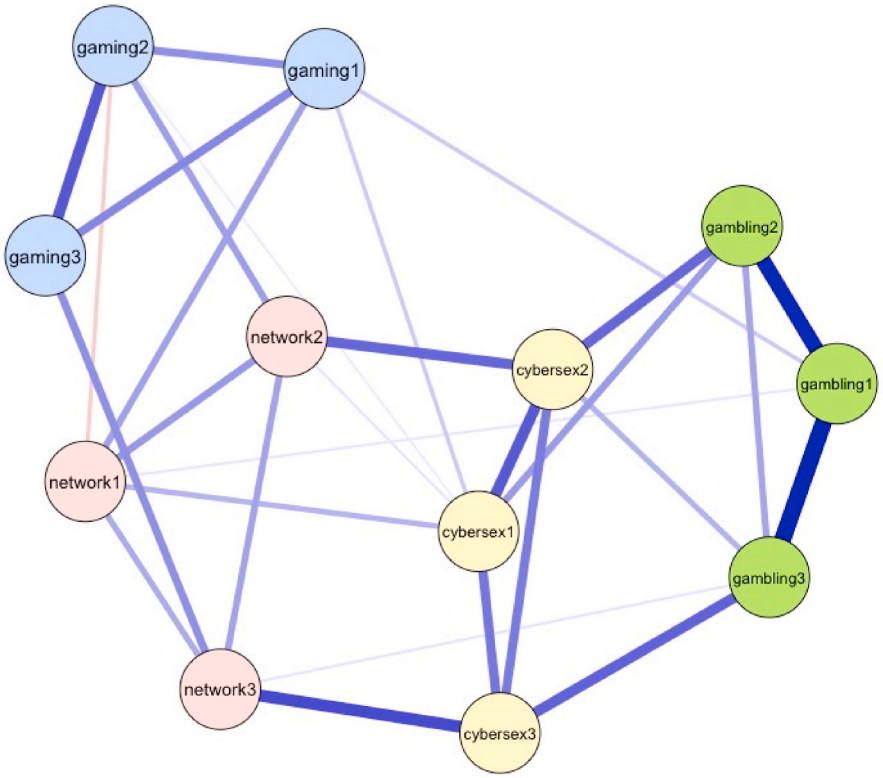

Fig. 3. Network for ICD-11 criteria.
For each problematic online behavior: number 1 corresponds to the symptom "impaired control over use", number 2 corresponds to "increased priority given to the activity", and number 3 corresponds to "continuation/escalation of use despite negative consequences".
Thicker edges indicate stronger relationships between symptoms. Blue edges indicate a positive relationship between symptoms (symptoms are likely to co-occur) and red edges indicate a negative relationship between symptoms (symptoms are not likely to co-occur).

Table 3
Percentages of within- and between-communities edges in problematic online behaviors for DSM-5.

	1	2	3	4
1. Problematic online gaming	**77.8%**	–	–	–
2. Problematic cybersex	11.1%	**77.8%**	–	–
3. Problematic use of social networking sites	6.2%	9.9%	**63.9%**	–
4. Problematic online gambling	3.7%	4.9%	2.5%	**58.3%**

Bold: within-community edges; non-bold: between-community edges.

Table 4
Percentages of within- and between-communities edges in problematic online behaviors for ICD-11.

	1	2	3	4
1. Problematic online gaming	**100%**	–	–	–
2. Problematic cybersex	22.2%	**100%**	–	–
3. Problematic use of social networking sites	22.2%	44.4%	**100%**	–
4. Problematic online gambling	11.1%	44.4%	22.2%	**100%**

Bold: within-community edges; non-bold: between-community edges.

hypothesis of an umbrella construct of Internet addiction.

This study has several limitations. First, the study focused on a representative sample of young men, meaning that findings cannot be generalized to women. Second, only a limited number of POBs were assessed in the present study. This is because we were authorized to survey conscripts with a very limited number of items, as a small amount of time is dedicated to psychological assessment during the mandatory recruitment day in Switzerland. It was thus decided to focus on the most established and representative POBs (Fineberg et al., 2022; Flayelle et al., 2023), although other behaviors could have been considered too (e.g., online health information seeking, online shopping, streaming of TV series). A third limitation was that the measures used in the study have not been validated before and their psychometric properties are unknown. Yet, we aimed to test our research hypotheses by capitalizing on the DSM-5 and ICD-11 diagnostic frameworks. This approach is particularly adapted to the item-based network analytic approach and would have been problematic if we had taken a reflective approach with latent constructs. Indeed, in such cases, the reliability and validity of the measures are critical to ensure that the latent construct is accurately captured. In contrast, our item-based network analysis treated each item as an independent node in a network and focuses on the direct relationships and interactions between these items. Therefore, an item with low reliability or validity would be less problematic in network analysis than in the latent factor approach. Fourth, the questionnaire relied on self-reports, without professional in-depth clinical evaluation. Future research should consider using clinician-administered interviews. Fifth, it was observed that the percentages of existing within- and between-community edges were higher in the ICD-11 network compared to the DSM-5 network. This may be due to the reduced number of symptoms (3 vs. 9) and the potential number of edges (smaller for ICD-11). Reliability may be reduced when the number of items is smaller. In that regard, future network studies using the ICD-11 framework could include not only the essential (required) features assessed in the current study, but also additional (non-required) clinical features, such as urges or withdrawal-like symptoms. Finally, another limitation could be that the study setting (prevention workshop held by the Centre for Excessive Gambling) might have influenced participants' responses. However, data collection took place before the prevention workshop, which limited its influence on participants' response.

Despite these limitations, this study had several notable strengths. First, it used a representative sample of young men with a high response rate. This ensures good external validity, which has not been the case in previous studies that have relied on convenience sampling strategies. Second, the large sample size increased the statistical power and generalizability of the study. Thirdly, the conjoint use of the ICD-11 and DSM-5 frameworks enriched the analytic approach by allowing a systematic and comprehensive examination of the relationships between POBs.

5. Conclusions

To conclude, the present study further shows, using a robust methodology and sampling, that the construct of "Internet addiction" could be empirically untenable. This was suggested using two different diagnostic systems. However, it remains essential to better understand the unique characteristics of POBs (e.g., specific etiological and risk/protective factors) and their similarities. We suggest that future research should focus on distinct POBs and not on problematic Internet use in general. It is also necessary to reproduce our findings in a representative sample of women. Although we agree that taking a broader approach (i.e., focusing on problematic Internet use in general) might at some point facilitate prioritization in policymaking and more efficient allocation of public health and clinical resources (Lee, Kim, & Lee, 2019), we think that epistemological shift might be necessary. This entails focusing on specific activities (and not problematic Internet use in general) to develop adequate public health measures and clinical care responses.

Funding

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Ethics approval

The Geneva's cantonal ethics committee approved the study protocol (no. 2018–02105).

Consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

Data, material, and code availability

All data, codes, and materials are available from the Open Science Framework: https://osf.io/bvpxf.

CRediT authorship contribution statement

Stéphanie Baggio: Writing – original draft, Visualization, Supervision, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Maurane Bosson:** Writing – review & editing, Visualization, Data curation. **David Berle:** Writing – review & editing, Methodology, Conceptualization. **Vladan Starcevic:** Writing – review & editing, Methodology, Conceptualization. **Olivier Simon:** Writing – review & editing, Supervision, Project administration, Investigation, Data curation, Conceptualization. **Joël Billieux:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors report no conflict of interest.

Data availability

All data, codes, and materials are available from the Open Science Framework: https://osf.io/bvpxf.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.chb.2024.108358.

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