



Establishing Academic Burnout's Relationship with Problematic Internet Use and Specific Health-Risk Behaviours: A Cross-sectional Study of Finnish Higher Education Students

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Abstract

Problematic Internet use is recognised as an emerging public health issue, particularly among young adults. Yet, there is scarce information on problematic Internet use as a predictor for academic burnout. This study aimed to identify academic burnout's association with both problematic Internet use and specific health-risk behaviour among higher education students. We analysed the population-based cross-sectional survey data (with post-stratification weighting) of Finnish higher education students. Data was collected in 2021 ($n = 6258$; age 18–34). Regression analyses were used to investigate academic burnout's relationship with problematic Internet use and health-risk behaviours. The results revealed that female gender, learning difficulties, the use snus (the Swedish-type of moist snuff), problematic Internet use, online shopping, and perceived loneliness were significantly and positively associated with academic burnout. In addition, a higher number of study credits earned, self-perceived good health, and a satisfactory financial level were significantly and inversely associated with academic burnout. The findings suggest that screening students for problematic behaviour and offering support for those in need are likely to be effective at increasing academic well-being among higher education students.

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Due to the COVID-19 pandemic and its restrictions, the Internet emerged as an indispensable tool for studying and communication in higher education. In particular, the conventional mode of learning has undergone a transformation, with traditional face-to-face classroom participation giving way to online platforms. As a consequence, students spend a lot of time online.

Research interest in burnout in academic contexts has increased in recent years. Academic burnout is characterised by a maladaptive response to long-term exposure to stressful events in school settings (Romano et al., 2021; Schaufeli et al., 2002) that occurs among students both in universities and polytechnics (Salmela-Aro & Read, 2017; Salmela-Aro et al., 2009a, 2009b). It occurs when students feel overwhelmed and exhausted without having effective personal resources for facing prolonged stressful events. Overall, the concept includes the following characteristics: exhaustion due to schoolwork, cynicism towards assignments, and a sense of incompetence at school (Dyrbye et al., 2014; Kim et al., 2021).

School burnout assumes that the school context is like a work context and that students face similar pressures and demands as workers. Thus, the most used measure of school burnout was adapted from the Maslach Burnout Inventory (MBI) for workers (see, e.g., Poghosyan et al., 2009). The dimensions originally employed to assess burnout associated with work have been subsequently adapted to investigate study-related burnout. The study conducted by Salmela-Aro et al. (2021) utilised the demands-resources model to examine the experiences of students. According to the authors, if students face higher study-related demands (such as pressure and workload), they are more likely to experience study burnout. In general, the measurements used have been criticised for not providing a global score for academic burnout and ignoring the cognitive aspects of burnout (Romano et al., 2022). Based on prior studies, in the present study, academic *burnout* refers to the student's experience of comprehensive unidimensional schoolwork-related pressure and demands (i.e. overall burnout).

Academic burnout can have adverse effects on students in multiple ways. Consequently, academic burnout may be related to lower academic achievement (Cadime et al., 2016; May et al., 2015), school absenteeism (Seibert et al., 2017), and dropouts (Bask & Salmela-Aro, 2013). Some studies have also found associations between students' academic burnout and poor psychological well-being (including lower life satisfaction (Gerber et al., 2015), suicidal ideation (Dyrbye et al., 2008), problems with sleep (Lehto et al., 2019), and experiencing a depressive mood (Salmela-Aro et al., 2009a, 2009b)). Furthermore, academic burnout may also be a pathway towards academic procrastination, whereupon the student may tend to choose to prioritise insignificant activities or postpone the completion of tasks (Purnomo et al., 2020; Qu et al., 2022). Consequently, the cited studies further support a view of a positive and substantial link between academic burnout and procrastination. In contrast, higher levels of self-efficacy (Rahmati, 2015) and positive coping techniques, such as resilience (Basri et al., 2022), may protect students from academic burnout. Consequently, academic burnout is a multifaceted condition, influenced by several interconnected individual and health-related factors.

A recent review investigated the prevalence of academic burnout among university students ($N=27,940$) across various regions (Kaggwa et al., 2021). According to the study, Africa has the highest burnout rate at 35.4%, followed by Asia at 30.2% and

Europe at 20.7%. In contrast, South America has the lowest burnout rate at 5.9%. The prevalence of academic burnout among Finnish higher education students is reported to be 41.7% ($n=6258$) (Parikka et al., 2021). Furthermore, females appeared to have a higher prevalence compared with males (46.6% [$n=3866$] versus 35.8% [$n=2392$]). This study also shows that academic burnout is more common among students in younger age groups. According to another study conducted in Finland, 23.5% of students ($N=538$) taking life sciences courses at a university in the country experienced symptoms of burnout (Asikainen et al., 2022). There is inconsistency in the findings of studies involving university students regarding the effects of gender (Fiorilli et al., 2022; Obregon et al., 2020). Notwithstanding the importance of burnout among university students, there is a dearth of empirical data that has been systematically collected across different countries using similar methods and instruments. This lack of consistency in data collection poses significant challenges when attempting cross-cultural comparisons.

Previous research has identified numerous factors that could potentially predict academic burnout. One of such factors is the excessive use of the Internet, which has been found to be associated with detrimental health behaviour (Fineberg et al., 2022). The addictive features of the Internet may result in problematic Internet use (PIU) among vulnerable individuals (Fineberg et al., 2022; Griffiths, 1995; Kamolthip et al., 2022). PIU is characterised by repeated and uncontrolled online behaviour that may result in significant harm and functional impairments in an individual's occupational, educational, and social life areas. Furthermore, it has been associated with many negative psychosocial outcomes, including poor social skills, sleep problems, depression (Fineberg et al., 2018; Kuss et al., 2014), and loneliness (Alheneidi et al., 2021). In general, younger individuals (i.e. adolescents and young adults) and men have been considered more vulnerable to PIU. However, all age groups and genders can be susceptible to PIU as everyone can find something interesting in the different available activities on the Internet (e.g. gaming, social networking, gambling, and online buying) (Fineberg et al., 2022).

The overall global average prevalence of PIU has been estimated to be around 7% (Pan et al., 2020). The prevalence rates vary widely between studies, and differences in the reported prevalence estimations of PIU have largely been attributed to methodological and measurement inconsistencies. According to a recent study, the prevalence of PIU among Finnish higher education students is 45% ($n=6258$) based on the Compulsory Internet Use Scale (Parikka et al., 2021). This study also showed that the prevalence of PIU was highest among young female students (52%) aged 18–21 years old, while men of the same age had a prevalence of 45%. Furthermore, females appeared to have a higher prevalence of self-reported social media problems when compared with males (33% versus 18%), which is in line with another recent Finnish study which also reported the same problems to be more predominant among females (Hylkilä et al., 2023).

Numerous studies have been carried out to determine the extent of PIU before and during the COVID-19 pandemic. However, these studies have produced varying results with some indicating an increase in PIU while others suggest no significant change or only a slight increase (Burkauskas et al., 2022; Casale et al., 2023; Gjoneska et al., 2022). These studies considered that the increased usage of the Internet during the pandemic-induced lockdown may be indicative of an adaptive coping mechanism to physical distancing, the need for social support, or mental health issues. Built on the coping framework, the Compensatory Internet Use model posits that negative life situations can motivate one to go online to avoid and inhibit negative emotions (Kardefelt-Winther, 2017). These findings suggest that individuals may have been utilising online platforms to alleviate feelings

of social isolation and to maintain a sense of connection with others during a period of heightened uncertainty and stress.

Traditionally, *health-risk behaviour* has been defined as a set of habits and actions that have the potential to increase the likelihood of developing a disease (i.e. a less healthy lifestyle) or slowing down the process of recovery (Spring et al., 2012). Examples of such behaviour include the consumption of a high-calorie diet, physical inactivity, smoking, and the abuse of substances such as alcohol and illicit drugs. The existing evidence suggests interrelations between individuals' different health-risk behaviours (Spring et al., 2012). Moreover, several studies suggest that PIU is interrelated and influences other forms of health-risk behaviour (Klavina et al., 2021; Kozybska et al., 2022). In general, health-risk behaviour—such as tobacco and nicotine use, excessive alcohol consumption, cannabis use, excessive gambling, and gaming—is more common among young men than young women (Delfabbro et al., 2016; ESPAD Group, 2016; Männikkö et al., 2019). Furthermore, some studies suggest that girls may be more likely to have problematic social media usage (Hylkilä et al., 2023; Vannucci et al., 2020). Consequently, more research is needed in order to shed light on the complex interplay between PIU and other factors affecting health and health-related behaviour.

The impacts of various health-risk behaviours on academic burnout have also been studied. For instance, research has revealed a correlation between academic burnout tendencies and heightened consumption of alcohol and drugs (Andrade et al., 2021), while research on smoke-free tobacco products, such as snus (herein the term *snus* is used [cut tobacco that can be loose or pouched and placed in the mouth]; Ruokolainen et al., 2019), and their impact on academic burnout is limited. Consequently, it has been suggested that certain students may resort to using alcohol or drugs to manage their exhaustion (Andrade et al., 2021; Erschens et al., 2018; Njim et al., 2019). However, the existing literature provides inconclusive evidence on the correlation between health-risk behaviour and academic burnout.

Aside from traditional health-risk behaviour, the connection of academic burnout to PIU has been studied (Cadime et al., 2016; May et al., 2015; Tomaszek & Muchacka-Cymerman, 2020). In regard to different online activities, for instance, higher gambling frequency has been found to be related to signs of school burnout among Finnish adolescents (Räsänen et al., 2015). Furthermore, a study of Chinese university students showed that problematic social media use, envy, and social media use anxiety all predicted burnout (Liu & Ma, 2020). Problematic gaming behaviour is considered a severe form of maladjustment that can significantly harm the academic progress of affected students (Király et al., 2023). In this regard, school-related pressure may induce students to search for ways to alleviate their stress and thus possibly result in escaping into online activities. A longitudinal study conducted on Finnish adolescents found a positive relationship between excessive Internet use and school burnout, suggesting that the two may reinforce each other over time (Salmela-Aro et al., 2017). Consequently, a student with PIU may gradually engage and increase priority online activities that eventually reach a point that makes it difficult to concentrate on academic studies. In this regard, PIU may also shorten the free time and energy for schoolwork (i.e. it may lead to inefficient studying), which, in turn, may result in academic burnout and difficulties in academic performance (Basri et al., 2022). Alternatively, as students recognise their lower performance in their schoolwork, they might seek alternative ways to achieve success and means of self-expression, such as engaging in various Internet activities. Taken together, these findings suggest a potential intercorrelation between PIU and other forms of health-risk behaviour rather than them existing independently. This may result in individuals engaging in less health-protective

behaviour and experiencing negative health outcomes (Klavina et al., 2021; Kozybska et al., 2022), which can further deteriorate academic performance. However, there is a paucity of empirical research on the relationship between PIU, unhealthy behaviour, and academic burnout among higher education students. As such, more research is warranted in order to ascertain the nature and extent of the association between these variables.

Considering the substantial pressure on students during COVID-19, more insight on PIU, health-related behaviour (both protective and negative behaviour), and academic burnout among higher education students is important when addressing how to enhance learning performance and outcomes. The associations between PIU, the use of tobacco and other nicotine products, and the use of psychoactive substances (alcohol, drugs) with academic burnout have been less studied. Consequently, the present study is explorative and driven by the research question of whether academic burnout can be linked to various background factors (self-perceived health, financial situation, completed study credits), PIU, and other health risk behaviour (the use of tobacco and nicotine products, risky alcohol consumption, and drug use). The health-risk behaviours may interrelate and exacerbate one another and, thus, further heighten problems. Therefore, an understanding of the role of PIU with other lifestyles on academic burnout would be useful for developing student-related preventive efforts and procedures for those who may be at a greater risk of harm.

Materials and Methods

Participants and Procedure

The study is based on the Finnish Student Health and Wellbeing Survey, conducted in 2021. The data collection was carried out by the Finnish Institute for Health and Welfare (THL) from February to March 2021, during the third wave of the COVID-19 pandemic. The total sample was 12,034, and the eligible sample (the participants who were at least 18 years old and currently enrolled in a higher education institution located in Finland) was 11,912. Those students without contact information, that is, email addresses, were excluded from the study ($n=122$). The study invitations were emailed to 11,912 undergraduate students aged 18 to 34 who were randomly selected from all Finnish higher education institutions (an overall population of 100,216 in universities and 96,977 in universities of applied sciences students¹).

The invitation to participate in the study was sent to both the students' university email and personal email. The message included a link to the questionnaire, along with a personal ID, password, and instructions for filling out the electronic questionnaire. The message also provided details regarding the purpose, content, and data protection of the study. The survey was available in Finnish, Swedish, and English. The research subjects were contacted by email up to a maximum of three times. Participating in the survey was voluntary.

Of the invitees, 6258 (52.5%) participated. The proportion of men was 38.2%. The weighted average age of the sample was 24.52 years ($SD=3.54$). The response rates varied

¹ A university and a university of applied sciences are separate legal entities in the Finnish education system.

by gender and age, being 60.1% for females and 43.7% for males. For the age groups of 18–21, 22–24, 25–29, and 30–34, the response rates were 59.8%, 54.7%, 47.3%, and 46.2%, respectively.

The invitees were informed about the study protocol in the invitation letter, and they were provided with the privacy notice. Filling in the questionnaire was considered as consent to participate in the study. Participation in the study was voluntary. The study procedure was conducted in accordance with the Declaration of Helsinki, and the survey was approved by the ethics committee of the Finnish Institute for Health and Welfare.

Measures

The School Burnout Inventory (SBI-9) was used to assess students' feelings of exhaustion (e.g. 'I feel overwhelmed by my schoolwork'), a cynical attitude towards the meaning of school (e.g. 'I am not motivated to do my schoolwork and often think of giving up'), and a sense of inadequacy at school (e.g. 'I often have feelings of inadequacy in relation to my schoolwork') (Salmela-Aro et al., 2009a, 2009b). All the items are evaluated on a six-point Likert scale ranging from 1 ('I strongly disagree') to 6 ('I strongly agree'). The scale was originally designed for adolescents, but it has also been used to evaluate academic burnout in university students (Guzmán et al., 2020; Salmela-Aro & Read, 2017; Škodová et al., 2017). With SBI-9, it is possible to use both the three separate scores of the subscales and the total score for the nine items. In the present study, the total score was used wherein a higher score corresponds to a higher severity of academic burnout. The Cronbach's alpha for the full scale, which we use in our analyses, was 0.897.

We assessed PIU using a short version of the Compulsive Internet Use Scale (CIUS-5) which comprises five items (e.g. 'Do others [e.g. your partner, children, parents] say you should use the Internet less?'; 'Are you short of sleep because of the Internet?'), rated from 0 ('never') to 4 ('very often') (Lopez-Fernandez et al., 2019). The scores of the scale range from 0 to 20, with higher scores corresponding to a higher severity of PIU. The original version of the Compulsive Internet Use Scale (CIUS) has demonstrated adequate factorial, content, and concurrent validity and good reliability (Meerkerk et al., 2009). CIUS-5 has previously been validated in the Finnish language (Lopez-Fernandez et al., 2019). The Cronbach's alpha for CIUS-5 in the present study was 0.783.

Risky alcohol consumption was evaluated using the Alcohol Use Disorder Identification Test (AUDIT) scale (Bush et al., 1998). AUDIT is a tool that helps identify patients who consume alcohol in ways that could be harmful to their health. The World Health Organization has extensively tested AUDIT as a screening tool in primary healthcare, making it the most widely used instrument for this purpose (Babor & Robaina, 2016). It has been widely used in Finland (e.g. Kaarne et al., 2010). AUDIT-C contains the three first AUDIT items (e.g. 'How often did you have a drink containing alcohol in the past year?') measuring the frequency and volume of alcohol consumption (scored from 0 to 4 for each item) for the past year, where the overall scores range from 0 to 12. A dichotomous version of the scale was used based on the current recommendations for risky alcohol consumption among males (score ≥ 6) and females (score ≥ 5) (Kaarne et al., 2010).

The participants reported on their sociodemographic and background characteristics, including their gender (male/female), age (numerical), general health ('How is your current health?' with answer options ranging from 1 ['Good'] to 5 ['Bad']), financial situation ('How did you manage financially during the past 12 months?' with answers categorised as follows: 1 'Very well'; 2 'Well'; 3 'I managed, but I had to live sparingly'; 4 'My income

was low and uncertain'), self-perceived loneliness ('Do you feel lonely?' with the answer options ranging from 1 ['Never'] to 5 ['All the time']), study sector (the answers were categorised as: university/university of applied sciences), and study credits earned (the answer options were categorised as: 1 [0 credits]; 2 [1–10 credits]; 3 [11–20 credits]; 4 [21–30 credits]; 5 [31+ credits]).

The participants were asked to indicate their current cigarette smoking status and snus use (the answer options ranged from 1 ['Not at all'] to 5 ['Daily']), weekly gambling ('How often have you gambled in the last 12 months?' with the answer options ranging from 1 ['Less often than monthly'] to 4 ['Almost daily']), and drug use ('Have you used the drug at least once in the last 12 months?' with the answers being categorised as 'No' or 'Yes' and involving the following list of substances: cannabis, ecstasy, amphetamine/methamphetamine, cocaine, drugs and alcohol used together, drugs to intoxicate). All lifestyle behaviour characteristics were dummy coded as 'Yes' or 'No'.

Finally, the participants were also asked (using dichotomous *yes/no* questions) whether they thought their gambling behaviour posed a problem for them and whether they felt they had a problem with using social media, gaming, Internet porn, or online shopping.

Statistical Analysis

All analyses were conducted using the R platform for statistical computing (v. 4.2.1, R Core Team). The post-stratification weights were used in the analyses to restore the representativeness of the data. The calculation of weights was based on the inverse probability weighting (IPW) method (Härkänen et al., 2014). In IPW, the participation probability is modelled using logistic regression and the inverse of the modelled probability is used for weighting. This allows one to calculate participant-wise analysis weights. In this study, the weights were calculated using register-based information for the entire sample on age, gender, native language, higher education sector (university/university of applied sciences), and the number of credits obtained in the previous semester. The IPW method has been used in several survey studies and has been found to be suitable for correcting non-response rates in the Finnish population (Härkänen et al., 2014, Parikka et al., 2022).

We used a (post-stratification) survey-weighted ordinary least-squares multiple regression with heteroscedasticity-robust (Huber-White) standard errors in the *survey* package in R (Lumley, 2004; 2020) and with SBI-9 (academic burnout) scores as the dependent variable. The independent variables were gender, learning difficulties, smoking, using snus, using drugs, problem gambling, weekly gambling, problematic alcohol use, study credits earned, CIUS-5, study sector, and problematic use of (i) social media; (ii) gaming; (iii) Internet porn; and (iv) online shopping, loneliness, income, and current health (see above for the variables' details). For exploratory analyses, we also modelled the interactions between gender and the other variables. Only the interaction between age and gender was statistically significant and was thus left in the final model. We further calculated Pearson correlations between all the measured variables (point-biserial correlations were calculated for dichotomous variables).

The fitted multiple regression model satisfied the assumptions of linearity. Q-Q plots indicated that the model residuals were normally distributed and homoscedastic. The variance inflation factor values ranged between 1.02 and 2.72, suggesting that there were no issues of multicollinearity. Missing values across all variables (21.3% in total) were omitted listwise.

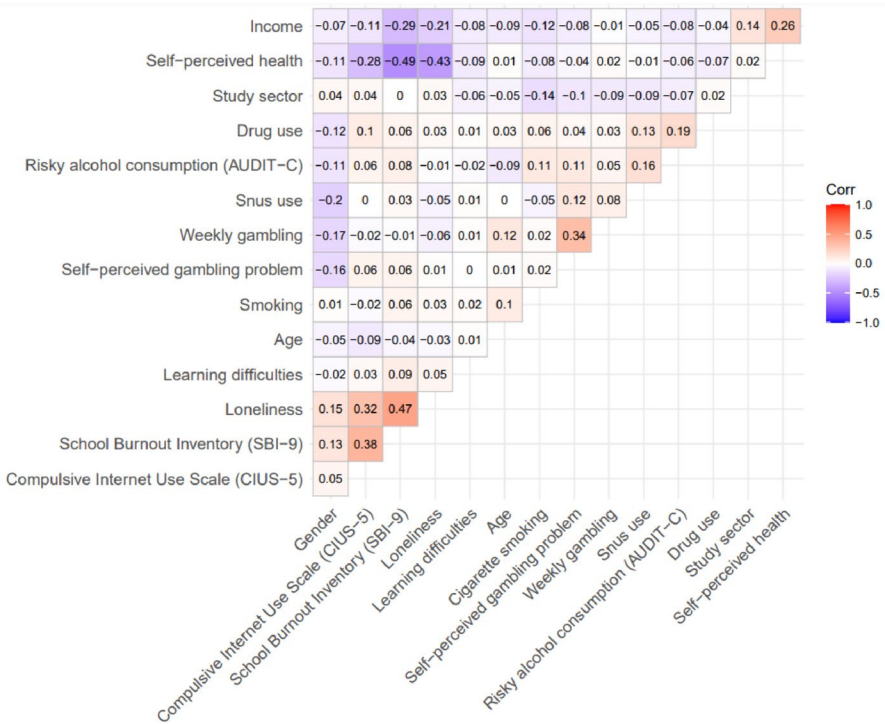
Table 1 A multiple regression model with school burnout inventory (SBI-9) scores as the dependent variable

Variable	Slope estimate	SE	<i>t</i> -value
Intercept	3.38	0.12	29.27
Age (standardised)	0.031	0.022	1.383
<i>Gender (ref.: male)</i>	0.162	0.030	5.304***
<i>Age * gender</i>	-0.123	0.028	-4.290***
Credits 1–10	0.058	0.054	1.087
Credits 11–20	-0.041	0.048	-0.861
<i>Credits 21–30</i>	-0.109	0.048	-2.275*
<i>Credits > 31</i>	-0.116	0.054	-2.144*
<i>Learning difficulties (ref.: 'no')</i>	0.131	0.043	3.023**
Smoke (ref.: 'no')	0.104	0.070	1.475
<i>Snus (ref.: 'no')</i>	0.150	0.058	2.568*
<i>Alcohol (ref.: 'no')</i>	0.086	0.030	2.824**
Drug (ref.: 'no')	-0.010	0.041	-0.243
<i>PIU (CIUS5)</i>	0.282	0.022	12.796***
Social media (ref.: 'no')	-0.047	0.035	-1.343
Digital gaming (ref.: 'no')	0.049	0.056	0.878
Online porn (ref.: 'no')	0.015	0.069	0.217
<i>Online shopping (ref.: 'no')</i>	0.190	0.070	2.712**
Gambling problem (ref.: 'no')	0.146	0.075	1.941
Gambling weekly (ref.: 'no')	0.035	0.061	0.579
<i>Loneliness</i>	0.289	0.016	17.863***
<i>Current health</i>	-0.299	0.016	-18.511***
<i>Income</i>	-0.177	0.016	-10.598***

Note. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Slope estimates are unstandardized *B*-values, except for age, which is standardised for ease of visualising interactions (see Fig. 2). Statistically significant associations are italicised and in bold

Results

We found that (female) gender ($B = 0.162$, $t = 5.3$, $p < 0.001$), perceived learning difficulties ($B = 0.131$, $t = 3.02$, $p < 0.01$), snus use ($B = 0.15$, $t = 2.56$, $p < 0.05$), PIU ($B = 0.282$, $t = 12.79$, $p < 0.001$), online shopping ($B = 0.19$, $t = 2.71$, $p < 0.01$), and perceived loneliness ($B = 0.289$, $t = 17.86$, $p < 0.001$) were significantly and positively associated with study burnout. In addition, a higher number of study credits earned (21–30 credits vs. 0 credits: $B = -0.109$, $t = -2.27$, $p < 0.05$; more than 31 credits vs. 0 credits: $B = -0.116$, $t = -2.14$, $p < 0.05$), self-perceived good health ($B = -0.299$, $t = -18.51$, $p < 0.001$), and a satisfactory level of income ($B = -0.177$, $t = -10.49$, $p < 0.001$) were significantly and inversely associated with experiencing study burnout. The model-adjusted r^2 was 0.39 ($p < 0.001$; see Table 1 for details). Figure 1 depicts the Pearson correlations across the measured variables as a correlogram, with statistically significant ($p < 0.01$) correlations coloured. The most notable ($r > 0.3$) statistically significant correlations were between self-perceived health and SBI-9 ($r = -0.49$, $p < 0.001$) as well as loneliness ($r = -0.43$, $p < 0.001$), weekly gambling and gambling



Note. Pearson correlations between all the measured variables. Statistically significant ($p < .05$) correlations are coloured

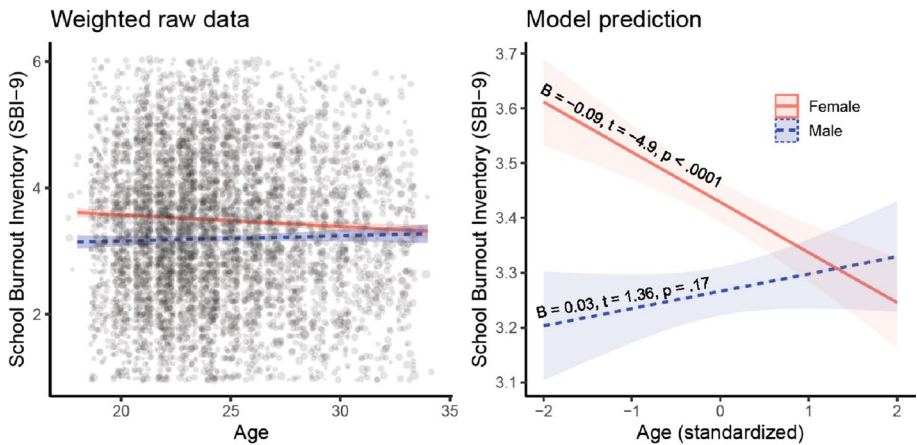
Fig. 1 Pearson correlations among the measured variables

problems ($r=0.34, p < 0.001$), loneliness and CIUS-5 ($r=0.32, p < 0.001$) and SBI-9 ($r=0.47, p < 0.001$), and SBI-9 and CIUS-5 ($r=0.38, p < 0.001$).

As can be seen in Fig. 2, there was significant interaction between age and gender—women with a higher age experienced lower levels of academic burnout—but it was not significant for men (the simple slopes effect of age on study burnout for females: $B = -0.09, t = -4.9, p < 0.0001$; the simple slopes effect of age on study burnout for males: $B = 0.03, t = 1.36, p = 0.17$).

Discussion

The aim of the study was to investigate associations between the levels of study burnout among Finnish academic students and their PIU and health risk behaviour. It was found that female gender, learning difficulties, the use of snus, risky alcohol consumption, PIU, online shopping, and loneliness were significantly and positively associated with the study burnout levels during the COVID-19 pandemic. In contrast, it appeared that health-interrelated clusters—including gaining higher study credits, self-perceived good health, and a satisfactory financial situation—seemed to be inversely related to study burnout levels in the Finnish academic students. Currently, there is only scarce information about



Note. Left: The association between age and School Burnout Inventory (SBI-9) scores. Weighted raw jittered datapoints and (non-adjusted) linear model fits are shown for female and male respondents. Right: The association between standardised age and SBI-9 scores, presented separately for female and male respondents and adjusted for all control variables with coloured 95% confidence bands

Fig. 2 The association between age and School Burnout Inventory (SBI-9) scores, presented separately for female and male respondents

PIU-related academic study burnout in Finland, and the findings of the present study provide new insight into the well-being of Finnish academic students.

The present study revealed that female gender, PIU, and online shopping were significantly and positively associated with the study burnout levels. Furthermore, it was previously reported from the same study that the higher degree of study burnout was particularly relevant among younger females (emerging adults) (Parikka et al., 2021). These results are consistent with previous research that has reported that problematic gaming and gambling are recognised to be predominant among males, whereas females are more at risk of experiencing problems with social media use and online shopping (Castrén et al., 2022; Hylkilä et al., 2023; Karlsson et al., 2019; Müller et al., 2019; Nogueira-López et al., 2023). Previous studies have also shown that individuals who favour online shopping are younger compared with those that favour in-store shopping (Augsburger et al., 2020). Additionally, it was found in the same study that a low level of education (it was categorised into three levels of education: low, middle, and high) was associated with addictive online shopping, while a medium level of education was related to risky online shopping. However, it is worth noting that gender-specific differences in problematic online shopping have not been consistently identified in representative population-based studies (Maraz et al., 2016). Further consideration concerns the influence of the COVID-19 pandemic and its related restrictions that probably led to a rise in online shopping (Georgiadou et al., 2021).

The current study indicates that younger females are more likely to experience higher levels of academic burnout. For male participants, academic burnout was not significantly related to age but showed a slight increasing trend among older individuals. In addition, students with a higher number of study credits (a level of study at least 21 credits) experienced significantly lower levels of academic burnout. Prior research on the correlation between gender and academic burnout has shown inconsistent findings (Fiorilli et al., 2022; Obregon et al., 2020). In regard to this, there is uncertainty concerning the direction of the relationship between academic burnout and lower study

credits, and whether other factors might explain this connection. According to recent reports from Finland, nearly half of the university students in the country believe that the amount of work required for their studies has increased during the COVID-19 pandemic (Parikka et al., 2021). The study found that, in particular, female students between the ages of 18 and 22 studying at a university and those aged 18 to 26 and studying at a university of applied sciences both reported an increase in their study load. Thus, the findings may further reflect variations in achievement expectations and performance pressure, where females may display more intense self-evaluation in terms of achievement. For instance, a study conducted by Salmela-Aro and Tynkkyinen (2012) revealed that females pursuing academic tracks were more prone to experiencing academic burnout and feelings of inadequacy compared with males pursuing the same track or students on vocational tracks. This could be due to higher academic demands, internalised stress and lower self-efficacy. Against the above-mentioned findings, it is worth noting that some internal coping strategies, such as problem-solving and seeking social support, may protect against the development of academic burnout (Simonsen et al., 2023). Consequently, the disparity (and the impacts in general) between genders may be influenced by complex interactions of internal factors (i.e. biological, psychological, physiological, and emotional factors) and external factors (i.e. social, physical, cultural, environmental factors) (Stentiford et al., 2023).

Cross-directional associations were found between self-perceived loneliness and academic burnout (or learning difficulties), which was line with the previous findings (Dopmeijer et al., 2022; Gradiski et al., 2022; Jaishankar et al., 2021; Singh et al., 2020). Loneliness has been identified as a significant factor affecting the mental distress and overall well-being of students (McIntyre et al., 2018). According to Mizani et al. (2022), students who study remotely may experience loneliness, especially if they remain less connected to their academic peers. This lack of social connectedness and belonging can lead to negative consequences, including academic burnout (Dopmeijer et al., 2022). Initial results from a study conducted on higher education students in Finland have revealed that individuals living alone experience heightened levels of loneliness compared with those who share living arrangements with family members (Parikka et al., 2021). On the other hand, according to a recent study among university students in the UK, residential students reported higher levels of loneliness and stress than commuter students who often lived in family homes (Brett et al., 2023). However, the classroom environment and satisfaction with the relationships with classmates and teachers (i.e. the school-context relationships) may decrease the risk of academic burnout (Romano et al., 2021).

Prior research has also shown that loneliness can have a significant and positive direct or indirect influence on PIU (Gazo et al., 2020; Mozafar Saadati et al., 2021; Sharifpoor et al., 2017). Consequently, the effects of PIU on loneliness could also be influenced by shyness (Huan et al., 2014), social anxiety (Wang et al., 2019), interpersonal problems (i.e. a lack of social support) (He et al., 2014), low self-esteem (Santini et al., 2021), and depression (Kim et al., 2017). Additionally, other interpersonal problems (e.g. socially inhibition) were found to be significantly related to loneliness (Simcharoen et al., 2018; Wongpakaran et al., 2021). Overall, some research has provided evidence for a psychological process of addictive behaviour (referring to the Interaction of Person–Affect–Cognition–Execution [I-PACE] model; Brand et al., 2019), and thus, some potential interplay between PIU, loneliness and study burnout may similarly appear. For example, the perception of internal loneliness (or general distress or symptoms of depression; Hernández et al., 2022) and the motive to avoid social interaction may induce the urge to browse websites (e.g. shopping sites, using social media) as a coping method, and this may lead to harm. Further research

is required to better understand the factors contributing to loneliness among students and develop effective interventions to address this issue.

In the present study, it was also found that snus use was associated with study burnout levels, which to our knowledge can be considered to scarcely be addressed in prior studies. While the prevalence of smoking has shown a decreasing trend in developed countries recently, alternative nicotine products have entered the market. In general, snus use is the most common alternative among young males, and the popularity of snus use has also increased among females in Finland and Sweden (Finnish Institute for Health and Welfare, 2023; Leon et al., 2016). Studies specifically investigating the association between snus use and study performance or burnout are virtually non-existent. Furthermore, previous studies on relationships between alternative nicotine products or smokeless tobacco products and mental health have also remained scarce, and contrasting findings have been reported (Engström et al., 2010; Raffetti et al., 2019; Tjora et al., 2023).

The current study found that health-related positive determinants—including the number of study credits, self-perceived good health, and a satisfactory financial level—were significantly and inversely related to the study burnout levels. On the contrary, our finding on risky alcohol consumption was in line with previous studies (El Ansari et al., 2013; Joseph Onyebuchukwu, 2015; Páramo et al., 2020; Vargas-Ramos et al., 2022) that found that such consumption significantly correlated to a higher level of student burnout. These results partly relate to the salutogenic approach (Antonovsky, 1996), in which positive health-supporting factors are related to students' ability to cope and maintain their health in the face of academic challenges (Brett et al., 2023). The model of student well-being proposed by Brett et al. (2023) stated that students' perceived stress levels (e.g. school-related stress levels) strongly influence how they rate their well-being. Additionally, according to this model, students' well-being is influenced by a combination of psychological resources, circumstances, and perceived stress.

Against the above-described underlying mechanism and the prevention of student burnout, the importance of social connectedness in regard to positive mental health outcomes among academic students has been recognised earlier (Perkins et al., 2021; Shochet et al., 2010). Prior reviews reveal that relational factors in school (such as supportive teachers and peer relationships or an experience of belongingness/connectedness to others and the school community) are related to better mental health (Kidger et al., 2012; McLaughlin & Clarke, 2010). Consequently, a sense of school connectedness can reduce experiences of loneliness and support mental health (Benner et al., 2017; Santini et al., 2021). Although good peer relationships and social bonds can be strongly linked to school connectedness and the school context, they can also be related to aspects outside the school setting. According to human nature and the need for social connections (Cacioppo & Patrick, 2008; Goossens, 2018), an individual has a high desire and need to be connected to others, and when this desire is averted, the individual experiences loneliness. These findings support the importance of social connectedness, especially in the context of remote learning, as was seen in the COVID-19 period.

The present study also has some limitations. First, the study included higher education students in Finland; thus, the replication of the study in another cultural context is required for wider international generalisability. Second, not all possible PIU factors (e.g. content preferences, time used, time periods in daily use, and money use for Internet activities), personal factors (e.g. leisure-time physical activity, self-efficacy, and coping strategies), education system factors (e.g. the teaching environment, studying motives, demands, and strategies), and relational factors were included in the study,

which may be linked to the academic students' experiences of burnout. Consequently, other study-related measures (for instance, study satisfaction, the scope of action, and the academic workload) might have provided further insights into factors linked to academic burnout (see, e.g., Olson et al., 2023). Furthermore, there have been some criticisms of the assessment methods of academic burnout (e.g. it neglects the cognitive aspects of burnout and focuses on emotional exhaustion) that further indicate the need for further development (Romano et al., 2022). Accordingly, future research should focus on a more fine-grained analysis of protective and risk factor modalities concerning academic burnout. Furthermore, separate analyses based on the specific subtype of PIU (e.g. social networking sites, cybersex) could give more insights regarding the different nature of problems among users. Finally, self-report measures were used in the study that may increase the probability of a social desirability bias. In certain instances, the health-risk behaviour assessments relied on a singular question item that may lead to potential inaccuracies in the results.

The present study highlights the importance of relational PIU and health factors among academic students from the perspective of study burnout prevention. Based on the findings of the present study, it could be argued that PIU and some health-related problems undermine an individual's coping strengths and resources, whereas salutogenic-based tendencies (such as a higher degree of health, study credits, and a perceived satisfactory financial situation) facilitate the necessary coping capabilities in relation to study performance. Various health problems may interact or reinforce each other over time, and this may inversely affect healthy trajectories, functioning, and learning outcomes. The results imply that fostering health determinants with social connectedness would promote overall school satisfaction and learning outcomes (e.g. prevent study burnout) among academic students. Addressing academic students' positive health factors is vital for preventing study burnout. These findings provide useful information and highlight the importance of the early detection of possible PIU. It is of utmost importance to include preventive efforts that take learning difficulties, gender-specific aspects and PIU into consideration in academic counselling practices. This should be done by including elements (e.g., communication skills, problem-solving approaches) that strengthen and support health and its related behaviour.

Taken together, to mitigate the risk of burnout among students, it is essential to implement preventive measures that centre around offering comprehensive support services, identifying and intervening early for students deemed vulnerable, enhancing study skills, and promoting a keen sense of interest and engagement in learning. These strategies will aid in the development of a conducive and supportive environment that fosters optimal academic performance and enhances overall student well-being. By doing so, educational institutions can effectively promote a culture of lifelong learning and contribute to the success of their students.

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Data Availability Due to data protection reasons personal data cannot be publicly available. The data controller is Finnish Institute for Health and Welfare. Access to confidential data requires permission to handle the data, signed non-disclosure agreement as well as collaboration agreement with Finnish Institute for Health and Welfare. For more information, please contact: kott-info@thl.fi.

Declarations

Ethics Approval The study procedure was conducted in accordance with the Declaration of Helsinki.

Informed Consent All participants provided informed consent, and participation was voluntary.

Conflict of Interest The authors declare no competing interests.

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