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**TYOLOGY OF CZECH UNIVERSITY STUDENTS BY THEIR
INTERNET ADDICTION**

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Abstract

The paper describes the first part of a research study aimed at addiction to the internet, computer games, and online communication among students of teacher training courses at Palacký University Olomouc, Czech Republic. The research method was the standardized CIAS scale. Addictive behaviour among students in relation to computer games was assessed by a questionnaire designed by the authors. Moreover, selected online activities and other data were analysed. The research sample in the preliminary research comprised 146 students of various study programmes. Internet addiction was observed in 2.7% of students. A higher degree of internet addiction was observed in men (score 44) and younger students (42), but the difference was not statistically significant. The Generalized k-Means Cluster Analysis suggested two clusters by respondents' addiction. The first cluster comprised about 26% of students, mostly men, who showed a higher internet addiction score (46) and a higher computer game score (11). Each day on average they played for 98 minutes, of which 55 minutes was online. They did not pursue leisure activities, spent less time communicating using their mobile phone, and read in their free time. The second cluster comprised about 74% of students, mostly women, who show a higher internet addiction score (39) and a lower computer game score (3). Each day on average they played for 16 minutes, of which 9 minutes was online. They pursued leisure activities, spent more time communicating using their mobile phone, and went out with friends in their free time.

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Keywords: Internet addiction, CIAS, students, Generalized k-Means Cluster Analysis



1. Introduction

Generally, internet addiction is defined as excessive use of the internet that causes psychological, social and work-related or school-related complications. Research has shown that people do not develop “internet addiction” but rather addiction to specific internet applications or websites (Škařupová, 2015). Internet addiction, also known as internet addiction disorder, is pathological use of internet in all forms, including playing web games, chatting, reading e-mails, surfing, etc. In a broader sense, this disorder is classified as addiction to the so-called virtual drugs, which also includes mobile telephones and TV (Young, 2017). However, experts agree that the concept of internet addiction is not very precise; instead, they recommend to refer to addictive behaviour (Blinka, Ševčíková, Škařupová, Vondráčková, & Licehammerová, 2015).

The most addictive applications and websites are those that allow two-way communication. Generally, there are 3 basic types of internet addiction:

- a) Online game addiction. This usually includes the so-called multiplayer RPG online games, i.e. hero games for more players.
- b) Online communication addiction. This category includes online communication, whether with real or internet friends. This also includes emailing, chatrooms, discussion fora, ICQ, Skype or various social networks such as Facebook and Twitter.
- c) Addiction to websites with pornographic content.

2. Problem Statement

Among the general population, the most-at-risk group in terms of addictive behaviour comprises university students regarding their use of information technology and especially the internet (Škařupová, 2015). The high prevalence is usually attributed to students’ easy access to the internet, flexible daily programme, and by the fact that after enrolling in university, most of them are in a new environment without their previous social ties and start to build new relationships and social status, which is largely facilitated by the internet.

The prevalence of addictive behaviour in relation to internet use among foreign university population ranges between 6 and 13% (Šmahel, Vondráčková, Blinka, & Godoy-Etcheverry, 2009; Weinstein et al., 2015; Seki, Hamazaki, Natori, & Inadera, 2019; Laconi et al., 2019). The problem is however that only a very small part of internet users are aware of the negative effects of this behaviour on their lives. Students with risk behaviour in relation to the internet most often use two-way communication applications such as chatrooms, emails, and interactive computer games (Škařupová & Blinka, 2015).

The most frequent negative implications of addictive behaviour in the context of internet use is worse academic achievement, late arrivals or absence in classes, worse eyesight, sleep deprivation, backache, hurting hands and fingers, and overall fatigue. However, the impact in the social area is disputable because some studies suggest a positive effect of internet use on interpersonal relationships, while others suggest negative implications, such as greater social isolation and a decreased number of new relationships (Blinka et al., 2015).

3. Research Questions

The following research questions were formulated for the purposes of the research:

1. What is the degree of internet addiction among students of teacher training courses?
2. Is the degree of internet addiction among students of teacher training courses dependent on gender?
3. Is the degree of internet addiction among students of teacher training courses dependent on their form of study?
4. Are there typical groups of students of teacher training courses by the degree of their internet addiction and addictive behaviour in relation to playing computer games and online communication?

4. Purpose of the Study

The paper aims to identify the risks posed by the increasing use of information and communication technologies (ICT) and internet in everyday university students life (Kopecký, 2013). Specifically, the paper focuses on the negatives associated with playing computer games (Blinka, Škařupová, & Mitterova, 2016) and internet addiction (Young, 2017). Currently, everyday use of the internet is an absolute necessity for university students, even in their free time (Cerniglia et al., 2016). Unfortunately, students often play computer games and show signs of addictive behaviour (Chráska, 2016a). Generally, this is referred to as Problematic Internet use (PIU), not only internet addiction (Laconi et al., 2019).

5. Research Methods

In the present research, the following two principal research methods were used. The first standardized CIAS method (see section 5.1) was used for baseline assessment of internet addiction (Chen, Weng, Su, Wu, & Yang, 2013). The second method (authors' questionnaire) has so far been partially standardized and was used to investigate students' addictive behaviour in relation to computer games (Chráska & Basler, 2016). Moreover, selected online activities, leisure activities, and other demographic data of students were examined (see Tab. 5).

5.1. The Chen Internet Addiction Scale

To assess the degree of internet addiction, an internet addiction scale was used (The Chen Internet Addiction Scale, CIAS). The scale was developed in 2003 by Dr. Sue-Huei Chen and his colleagues (National Taiwan University, Taipei) in order to assess the severity of internet addiction. This scale comprises 26 items (see Tab. 2); each item is ranked on a 4-point scale. Respondents choose the most appropriate response (never – almost never – often – almost always) covering a period of the past 6 months. The final score ranges from 26 to 104 points. A higher score indicates more serious internet addiction. A score of 64 and higher is considered addiction. The subscales of the CIAS questionnaire relate to 5 dimensions as follows: compulsive behaviour syndrome, disrupted control over one's behaviour, withdrawal symptoms, degree of tolerance, problems in interpersonal relations, and health problems. The

internal reliability of the scale and subscales ranges from 0.79 to 0.93. For the purposes of measuring internet addiction in China, the method was adapted and a new revised internet addiction scale CIAS-R including a four-factor structure was developed.

Prior to the evaluation of the CIAS scale its reliability was calculated (see Table. 1) and a value of 0.93 was achieved (Chráska, 2016b). None of the scale items decreased its overall high reliability.

Table 01. Reliability of the CIAS scale and effect of individual items on overall reliability

Summary for scale: Mean=40.68 Std.Dv.=10.92 Valid N:146 (Data ICEEPSY) Cronbach's alpha:0.92 Standardized alpha: 0.93 Average inter-item corr.: 0.33	
Variable – CIAS item	Alpha if deleted
O1: I was told more than once that I spend too much time online.	0.92
O2: I get backaches or other physical discomfort from spending time surfing the net.	0.93
O3: I find myself going online instead of spending time with friends.	0.92
O4: Going online is the first thought I have when I wake up each morning.	0.92
Q5: I fail to control the impulse to log on.	0.92
O6: More than once, I have slept less than four hours due to being online.	0.92
O7: Surfing the internet has negatively affected my physical health.	0.92
Q8: Although using the internet has negatively affected my relationships, the amount of time I spend online has not decreased.	0.92
O9: I feel like I am missing something if I don't go online for a certain period of time.	0.92
Q10: My interactions with family members have decreased as a result of internet use.	0.92
Q11: My recreational activities have decreased as a result of internet use.	0.92
Q12: I feel distressed or down when I stop using the internet for a certain period of time.	0.92
O13: During the past term (6 months), I have increased substantially the amount of time I spend online per week.	0.92
O14: Going online has negatively affected my schoolwork or job performance.	0.92
Q15: I fail to control the impulse to go back online after logging off for other work.	0.92
Q16: My life would be joyless without the internet.	0.92
Q17: I have tried to spend less time online but have been unsuccessful.	0.92
Q18: I stay online for longer periods of time than intended.	0.92
Q19: I feel energized online.	0.92
Q20: I feel tired during the day because of using the internet late at night.	0.92
Q21: I fail to have meals on time because of using the internet.	0.92
O22: I need to spend an increasing amount of time online to achieve the same satisfaction as before.	0.92
O23: I make it a habit to sleep less so that more time can be spent online.	0.92
O24: I feel restless and irritable when the internet is disconnected or unavailable.	0.92
O25: I find that I have been spending longer and longer periods of time online.	0.92
O26: I feel uneasy once I stop going online for a certain period of time.	0.92

5.1. Addictive behaviour questionnaire in relation to playing computer games

The research method to measure addictive behaviour in relation to playing computer games was a yet non-standardized questionnaire, which was based on a questionnaire used in 2016 (Chráska & Basler, 2016). For the purposes of an IGA project aimed at the issue of addiction to computer games among university students in a broader context, in 2018 the questionnaire was supplemented with additional items. The purpose of the questions was to determine detailed characteristics of the types of students by their

computer game addition. Apart from these characteristics, the questionnaire focused on the degree of addictive behaviour among students in relation to playing computer games by means of 12 statements. The degree of agreement with each statement was indicated by students on a six point scale with coded answers: totally agree (value 5), agree (4), rather agree (3), rather disagree (2) disagree (1) completely disagree (0). The questionnaire was presented to students in an electronic form via a web interface. Prior to the assessment of the questionnaire its reliability was determined. The resulting value of 0.94 suggests high measurement reliability.

5.2. Description of the research sample

The first part of the research study (preliminary research) was performed among students at the Faculty of Education, Palacký University Olomouc in autumn 2018 and spring 2019. The research sample in the preliminary research comprised 146 students of various teacher training courses in the full-time (F) and part-time (P) form of study. The total planned research sample will comprise approximately 600 students. A detailed description of the research sample by gender and form of study is specified in Table 2.

Table 02. Structure of the research sample

Type of study	Gender (Male)	Gender (Female)	Row Totals
Full-time (F)	23	72	95
Part-time (P)	9	42	51
All Grps	32	114	146

6. Findings

6.1. Degree of internet addiction among students of teacher training courses

The first part of the research focused on what proportion of students showed internet addiction by scoring at least 64 points. The results are shown in Figure 1. The results suggest that a total of 4 students are addicted to the internet, one of them with a very high score of 91. Internet addiction was observed in 2.7% of students of teacher training courses, which does not exceed the general prevalence of 6-10%. This is probably caused by the nature of teacher training as a helping profession. To provide a comparison, in 2019 internet addiction was observed in 4.6% of university students in Japan (Seki et al., 2019).

6.2. Internet addiction among students by gender

The results in the table 3 and figure 2 suggest that men achieve a higher absolute score in the CIAS scale (internet addiction) than women, but this difference is not statistically significant ($p=0.08$).

Table 03. Internet addiction among students by gender – comparison using a t-test

T-tests; Grouping: Gender (Chraska data ICEEPSY)											
Variable	Mean Female	Mean Male	t-value	df	p	Valid N Female	Valid N Male	Std.Dev. Female	Std.Dev. Male	F-ratio Variances	p Variances
CIAS score	39.84	43.69	1.77	144	0.08	114	32	10.62	11.60	1.19	0.50

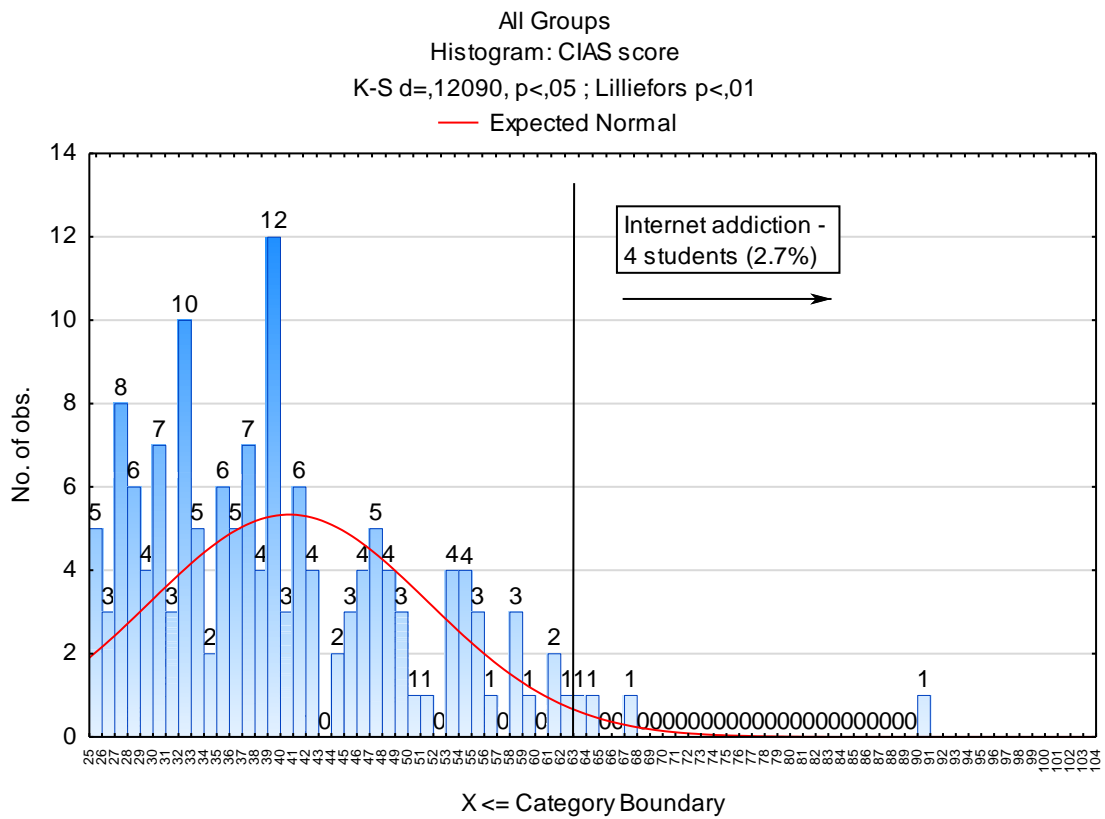


Figure 01. Internet addiction score among students (CIAS)

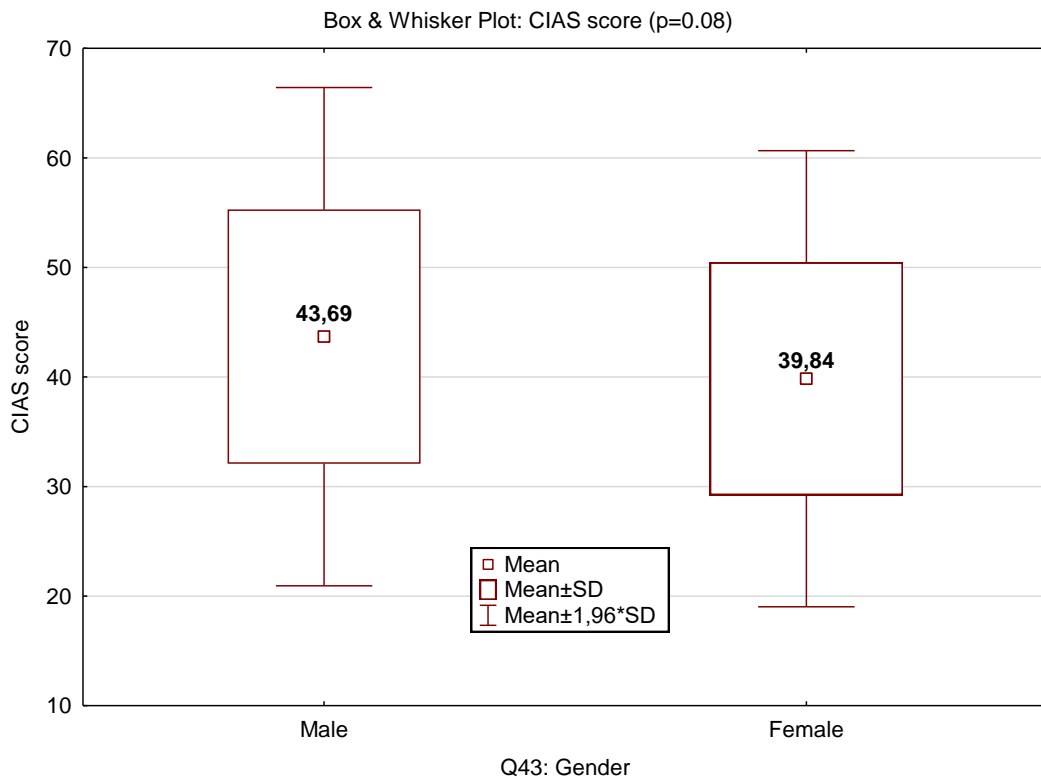


Figure 02. Internet addiction score among students using the CIAS scale – comparison by gender using the Box & Whisker Plot

6.3. Internet addiction among students by form of study and age

The results in the table 4 and figure 3 suggest that full-time students achieve a higher absolute score in the CIAS scale (internet addiction) than part-time students, but this difference is not statistically significant ($p=0.11$). It was assumed that this difference was caused by students' age and that older students were less addicted to the internet than younger students. Therefore, the results of the CIAS test were also compared by age (see table 4). The assumption was confirmed, but again the difference was not statistically significant. However, this fact may be caused by the small research sample in the preliminary research.

Table 04. Internet addiction among students by form of study and age – comparison using a t-test

T-tests; Grouping: Form of study (Chraska data ICEEPSY)											
Variable	Mean Full-time	Mean Part-time	t-value	df	p	Valid N Full-time	Valid N Part-time	Std.Dev. Full-time	Std.Dev. Part-time	F-ratio Variances	p Variances
CIAS score	41.76	38.69	1.63	144	0.11	95	51	11.50	9.52	1.46	0.14
T-tests; Grouping: Age (category) (Chraska data ICEEPSY)											
Variable	Mean 25 years and younger	Mean Older than 25 years	t-value	df	p	Valid N 25 years and younger	Valid N Older than 25 years	Std.Dev. 25 years and younger	Std.Dev. More than 25 years	F-ratio Variances	p Variances
CIAS score	41.76	38.81	1.57	144	0.12	93	53	11.44	9.75	1.38	0.21

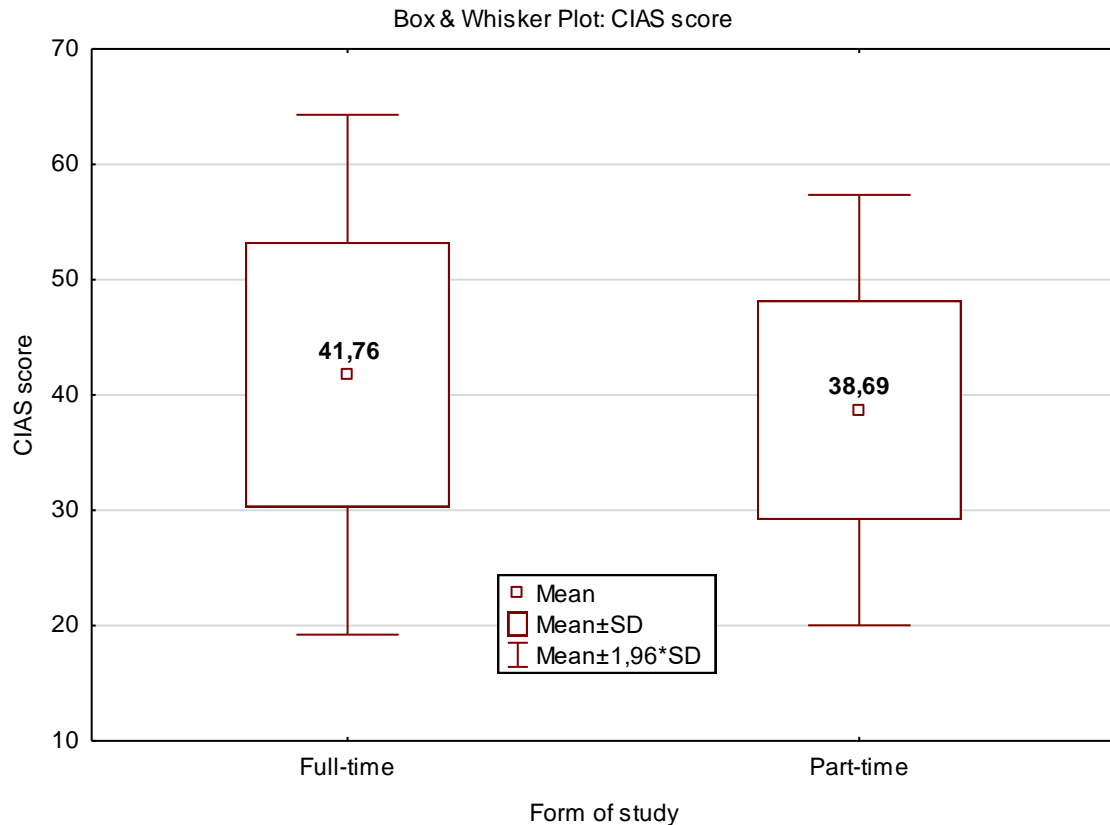


Figure 03. Internet addiction score among students using the CIAS scale – comparison by form of study using the Box & Whisker Plot

6.4. Identification of typical groups of students of teacher training courses by the degree of their internet addiction and addictive behaviour in relation to playing computer games and online communication

To determine any typical groups of students of teacher training courses by their responses in the CIAS scale and the authors' addictive behaviour questionnaire in relation to playing games, the Generalized k-Means Cluster Analysis was used (Chráska, 2016a). This analysis was performed using STATISTICA 13 (TIBCO Software Inc., 2017). The results are shown in Table 5.

Table 05. Generalized cluster analysis of students' responses

Questionnaire item	Cluster 1	Cluster 2	p
Prevailing responses to items in groups:			
I1: Do you play computer games?	Yes	Yes	1.00
I2: Do you play online computer games?	No	No	<0.01
I3: Do you play computer games on Facebook?	No	No	0.82
I6: What do you usually do in your free time when you don't have to study?	D – I read	C – I go out with my friends	<0.01
I7: Do you take part in any leisure time activities?	No	Yes	<0.01
I27: Do you play educative computer games (e.g. Lingua.Ly, Duolingo, Lightbot, etc.)?	No	No	0.60
I43: Gender	Male	Female	<0.01
I9: Did or do your parents limit the time for playing computer games?	No	No	0.30
I22: I often play computer games at school during lessons (e.g. using a mobile phone).	No	No	0.67
Average values in groups			
I37: On average, how many hours and minutes per day do you spend on social networks: (minutes)	135.59	152.84	0.59
I37: On average, how many hours and minutes per day do you spend communicating using your mobile phone (calls, text, chat): (minutes)	77.30	139.13	0.05
I37: On average, how many hours and minutes per day do you spend using the internet (do not include school duties): (minutes)	179.05	129.95	0.07
I37: On average, how many hours and minutes per day do you spend using the internet (include only school duties): (minutes)	89.86	103.44	0.48
I38: How much time during all lessons on a single day do spend online (using social networks, mobile phone, playing computer games): (minutes)	78.24	68.63	0.60
CIAS score	46.46	38.56	<0.01
Addiction score	11.41	2.97	<0.01
I8: How much of the total time do you spend playing online computer games? (total minutes per day)	55.41	9.41	<0.01
I8: How long do you play games each day? (total minutes per day)	97.57	15.71	<0.01
Number of respondents in cluster	37	108	
Percentage of respondents in cluster	25.52	74.48	

The results of the research suggested two groups (clusters) of students of teacher training courses according to their internet addiction and the way they approach computer games and online communication. These groups also show a completely different degree of internet addiction and computer game addiction.

The first cluster comprised about 26% of students, mostly men, who showed a higher internet addiction score (46) and a higher computer game score (11). Each day on average they played for 98

minutes, of which 55 minutes was online. They did not pursue leisure activities, spent less time communicating using their mobile phone, and read in their free time.

The second cluster comprised about 74% of students, mostly women, who showed a higher internet addiction score (39) and a lower computer game score (3). Each day on average they played for 16 minutes, of which 9 minutes was online. They pursued leisure activities, spent more time communicating using their mobile phone, and went out with friends in their free time.

7. Conclusion

Internet addiction was observed in 2.74% of students of teacher training courses, which is less than for example in Japan (Seki et al., 2019) or in a comparable population of adults in Europe (Cerniglia et al., 2016). A higher degree of internet addiction was observed in men (score 43.69) than women (39.84), which was surprising concerning the original assumptions. A comparison of 9 European countries (Laconi et al., 2019) showed a prevalence of problematic internet use (PIU) from 14% to 55%, and was more frequent in women. This discrepancy may be caused by the teaching specialization of the research sample.

However, it is typically reported that men are a higher risk group for Internet addiction (Wenliang, Xiaoli, Cheng, Yan, & Potenza, 2019). Most studies report significant results to varying degrees, mostly suggesting a higher average male dependence rate (Cerniglia et al., 2016; Weinstein et al., 2015). However, the findings are particularly ambivalent for university students. Some studies indicate that the difference has not been demonstrated (eg Kuss et al., 2013), or has been mild (Servidio, 2014), or that the difference has not been demonstrated (Capetillo-Ventura & Juárez-Treviño, 2015).

A higher degree of internet addiction was observed among younger students (41.76) compared with older students (38.69). However, the differences were not statistically significant.

The Generalized k-Means Cluster Analysis suggested two different groups of students according to their addiction to the internet, computer games, and frequency of online activities. These groups show different addiction to the internet, computer games, and mobile phone communication by gender.

7.1. Risks and limitations of the conclusions

Regarding the partial results of the research, the research sample of students does not so far include all study specializations, which is another intervening variable.

Another limitation concerning the interpretation of the results is the CIAS scale in terms of intercultural transfer. In foreign countries, the tool has been revised – CIAS-R (Mak et al., 2014) and suggests four dimensions of internet addiction. However, in the Czech Republic, CIAS is used as a basic indicative tool to test internet addiction in humanities-oriented research.

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