












FULL-LENGTH REPORT



Q-single: Linking functional impairment to problematic internet use through a single-question approach

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ABSTRACT

Background: Short versions of problematic internet use (PIU) questionnaires may provide a convenient and effective way of assessing internet-related problems in various contexts, ranging from research to clinical practice. The aim of this study was to investigate whether single yes/no question (Q-single) regarding “functional impairment due to PIU” could serve as a screening tool to indicate the potential absence of PIU, given the lack of functional impairment. **Methods:** Data from two online studies ($N = 524$ and $N = 272$) assessing internet-related behaviors among students were used for the analyses. Participants completed questionnaires (the nine-item Problematic Internet Use Questionnaire [PIUQ-9], the Compulsive Internet Use Scale [CIUS], the nine-item Patient Health Questionnaire, depression module [PHQ-9], the seven-item Generalized Anxiety Disorder scale [GAD-7]), questions about their internet use time, besides answering the Q-Single question. Block-wise multiple linear regression analyses were used to determine the predictive effect of the Q-Single on PIU (as measured with the PIUQ-9 and the CIUS) and its association with depression and anxiety symptom scores (as measured with the PHQ-9 and the GAD-7). **Results:** The Q-Single demonstrated a high negative predictive value in screening the absence of PIU, however positive predictive value was low to moderate. Q-Single proved to be a good predictor of PIU ($\beta = 0.484$, $p < 0.001$ [PIUQ-9] and $\beta = 0.481$, $p < 0.001$ [CIUS]) when controlling for age, gender, and internet use time. Adjusting for the same controlling variables, the Q-Single had a moderate association with depression symptoms ($\beta = 0.385$, $p < 0.001$ [PHQ-9]) and anxiety symptoms ($\beta = 0.252$, $p < 0.001$ [GAD-7]) supporting the validity of the single-question instrument. **Conclusions:** The finding that a single question could predict absence of PIU in students, implies that functional impairment is an important indicator of PIU.

KEYWORDS

Q-single, internet addiction, psychological correlates, assessment, questionnaire, behavioral addictions, anxiety, depression, problematic internet use

INTRODUCTION

It is predicted that the number of internet users will grow in the future (Global Online Population Forecast Report, 2024). Along with that, the global concern about problematic

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internet use (PIU) and its public health and social implications continue to increase, as well (Brand & Potenza, 2023; Fineberg et al., 2022). PIU is often used as an umbrella term that includes problematic online gaming, problematic pornography viewing, compulsive online shopping, problematic video content viewing, problematic social media use, or other problematic online activities (Fineberg et al., 2018). While certain forms of PIU may exhibit phenotypic similarities to behavioral addictions, other forms may more closely align with characteristics observed in social anxiety, impulse-control disorders, or obsessive-compulsive disorder (Fineberg et al., 2018). Internet use is generally considered problematic when excessive engagement leads to psychological, social, educational, and/or occupational difficulties; however, given the substantial overlap in the presence of addictive, impulsive, and compulsive features across various forms of PIU, more nuanced definitions have also been proposed (Brand et al., 2025; Fineberg et al., 2022, 2025; Montag et al., 2024).

Several systematic reviews have found positive relationships between PIU and unfavorable mental health outcomes, including mental distress (depression and anxiety symptoms), as well as eating disorders (Ioannidis et al., 2021; Lopes et al., 2022; Melca, Teixeira, Nardi, & Spear, 2023).

In recent years, especially during the COVID-19 pandemic, students have experienced an unprecedented expansion of internet use for online learning, work, and communication (Almomani et al., 2020; Buneviciene & Bunevicius, 2020). Several meta-analyses reported PIU prevalence estimates ranging from 6 to 9.7% (Burkauskas et al., 2022, 2023; Pan, Chiu, & Lin, 2020).

Before developing appropriate interventions to reduce PIU, it is essential to have well-tailored assessment instruments (Ioannidis et al., 2023; King et al., 2020, 2023, 2024; Podlipskyte, Kiraly, Demetrovics, Burkauskas, & Steibliene, 2022). There are different psychometric instruments to identify PIU. However, empirical research shows that different assessment tools may offer contradictory prognostic qualities (S. Laconi et al., 2019; Siciliano et al., 2015). It is still unclear which scales measuring PIU are better than others.

Furthermore, due to the high comorbidity of PIU and other mental health symptoms, when evaluating PIU, it is necessary to use additional assessments to assess individual mental distress qualities such as anxiety and depression symptoms.

The nine-item version of the Problematic Internet Use Questionnaire (PIUQ-9) (Stéphanie Laconi et al., 2019) and the Compulsive Internet Use Scale (CIUS) (Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009) are currently adapted and widely used in Lithuania to assess PIU (Burkauskas, Király, Demetrovics, Podlipskyte, & Steibliene, 2020; E. Milasauskiene et al., 2021). The PIUQ-9 is a nine-item scale with a bi-factor structure including one “general problem” factor and two specific factors of “obsession” and “neglect + control disorder” (Burkauskas et al., 2020). The CIUS is a self-report 14-item scale for the assessment of the severity of compulsive, pathological, or other internet use issues, which could be considered problematic (E. Milasauskiene et al., 2021).

However, there is a need for a short screening tool to detect PIU, especially in cases where a problematic use of the internet is not the main concern of the individual. The ideal screening test should be brief, easy to administer, and sensitive enough to recognize the risk of PIU or its absence. Ideally, this screening tool should be able to capture additional issues related to current symptomatology. For example, in the case of PIU, results on the screening tool that measures it should also be associated with common comorbid mental health issues such as mental distress. A short screening tool could be used to explore the risk profile of internet users or be used as a part of more complex risk behavior assessments.

To address this issue, we used “Q-Single” – a single question “Has the use of the Internet significantly impaired your normal daily activities and/or relationships with those around you?”. The question was developed to assess impairment due to internet use, and respondents had to subjectively evaluate themselves. “Functional impairment” is often used to express individual limitations in social and occupational spheres of life (Ustün & Kennedy, 2009).

The 11th version of the International Classification of Diseases (ICD-11) offers diagnostic criteria for disorders due to addictive behaviors (predominantly online), such as gambling disorder and gaming disorder (Griffiths & M., 2025; Király, Koncz, Griffiths, & Demetrovics, 2023). These disorders include functional impairment as a necessary criterion along ‘impaired control over the behavior’, ‘increasing priority given’, ‘continuation despite negative consequences’ (Brand et al., 2020). Problematic online pornography use, online shopping, and excessive social-network use, may fall under the ICD-11 subcategory of “other specified disorders due to addictive behaviors,” with similar criteria applied for diagnosis. The DSM-5 does not currently recognize PIU as an official diagnosis. However, it provides a framework for evaluating behavioral addictions, including internet gaming disorder. A diagnosis in this particular case depends on a cut-off point of symptoms and daily functioning abilities. Nevertheless, screening instruments for these conditions remain highly inconsistent, and there is a need for unified assessment approaches. Current instruments based on ICD-11 criteria, such as the ACSID-11 (Müller et al., 2022), assess functional impairment alongside other symptoms across various domains of PIU; however, these are not designed as single-item measures.

Thus, we developed a one-question test, namely “whether internet use impairs daily functioning” (Q-Single), with the primary aim of serving as a screening tool to indicate the potential absence of PIU, given the lack of functional impairment. Additionally, we aimed to explore whether a positive response to this question is associated with mental distress symptoms such as anxiety and depression.

First, with functional impairment being a core criterion for identifying disorders related to PIU, we hypothesized that the Q-Single would have a high negative predictive value (Steinberg, Fine, & Chappell, 2009) for PIU. Second, we have also hypothesized that the Q-Single would show strong positive associations with established PIU measures,

such as the PIUQ-9 and CIUS, as well as with other PIU-related mental distress outcomes, such as anxiety and depression as measured with the seven-item Generalized Anxiety Disorder scale (GAD-7) and the nine-item Patient Health Questionnaire, depression module (PHQ-9). Third, we expected Q-single to have similar predictive power on mental distress scales as other PIU measures.

METHODS

Participants and procedures

Lithuanian students participated in two independent online surveys launched between December 2020 and February 2021 (Study 1, $N = 524$; mean age 23.7 (range 18–40) years [$SD = 3.0$], 21.4% males), and between September 2019 and November 2019 (Study 2, $N = 272$; mean age 26.8 (range 18–65) years [$SD = 9.3$], 16.5% males). Both online surveys provided information about the study (i.e., the study objectives and assurances of anonymity and confidentiality).

Measures

Besides providing basic information on age and gender, participants completed a questionnaire about their internet use time and the CIUS (Meerkerk et al., 2009; E. Milasauskiene et al., 2021) in Study 1 and the PIUQ-9 (Burkauskas et al., 2020; Stéphanie Laconi et al., 2019) in Study 2, as well as the Patient Health Questionnaire (PHQ-9), and the Generalized Anxiety Disorder (GAD-7) scales (K. Kroenke, Spitzer, & Williams, 2001; Pranckeviciene et al., 2022; Spitzer, Kroenke, Williams, & Lowe, 2006) in both studies.

In addition, we evaluated impairment due to PIU by asking study participants a single question - “Has the use of the Internet significantly impaired your normal daily activities and/or relationships with those around you?” with a yes/no answer (Q-Single; Studies 1 and 2). The Q-single was designed to address the specific functional impairment criterion. We believe that the dichotomous response format “yes/no” is useful for a quick decision-making process and might actually reduce cognitive load for the participant (due to the absence of potential ambiguity). This might be of particular importance in the settings where initial PIU screening is required.

The PHQ-9 and the GAD-7 represent components of the broader Patient Health Questionnaire (PHQ), designed for the assessment of symptoms related to depression and anxiety (Kurt Kroenke et al., 2001). Both scales are aligned with the fourth edition of the DSM (DSM-IV) criteria for major depressive disorder and generalized anxiety disorder, respectively. With a nine-item criteria list for major depressive disorder, the PHQ-9 measures the frequency and intensity of depression symptoms over the past 2 weeks. Responses were rated on a 4-point scale (0 – “Not at all” to 3 – “Nearly every day”) and summed for a total score (range = 0–27), reflecting overall symptom severity. Consisting of seven items, the GAD-7 measures the frequency

and intensity of anxiety symptoms over the past 2 weeks. Respondents rated each item on a 4-point scale (0 – “Not at all” to 3 – “Nearly every day”). The cumulative score reflected the extent of anxiety symptom severity (range = 0–21). Both the PHQ-9 and the GAD-7 had been previously validated in Lithuanian populations (Pranckeviciene et al., 2022; Stanyte et al., 2023).

We also employed the PIUQ-9, which measures three components of PIU: obsession, neglect, and control disorder (Koronczi et al., 2011; Stéphanie Laconi et al., 2019). Respondents rated each of the nine items on a 5-point Likert scale, spanning from 1 “Never” to 5 “Always/almost always.” The summative scores encompassed a range from 9 to 45, with higher scores reflecting a higher predisposition towards PIU.

In addition, we used the CIUS – a self-report instrument consisting of 14 items designed to quantify the severity of behaviors associated with problematic internet use (Meerkerk et al., 2009). Utilizing a 5-point Likert scale ranging from 0 (“Never”) to 4 (“Very often”), respondents provided ratings for each item, yielding a composite score that ranged from 0 to 56. The Lithuanian versions of both the PIUQ-9 (Burkauskas et al., 2020) and the CIUS (E. Milasauskiene et al., 2021) showed plausible psychometric properties in student populations with cut-scores to identify PIU proposed at the level of ≥ 29 and ≥ 24 for the respective questionnaires.

Statistical analysis

The data analyses were conducted with SPSS 29.0 (IBM/SPSS Inc., Chicago, IL). First, by using a two-by-two contingency table, we evaluated the predictive ability of Q-Single to identify PIU by using PIUQ-9 and CIUS cut scores as reference standards. Diagnostic accuracy was determined by calculating the Q-Single instrument’s sensitivity, specificity, positive predictive value (Steinberg et al., 2009), and negative predictive value (Steinberg et al., 2009).

Second, we used block-wise linear regression analyses to estimate associations between the Q-Single question and the CIUS and the PIUQ-9 when controlling for gender, age, and internet use time.

Third, PHQ-9 and GAD-7 values were regressed on two blocks of variables: the first block included gender, age, and internet use time, and the second block contained one of the variables Q-Single, CIUS, or PIUQ-9.

We estimated the coefficient of determination (Fadaei) of each block; increases in R^2 when including the variables Q-Single, CIUS, or PIUQ-9; and the standardized coefficients (β) of the predictive variables. Prior to the regression analyses, univariate outliers were identified and removed in the variables Q-Single, CIUS, PIUQ-9, PHQ-9, GAD-7, and age.

Ethics

A formal online consent form was required from each participant to tick before starting the survey. Both studies received approval from a bioethics committee and conformed to the principles outlined in the Declaration of Helsinki.

RESULTS

Socio-demographic characteristics and measurement scores of both study samples are provided in Table 1.

The predictive abilities of the Q-Single in identifying potential PIU were evaluated against the PIUQ-9 (cut-off ≥ 29) and CIUS (cut-off ≥ 24). When using the PIUQ-9 as a reference, the Q-Single showed high specificity (97.0%) and NPV (91.5%), indicating strong ability to identify cases without PIU correctly. However, sensitivity (46.2%) and PPV (72.0%) of the Q-Single were limited. Conversely, when CIUS was used as a reference point, the Q-Single showed excellent sensitivity (89.6%) and NPV (96.5%) although its specificity (64.7%) and PPV (36.3%) were moderate, showing higher likelihood of false positives.

Block-wise multiple linear regression analyses showed that Q-Single was moderately-to-strongly associated with CIUS and PIUQ-9 when controlling for gender, age, and

internet use time (Fig. 1). The predictive value of Q-Single on CIUS and PIUQ-9 (problematic internet use) was very similar ($\beta = 0.481$ and $\beta = 0.484$, accordingly). The linear regression model that included Q-Single had moderate determination coefficients ($R^2 = 0.227$ and 0.313 , accordingly) and showed that Q-Single explained up to 23% of CIUS and 31% of PIUQ-9 variability (added predictive power in supplementary Table S1 and Table S2).

As shown in Fig. 2, the predictive effect of Q-Single, PIUQ-9, and CIUS on PHQ-9 (depressive symptoms) was very similar (β 's range = 0.340 – 0.425 ; p 's < 0.001). Linear regression models indicated that Q-Single, PIUQ-9, and CIUS explained up to 17.8% of PHQ-9 variability ($R^2 = 0.143$ – 0.178).

Similarly, the predictive effect of Q-Single was as good as PIUQ-9 and CIUS on GAD-7 (anxiety symptoms) (β 's range = 0.238 – 0.304 , p 's < 0.001) (Fig. 3). The linear regression models indicated that Q-Single, PIUQ-9, and CIUS explained up to 13.1% of GAD-7 variability ($R^2 = 0.062$ – 0.131). (added predictive power in supplementary Table S1 and Table S2).

Table 1. Sociodemographic characteristics of the study participants (N = 796)

		Study 1 (N = 524)		Study 2 (N = 272)	
		Frequency	%	Frequency	%
Gender	Male	112	21.4	45	16.5
	Female	412	78.6	227	83.5
	Other	0	0	0	0
	Total	524	100	272	100
Q-Single	No	428	81.7	233	85.7
	Yes	96	18.3	39	14.3
	Total	524	100	272	100
		Mean (SD)	Min-max	Mean (SD)	Min-max
Age		23.7 (3.1)	18–40	26.8 (9.3)	18–65
Internet use time, IUT		4.9 (2.6)	0–15	–	–
Compulsive internet use, CIUS		22.1 (10.5)	0–50	–	–
Problematic internet use, PIUQ-9		–	–	18.4 (6.9)	9–40
Depressive symptoms, PHQ-9		9.1 (5.7)	0–27	7.7 (5.2)	0–27
Anxiety symptoms, GAD-7		7.4 (5.1)	0–21	4.9 (3.5)	0–14

SD – standard deviation; min – minimal value; max – maximal value.
 Q-Single – a single question “Has the use of the Internet significantly impaired your normal daily activities and/or relationships with those around you”; IUT – internet use time, hours/day (Weinstein, Yaacov, Manning, Danon, & Weizman, 2015); CIUS – the Compulsive Internet Use Scale; PIUQ-9 – the nine-item Problematic Internet Use Questionnaire; PHQ-9 – the nine-item Patient Health Questionnaire, depression module; GAD-7 – the seven-item Generalized Anxiety Disorder scale.

DISCUSSION

The objective of this study was to investigate whether Q-Single could serve as a screening tool to indicate the potential absence of PIU, given the lack of functional impairment. We have also evaluated the association of the Q-Single question with more complex PIU measures. To further validate the single-question instrument, its associations with depression and anxiety symptoms were compared to the associations of more complex instruments (CIUS and PIUQ-9) with the same mental health variables in a population of students.

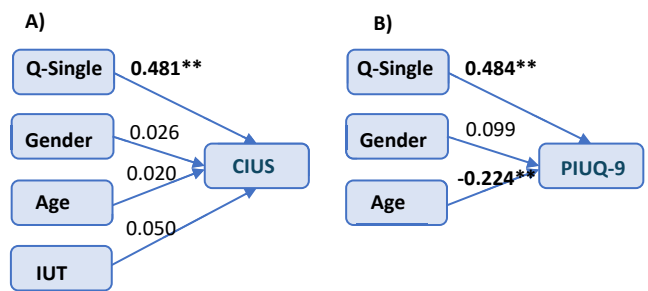


Fig. 1. Schematic diagram of Q-Single's effects on problematic internet use (CIUS and PIUQ-9)
 A) Q-Single's effect on CIUS (Study 1, full data in supplementary Table S1); B) Q-Single's effect on PIUQ-9 (Study 2, full data in supplementary Table S2);
 ** $p < 0.001$, * $p < 0.05$

Q-Single – a single question “Has the use of the Internet significantly impaired your normal daily activities and/or relationships with those around you”; IUT – internet use time; CIUS – the Compulsive Internet Use Scale; PIUQ-9 – the nine-item Problematic Internet Use Questionnaire; Gender – 0-male, 1-female.

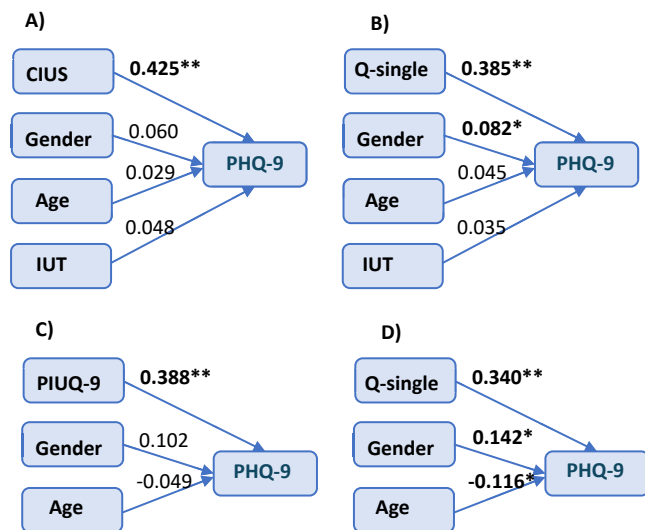


Fig. 2. Schematic diagram of CIUS, Q-Single, and PIUQ-9 effects on depressive symptoms

A) CIUS's effect on PHQ-9 (Study 1, full data in [supplementary Table S1](#)); B) Q-Single's effect on PHQ-9 (Study 1, full data in [supplementary Table S1](#)); C) PIUQ-9's effect on PHQ-9 (Study 2, full data in [supplementary Table S2](#)); D) Q-Single's effect on PHQ-9 (Study 2, full data in [supplementary Table S2](#));

** $p < 0.001$, * $p < 0.05$

CIUS – the Compulsive Internet Use Scale; Q-Single – a single question “Has the use of the Internet significantly impaired your normal daily activities and/or relationships with those around you”; IUT – internet use time; PHQ-9 – the nine-item Patient Health Questionnaire, depression module; PIUQ-9 – the nine-item Problematic Internet Use Questionnaire; Gender – 0-male, 1-female.

Our study findings support the utility of the Q-Single as a practical and partially efficient screening tool for PIU. As hypothesized, the Q-Single demonstrated a high NPV, indicating effectiveness in screening the absence of PIU (through the lack of functional impairment). Functional impairment is an important and defining feature of all mental disorders. DSM-5 diagnostic criteria for various spectrum disorders specify that symptoms must have a clinically significant impact on an individual's functioning in social, occupational, or other important domains of functioning (Hantke, Etkin, & Ohara, 2020). PIU is known as the use of the Internet which leads to physical, psychological, and social impairment (Kożybska et al., 2022). However, the instruments' utility as a standalone diagnostic tool might be limited due to variations in sensitivity and specificity depending on the reference measure (in our study, we have chosen PIUQ-9 and CIUS). Complementary measures may enhance its practical application in diverse settings. Also, Likert type scale, instead of dichotomous yes/no answer, might have provided the degree of function impairment, which would have resulted in better sensitivity and specificity characteristics of the Q-single.

However, when testing our second hypothesis, we found that the Q-Single measure comprising a “functional impairment due to PIU” question quite well-captured the essence of what is reflected in the PIUQ-9 and the CIUS.

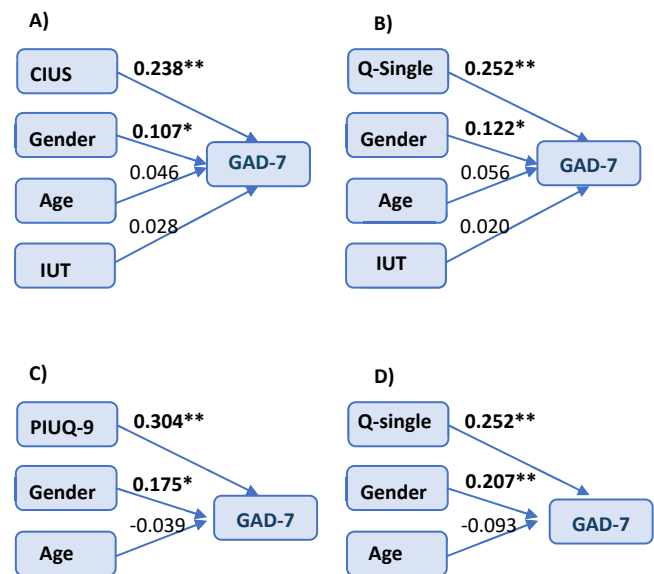


Fig. 3. Schematic diagram of CIUS, Q-Single, and PIUQ-9 effects on anxiety symptoms

A) CIUS's effect on GAD-7 (Study 1, full data in [supplementary Table S1](#)); B) Q-Single's effect on GAD-7 (Study 1, full data in [supplementary Table S1](#)); C) PIUQ-9's effect on GAD-7 (Study 2, full data in [supplementary Table S2](#)); D) Q-Single's effect on GAD-7 (Study 2, full data in [supplementary Table S2](#));

** $p < 0.001$, * $p < 0.05$

Q-Single – a single question “Has the use of the Internet significantly impaired your normal daily activities and/or relationships with those around you”; PIUQ-9 – the nine-item Problematic Internet Use Questionnaire; IUT – internet use time; GAD-7 – the seven-item Generalized Anxiety Disorder scale; Gender – 0-male, 1-female.

Furthermore, the examination of the third hypothesis showed that the Q-Single was associated with anxiety and depression symptoms similarly to how anxiety and depression symptoms were associated with the PIUQ-9 and the CIUS, and the strength of these associations was also in line with previous research (Egle Milasauskiene et al., 2021; Gecaite-Stonciene et al., 2021). Moreover, our findings were supported by evidence from other comprehensive studies that demonstrated the link between PIU and depression/anxiety symptoms (Gupta et al., 2021; Nikolic et al., 2023; Sayed, Naiim, Aboelsaad, & Ibrahim, 2022).

The Q-Single assessment tool is a short screening instrument that provides a broad profile of the respondent. As a short screening test, the Q-Single could be used in various contexts. The Q-Single has simple instructions, thus it is easy to administer. Furthermore, it is highly effective in detecting the absence of PIU and is associated with anxiety and depression symptoms.

It is predicted that the number of internet users will increase in the future. Thus, well-tailored assessment tools are essential to managing PIU risk and mental problems related to PIU. Primary care professionals are often on the front line to assess PIU, and the Q-Single can be a handy tool for screening purposes (Wieland, 2015). The early

involvement of health care professionals and the early identification of PIU would ensure not only better individual health but also a targeted distribution of health care efficiency and resources.

Although we are the first to evaluate the predictive value of the Q-Single compared to the CIUS and the PIUQ-9 to predict PIU among students in Lithuania, our study has some limitations. First, the data were self-report and drawn from a convenience sampling of students from Lithuania. Also, data collection might have been influenced by a bias in participant selection, as the distribution of questionnaires occurred exclusively through online platforms. The number of respondents who choose to respond to a survey question may differ from those who choose not to respond. Those who more frequently use the Internet are potentially more inclined to complete an online questionnaire and are perhaps more likely to experience PIU. Also, gender differences – where females were significantly overrepresented in both studies 1 and 2 – may have affected the observed rates of depression and anxiety symptoms.

Moreover, the Q-single question may not be sufficiently open. We also acknowledge that it emphasizes negative consequences (i.e., significant impairment of normal daily activities and/or relationships) and was given to participants after they had completed PIUQ-9 and CIUS questionnaires. Thus, this phrasing might create negative expectations for respondents and influence them to be more aware of negative PIU experiences after completing other scales asking about PIU symptomatology. This might potentially affect our findings on the moderate association with depression and anxiety symptoms. Also, the Q-single question has no time frame of reference, which may lead to measurement errors, as the answer might vary depending on how problematic internet use is during a particular period (e.g., a week or several months). Adding a time frame could improve the specificity of the instrument. For example, a respondent who perceives that their internet usage has disrupted their life for a week may provide a different response than one who identifies this disruption over a longer duration, such as several months.

Additionally, this study was conducted during the COVID-19 pandemic. Increases in depression and anxiety symptoms might have been partially related to the COVID-19 situation.

Finally, our cross-sectional study design makes it impossible to establish cause-and-effect and temporal relationships.

However, the sample size and comprehensive statistical analysis are the main strengths of this study. While our results are promising, they could be tested in larger and more diverse samples, such as adolescents and older adults, in future studies conducted during the post-pandemic period.

CONCLUSIONS

A single question pertaining to “function impairment due to PIU” well-predicted absence of PIU (problematic internet use) in students. In surveys, a single question/item on

functioning impairment due to PIU could be recommended as the Q-Single effectively predicted absence of PIU as assessed by more complex instruments (PIUQ-9, CIUS) and its association with depression and anxiety symptoms was also comparable to the associations reported with those other instruments in this study. However, in the current line of evidence in this work, we would recommend the use of Q-Single as a complementary measure along more comprehensive scales.

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Conflict of interest: JGS serves as a consultant at FACITtrans. In the past several years JB has been serving as a consultant to IQVIA. VS reported being a consultant to Signant Health and received personal fees from Lundbeck, Sanofi, Servier, Johnson & Johnson, KRKA, and grants from the Research Council of Lithuania. ZD is the Editor-in-Chief of the Journal of Behavioral Addictions. The rest of the authors declare no commercial or financial relationships that could be construed as a potential conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary data to this article can be found online at <https://doi.org/10.1556/2006.2025.00029>.

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