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The association between depression and cannabis use with technology multitasking among Finnish university students – a pilot study

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Abstract

Multitasking with technology – the simultaneous use of two or more media devices – has increased in recent years. However, to date, little research has been done on the subject, and it is therefore important to gain more information on its effects. The aim of this preliminary study was to examine associations between technology multitasking, depression symptoms and cannabis use among Finnish university students; background factors which affect technology multitasking were also considered.

The study was a cross-sectional study. Participants were Finnish university students (n = 260) and the data were gathered through a survey. The data were analyzed using descriptive statistics, independent t-test, correlation coefficient and linear regression analysis.

The results demonstrated that specific background variables are associated with technology multitasking, whereas there was no significant association between depression symptoms and cannabis use with technology multitasking. It transpired that female gender, age and daily mobile phone use related significantly to technology multitasking.

The study identified certain background factors which affect technology multitasking; technology multitasking was more common among girls and younger participants. There were no significant associations between technology multitasking and depression symptoms or cannabis use, but the results should be interpreted with caution due to the small study population. Instead, higher daily internet use was significantly associated with increased depression symptoms. Technology multitasking is a very recent subject for research, so it is important to improve our knowledge and gain new insights. The results can be used to design various health promotion projects, and multiple actors such as municipalities or organizations can use the data to e.g., plan targeted interventions.

Keywords: technology, cannabis, depression, students, internet use

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Introduction

Mobile devices have dramatically increased the use of technology and internet because they enable usage anywhere and anytime [1]. In 2021, 93% of Finns aged 1 to 89 were Internet users, and 82% used the Internet several times a day [2]. For young people particularly, the Internet has become an integral part of their lifestyle: social interaction is becoming more technology-oriented [3], and people might prefer to communicate via social media, for example, rather than meeting people face to face [4]. Kunttu et al. [5] found that Internet use has become more common among university students, and in 2021, every tenth of the students reported that their sleep has reduced due to using the Internet [6]. Furthermore, 27% of male students and 24% of female students find that Internet use disrupts studying [5].

Technology multitasking, which more precisely means the simultaneous use of two or more media devices, has increased significantly and has become particularly popular with young people [7]. It can mean, for example, listening to music and simultaneously reading news on the Internet [8]. The rate of technology multitasking has doubled in ten years: in 1999, young people reported that 16% of their time in a day was spent on technology multitasking, whereas ten years later one-third of the day was spent on technology multitasking [9]. According to an earlier survey, people spent 25-50 % of their time using technology simultaneously [9], and the number has increased ever since [10].

This increase of technology multitasking has raised concerns about the cognitive development of young people [7]. Some studies have shown that technology multitasking adversely influences levels of concentration and is associated with a higher risk of disruption [7,8]. Among young people, lack of concentration appears to show itself as difficulty in focusing on one thing at a time and young people who lack concentration get easily bored [7]. Technology multitasking frequency has been found to have an impact on response inhibition [11] and impairment of response inhibition predicts various behavioral and impulse-control outcomes such as problematic internet use, alcohol and substance use (e.g., cannabis) [12]. Earlier study results suggest that there might be a correlation between the co-occurrence of behaviour addictions, mental health problems and substance use disorders [13]. For example, individuals who have alcohol disorder with co-occurring behavioral addiction report higher impulsivity [14]. On the other hand, people with problematic internet use [15] are more likely to be associated with substance use and psychosocial problems [16]. Regular substance users have also reported higher mean scores in different kinds of behavioral addiction scales, and there seems to be an overlap between substance use and addictive behaviors (e.g., problematic internet use, problematic gaming) [14].

Earlier studies have indicated that technology multitasking may pose a threat to people's mental health. Associations have been found between technology multitasking and depression symptoms, anxiety, stress, burnout, lower social success and it had a negative impact on synchronous social interactions [17-20]. On the other hand, studies have shown that also students' mental health problems have increased [21,22]. This is a part of a wider trend, as over one-third of the European Union population suffers from mental disorders [23]. In European countries, 13% of 15-year-old boys and 29% of 15-year-old girls reported feeling down more than once a week, and half of all mental health problems experienced in adulthood also occur during or before adolescence. Childhood and youth are important stages of life for an individual's longer-term well-being and mental health;

experiences in adolescence can affect mental health in later life [22].

In Finland, the proportion of university and university of applied sciences students diagnosed with depression has continuously increased, as 13% have been diagnosed with depression [6]. In 2021, 35% of higher education students (28% men and 40% women) had psychological distress and 33% experienced high levels of stress. In particular, young men's mental health problems have become more common in the 21st century [5,6]. Students who study at a university have a higher risk of developing mental health problems compared to people of the same age group who are not attending university [24]. Indeed, the emergence of psychological problems among university students has been found to be significantly more prevalent compared to the rest of the population [6,25,26]. Study load and stress can be linked to students' mental health problems [21] and distress levels are reported to be much higher among higher education students comparing to same age population [27].

It is important to understand the full extent of the effects of extensive multitasking with technology [1]. The relationship between technology multitasking, depression and cannabis use among the Finnish population has not been studied, and this preliminary study focuses specifically on examining these associations while also considering the underlying factors that influence these associations. It has been suggested that the country of origin may influence technology multitasking [28], so it is important to gain insight into the topic from a Finnish perspective. Although previous studies have found links between behavioral problems such as problematic internet use and technology multitasking and problematic internet use and substance use, no prior studies have been found considering the association between technology multitasking and substance use (which is understood in the current study as cannabis use). Also, other studies have shown that technology multitasking and cannabis use are related to mental health problems, and therefore, it is important to study their associations. Because technology multitasking has become so common [e.g., 10], it is important to explore how it affects people's well-being and whether there are any influential or psychological factors in the background which affect these outcomes. It is also essential to study technology multitasking among young people because they use technology the most and are thus potentially more exposed to its effects [1]. The study provides new information about the impacts of technology multitasking on people's well-being, and the results can be used in healthcare to improve students' well-being.

Aim of the study

The aim of this preliminary study was to examine associations between technology multitasking, cannabis use and depression symptoms among university students. The research questions were:

1. Is there an association between technology multitasking, depression symptoms, and cannabis use?

2. Which factors are associated with technology multitasking among Finnish university students?

Methods

Study design and participants

The study was a cross-sectional study and data were collected using a web-based survey. Before the beginning of the study, written permission to conduct it was given by the school principals at the target organizations. A statement of support from the Ethics Commission was requested, and approval was sought from the local Ethics Committee.

The approval of the Regional Ethical Commission of the hospital district of North Ostrobothnia was obtained for the study (16.8.2018, EETTMK: 50/2018; 209 §). The work was part of a cross-cultural Internet and mobile phone use project. In the Finnish part of this project two universities from northern Finland were recruited for the research. After cleaning the incomplete data (n=264), a final sample incorporating 260 responses (189 women and 71 men) was used.

Data collection

The recruitment of participants was based on purposive sampling. The data collection for the study started on October 5th 2018, and lasted until December 16th 2018. Participants were provided information about the study and participation was voluntary. An electronic link to the survey was sent to the liaison officers of the research institutes who were nominated by the participating organizations, and they provided a response link to the study participants via email and through the Student Administration Information System. The subjects were also reminded of the ongoing survey through the institutions' Facebook. Instructions on the questionnaire were sent to the subjects under the covering letter, and the participating students gave their informed consent to the study. Consent was given on the landing page of the electronic questionnaire.

Measurements

The data were collected with a web-based survey. The survey included four main areas: 1) Background information (gender, age, marital status, mobile phone and internet use), 2) technology multitasking, 3) depression symptoms and 4) cannabis use. The questions were based on validated instruments, and permission to use the instruments was obtained before the survey. Used instruments were translated from English into Finnish using the translation-back-translation method.

The mobile phone and internet usage were measured with one question. Questions were: "How many hours you spent on mobile phone during a day" and "how many hours you spent on the Internet (via computer, mobile phone) during a day?". Daily mobile phone use did not specify how and for what the mobile phone was used.

Technology multitasking was measured with a 9-item short media multitasking measure for adolescents (MMM-S) [7]. It contained four different media activities: watching TV; sending messages via phone or computer; listening to music; and using social network sites. Participants estimated how frequently they engage in the other activities simultaneously with each of these activities. An example from the questionnaire was: "While watching TV, how often do you use social network sites at the same time?" The questionnaire contained a 5-point scale for respondents to rate their answers, ranging from 1 (never) to 5 (very often). In the present study, Cronbach's Alpha was .87.

Depression symptoms were measured with the Center for Epidemiologic Studies Depression Scale (CES-D-10) [29], which is a shorter version of the original the CES-D scale [30]. It contained a 10-items. The participant was asked to evaluate different statements, for example: "I was bothered by things that usually don't bother me". This test contained a 4-point scale which included response options "Rarely or none of the time (less than 1 day)", "Some or a little of the time (1-2 days)", "Occasionally or a moderate amount of time (3-4 days)" and "All of the time (5-7 days)". Total scores are ranged from 0 to 30; higher scores indicate a higher level of depression symptoms and scores equal to or above 10 are considered depressed [30]. The Cronbach's Alpha for the scale was .84.

Cannabis use was measured with the Cannabis Use Disorders Identification Test-Revised (CUDIT-R) [31]. It contained 8 items considering participants' cannabis use (e.g., "How often do you use cannabis?"). For the items from 1 to 7 the responses were measured on a 5-point Likert scale ranging from 0 (Never) to 4 (4 or more times a week or daily or almost daily), and item 8 on a 3-point scale which included response options 0 (Never), 2 (Yes, but not in the past 6 months) and 4 (Yes, during the past 6 months). Items 1-7 were scored between 0 to 4 and for item 8, participants scored 0, 2 or 4 depending on their response. Total scores are ranged from 0 to 30; higher scores indicate higher symptomatology. Scores of 8 or more indicate hazardous cannabis use, while scores of 12 or more indicate a possible cannabis use disorder [31]. The Cronbach's Alpha for the scale was .62.

Data analysis

The data were analyzed with IBM SPSS Statistics version 24. The data were checked for missing data and participants whose data were missing more than 50% (including four cases) were excluded. For participants who did not fully complete the Cannabis Use Disorder Identification Test-Revised (CUDIT-R) (<5% of the data were missing), open spaces were replaced by the mean scores of the scale. Technology multitasking, depression symptoms, cannabis use and participants' background data were analyzed by descriptive metrics (frequencies, percentages, averages and standard deviation (SD)). The correlation coefficient was obtained using the Spearman correlation coefficient because the cannabis variable was not normally distributed (table 2). Correlation coefficients were calculated to assess the interrelationships between each pair of the study's variables. Statistical differences between women and men were analyzed with the independent t-test.

The linear regression analyses were then performed with technology multitasking as the dependent variable. Background variables (age, gender, marital status, how many hours/day spent on mobile phone and how many hours/day spent on the Internet) were entered as independent variables into the regression analysis. Gender and marital status were dummy-coded, and the first group of each section (female, in a relationship) comprised the reference category. Preliminary analyses ensured that there was no violation of the assumptions of multicollinearity (tolerance for all predictors was over .10 and VIF under 5) and homoscedasticity. The level of significance was set at $p < 0.05$ [32].

Results

Table 1 presents the mean scores and SDs comparing men and women in each of the study's variables. The average mobile phone time for a typical day differed significantly between genders, with around four hours for women (M = 4.14; SD = 2.30) and about three for men (M = 3.07; SD = 2.33); $t(258) = 3.30$, $p < .001$). Men (M = 7.70; SD = 3.54) spent significantly more time on the Internet per day compared to women (M = 6.28; SD = 3.13); $t(258) = -3.12$, $p = .002$). There was also a significant difference in the technology multitasking scores between women (M = 25.55; SD = 7.46) and men (M = 18.42; SD = 6.03); $t(258) = 7.16$, $p < .001$). There was a slight difference in cannabis use between genders, but there were not many cannabis users among the respondents. Only 9 respondents answered that they had used cannabis in the last six months, and the rest of the respondents (n=251) answered that they haven't used cannabis. Men used cannabis nominally more (M = 0.25; SD = 1.23) than women (M = 0.14; SD = .68). Depression symptoms were more common for women (M = 9.63; SD = 5.92) than men (M = 8.41; SD = 4.98).

Table 2 presents mean scores and SDs for each of the study's variables and their correlation coefficients. Age and the time spent on mobile phone per day (r(258) = -.23; p = .002), the time spent on the Internet (r(258) = -.28; p < .001), technology multitasking (r(258) = -.29; p <.001) and depression symptoms (r(258) = -.13; p < .025) correlated negatively and findings were significant. The time spent on mobile phone was correlated significantly and positively with time spent on the Internet per day (r(258) = .28; p < .001) and technology multitasking (r(258) = .48; p< .001). The time spent on the Internet positively correlated with depression symptoms (r(258) = .27; p < .001). There was no association between cannabis use and age, time spent on mobile phone, multitasking or depression symptoms.

Table 1. Differences between men and women.

Variable	Men (n=71)		Women (n=189)	
	M	***SD***	***M***	***SD***
How many hours/day spent on mobile phone	3.07	2.33	4.14	2.30
How many hours/day spent on the internet	7.70	3.54	6.28	3.13
Multitasking	18.42	6.03	25.55	7.46
Cannabis	.25	1.23	.14	.68
CESD	8.41	4.98	9.63	5.92

Note. M = mean; SD = standard deviation; Cannabis = cannabis use; Multitasking = technology multitasking; CESD = Center for Epidemiologic Studies Depression Scale.

Table 2. Descriptive data and correlation coefficients between study variables (N = 260).

Variables	1	2	3	4	5	6
1.Age	-	-	-	-	-	-
2.How many hours/day spent on mobile phone	-.23*	-	-	-	-	-
3.How many hours/day spent on the Internet	-.28**	.28**	-	-	-	-
4.Cannabis	-.12	-.04	.02	-	-	-
5.Multitasking	-.29**	.48**	.12	.04	-	-
6.CESD	-.13*	.10	.27**	.10	.11	-
M	27.79	3.85	6.66	0.16	23.63	9.30
SD	8.97	2.35	3.30	0.86	7.77	5.70
Range	18–57	1–16	1–17	0–7	9–44	0-27
Items	1	1	1	8	9	10
Skewness	1.37	1.47	.66	5.84	.18	.63
Kurtosis	1.06	3.48	-.06	35.37	-.54	-.15
Cronbach's Alpha	-	-	-	.62	.87	.84

Note. M = mean; SD = standard deviation; Cannabis = cannabis use; Multitasking = technology multitasking; CESD = Center for Epidemiologic Studies Depression Scale; *p < .05, **p < .001.

Table 3. Results from the regression analyses where age, gender, marital status, depression symptoms and cannabis use were regressed upon the technology multitasking (N = 260).

	B	*SE*	*β*	*t*	*sig*
Gender	-5.79**	.97	-.33	-5.96	<.001
Marital status	-1.42	.91	-.09	-1.55	.12
Age	-.26**	.05	-.31	-5.31	<.001
Hours/day on mobile phone	.96**	.18	.29	5.27	<.001
Hours/day on the Internet	.12	.13	.05	.89	.37
Cannabis	-.31	.46	-.03	-.67	.50
CESD	.00	.07	.00	.06	.95

Note. *B* = unstandardized regression coefficient; *SE* = standard error; *β* = standardized regression coefficient; *t* = t-test statistic; Gender = 0 female, 1 male; Marital status = 0 in a relationship, 1 single; Cannabis = cannabis use; CESD = Center for Epidemiologic Studies Depression Scale; *p < .05, **p < .001.

The results from the regression analyses, where age, gender, marital status, depression symptoms and cannabis use were regressed upon technology multitasking, are presented in Table 3. Male gender, a marital status of single, age, cannabis use and depression symptoms were negatively associated with technology multitasking, while the daily time spent on mobile phone and the daily time spent on the Internet were associated positively with technology multitasking. The only significant predictors of technology multitasking were gender, age and daily mobile phone use.

Discussion

The aims of the present study were to examine associations between depression symptoms and cannabis use with technology multitasking among Finnish university students and consider background variables which might have effects on technology multitasking. The results demonstrated that specific background variables are associated with technology multitasking, whereas there was no significant association between depression symptoms or cannabis use with technology multitasking. In this study, higher depression symptoms and cannabis use were associated with technology multitasking, but the findings were not significant.

The findings of the study demonstrated that gender, age and hours spent per day on a mobile phone are associated with technology multitasking which indicates that those factors might predict technology multitasking. Women spent more hours per day on a mobile phone and multitasked with technology more often compared to men. Women spent about four hours per day on a mobile phone, and men about three hours. In Vally and El Hichami's [33] study, young adults' daily mobile phone use varied from one to 24 hours per day, but for the majority daily use was somewhere between three and ten hours. Other studies have shown that females are technology multitasking more often than men because women are more involved in social media and texting [7,34]. However, on a daily basis, men tend to spend more time on the Internet. This result is similar to the findings of earlier studies. According to the Finnish student health survey, men who studied at the University used the internet more often than men studying at the University of Applied Sciences or women studying at the University or the University of Applied Sciences [5]. Also students who studied at the University had more often

problems with their internet use compared to the University of Applied Sciences students [6]. Lenhart [34] and Männikkö et al. [35] have shown that men play more video games than women, which could partly explain why men use the Internet more. Since the survey did not specify how much of the daily internet use was via mobile phone, and the question about daily internet use also included internet use via mobile phone, there may have been overlapping. Interestingly, some studies have shown national differences in the association between technology multitasking and gender, e.g., Kuwaiti and Russian women multitask with technology more often than men, but in the US men, in general, multitasked more than women [36].

Daily mobile phone use was significantly associated with technology multitasking and predicted higher levels of technology multitasking. Higher daily internet use was significantly associated with higher daily mobile phone use and depression symptoms. Also, earlier studies have indicated that excessive use of the internet is associated with increased depression levels [37]. Alarmingly, in 2021, almost 50% of the Finnish university students had problems with internet use [5], which might as well be part of the reason for the increased psychological problems. In Lenhart's [34] study 92% of adolescents reported going online daily because of the constant access provided by mobile phones. Duff et al. [38] showed that age was a significant factor in technology multitasking. In the present study, younger people engaged in technology multitasking more often compared to older respondents, while respondents who were in a relationship involved in technology multitasking more often compared to singles, even though the result was not significant.

The results of technology multitasking and depression symptoms are in line with previous studies, which indicated that higher technology multitasking was associated with higher depression symptoms and social anxiety symptoms [17] even though the result was not significant. Depression symptoms were found to be more common among women and participants' depression symptom scores ranged from 0-27. The cut-off point for depression was 10 points and most participants were not found to be depressed. It has been shown that gender is a significant factor in explaining psychological problems [6,26]. In an earlier study the results showed differences between genders' cannabis use: men used cannabis more often compared to women (males 48.7% vs. females 29.5%) [39]. In this study, the results are similar, but there were only a few participants who answered that they use cannabis. Younger respondents used cannabis more often compared to older respondents, even though the result was not significant, which is in line with earlier studies [6]. In the Finnish student health survey, 16.9% of men and 9.1% of women had used or tried cannabis [6]. From this, we can gather that there might be fewer cannabis users in universities who participated in this study. On the other hand, Finnish people's attitudes towards drug use have changed in recent years, becoming less negative compared to a few years age [40]. According to a Finnish drug use survey [40] for adult population, cannabis experimentation and use increased from just over 20% to nearly 30% between 2018 and 2022. Therefore, there may be variance in the study results due to these changing attitudes. Consequently, the study results should be interpreted with caution. In the future, it would be beneficial to study technology multitasking and cannabis use among the wider population to gain more specific insights into their associations and effects.

Limitations

The present study has several limitations. The study area was limited to northern Finland and two

higher education settings, and the target groups were not recruited randomly: thus the findings might not be safely generalized to the wider population. Outcomes were assessed by using a self-reporting survey and may therefore be underestimated. The sample size of cannabis use is too small to be representative of the Finnish student population (cannabis use might be a sensitive issue, which may explain the lack of answers). Because of the lack of answers in the cannabis measure, there are limitations in conclusions that can be drawn from this data. The Cronbach's alpha for the cannabis use measure is quite low and has quite poor reliability. Maybe with a larger number of participants who use cannabis, the results could diverge from the received results. One limitation, which is also worth noting, is the time of data collection. The data were collected several years ago, and a study based on more recent data could yield different results.

Conclusions

The study identified certain background factors which affect technology multitasking: female gender, younger age and higher daily mobile phone use were all related to technology multitasking. There were no significant associations between technology multitasking and cannabis use or depression symptoms, but the results should be interpreted with caution due to the small sample size. Instead, higher daily internet use was significantly associated with increased depression symptoms. The findings provide more knowledge about technology multitasking. Technology multitasking and other digital media usage patterns (e.g., internet use, gaming, social media) should be taken into consideration when promoting students' well-being. In the future, it is necessary to provide more knowledge about technology multitasking and how excessive digital media use might affect to well-being. Clearly, interventions which improve students' mental health and well-being and guide them to healthier digital media use are needed. This preliminary study provided a basis for future research, but more studies based on larger samples are needed to deepen our understanding of the association between technology multitasking, mental health problems and substance abuse.

Conflict of interest statement

The authors report no conflicts of interest in this work.

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