TITLE:
Internet Use and Associated Risks in a College Sample

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Abstract: The Internet is commonly used among young adults; however, internet use may become a problematic behavior. Past research has examined Internet behavior in young adults and its relationship to other behaviors and health issues, yet further research needs to be completed to gain a more comprehensive understanding of this relationship. A sample (n=2108) of college students (56.9% female) was examined using a self-report Internet survey concerning demographic characteristics, Internet use, health behaviors, psychosocial functioning, and psychiatric comorbidities. We found that 237 students (12.9%) met criteria for limited Internet use, 1502 (81.8%) for mild Internet use and 98 (5.3%) for moderate to severe Internet use. Variables significantly associated with greater frequency of Internet use included lower Grade Point Average (p= .006), less frequent exercise (p= .018), higher PHQ-9 scores (p<.0001) (indicative of greater depression symptoms) and higher Perceived Stress Scores (p<.0001). These data indicate that moderate to severe Internet use is associated with a range of psychosocial problems in young adults. More research is needed to better understand the relationship between Internet use and physical and mental health, as well as academic variables.

BACKGROUND
- One third of the world and 77% of Americans use the Internet; this rate is even higher for college students. These numbers have been gradually increasing over the past years.
- There is currently no recognized diagnosis of Internet addiction in the DSM, so it is unclear how many people currently from problematic Internet use. Criteria similar to

pathological gambling and alcoholism have been suggested, such as withdrawal and tolerance.
- The purpose of this study was to: 1) examine the prevalence and sociodemographic correlates of different levels of Internet use in young adults,2) investigate health correlates in young adults who report problematic Internet use, and 3) examine gender differences in those whose Internet use is indicative of problematic behavior.
- We hypothesized that problematic levels of Internet use would be higher in males and would be associated with both internalizing (relating to depression and anxiety) and externalizing (relating to substance use) behaviors, as well as poor psychosocial functioning (e.g., poor school performance).

METHODS
Sample
A total of 2108 (35.1%; mean age 22.6 ± 5.1 [range 18-58]; 78.8% Caucasian; 41.8% male) students completed the survey distributed by email. Of the 2108 participants that completed the survey, 1837 participants were included in the final data due to incomplete data capture.

Assessments
The self-report survey obtained information about demographics, psychiatric background, mood, stress, academic variables, and health indices.

Embedded scales included:
- Internet Addiction Test (IAT)
- Perceived Stress Scale (PSS)
- Patient Health Questionnaire (PHQ-9)
- Minnesota Impulsive Disorders Interview (MIDI)

Participants were grouped based on their total Internet Addiction Test score: limited use (0-19), mild use (20-49) and moderate/severe (50-100) (Table 1). In order to examine differences between type of Internet use, subjects were examined by separating essential (academic, email) from non-essential (gaming, social networks, etc) Internet use (Table 2).

RESULTS
- A total of 237 (12.9%) of subjects reported limited Internet use, 1502 (81.8%) reported mild and 98 (5.3%) reported moderate to severe use of the Internet according to IAT scores.
- As the severity level of the Internet use rose, the overall GPA significantly decreased (p=.006, F=5.214). The moderate/severe group used caffeine (p<.0001) or stimulants (p=.001) significantly more frequently as a means of prolonging their time on the Internet compared to the limited and mild groups.
- Moderate/severe Internet users had higher scores on the Perceived Stress Scale (p<.0001) and on the PHQ-9 (p<.0001) and lower amount of recommended exercise (p=.018).
- A majority of the limited Internet use and mild use individuals identified as Caucasian, however, in the moderate/severe use categories, only half the population identified as

Caucasian, while a higher percentage of non-Caucasian participants fell into the moderate/severe categories.
- No significant differences between the Internet use groups were found to be associated with psychiatric illness.
- In terms of essential compared with non-essential Internet use, moderate-severe users spent much more time on non-essential Internet use while limited to mild Internet users spent equal or less time on non-essential use versus essential use.

DISCUSSION
- In this study, we sought to examine the prevalence, health correlates, sociodemographic variables, and gender differences of problematic Internet use in a large sample of college students.
- Consistent with previous research, our results indicate that overall GPA is significantly affected by the level of use, with the lowest GPAs seen in the highest level of Internet use group. Schools may wish to address Internet use amongst students and inquire as to their level of use as they present for healthcare services.
- Our results indicate that as Internet use severity increased, depression and stress scores also increased significantly. However, interestingly, our findings did not suggest that psychiatric comorbidity was associated with IAT scores.
- By identifying potential risk factors, interventions may be possible for those that are developing a problematic relationship with the Internet.

Table 1. Demographic Characteristics of College Students (n=1837) Grouped by Internet Addiction Test Category

	Limited Use (Score 0-19) n=237	Mild Use Score (20-49) n=1502	Moderate-Severe Use (Score 50-100) n= 98	p-value	Test statistic
Age, Mean (SD)	23.73 (5.57) n=230	22.58 (5.21) n=1474	22.64 (3.21)	**.001**	$F_{(2,1798)}$=6.919)
Gender					
Female	142 (60.7)	864 (57.8)	54 (56.8)	**.678**	χ^2=0.777, df=2
Race/Ethnicity					
White/Caucasian	206 (88.0)	1207 (80.7)	449 (51.6)	**<.0001**	χ^2=58.061, df=2
Asian/Pacific Islander	9 (3.8)	156 (10.4)	33 (33.7)	**<.0001**	χ^2=63.632, df=2
Relationship Status					
Single	118 (50.4)	863 (57.8)	65 (68.4)	**.009**	χ^2=9.49, df=2
Student Status					
Undergraduate	170 (72.6)	1152 (77.5)	81 (85.3)	**.042**	χ^2=6.33, df=2

International Students	8 (3.4)	80 (5.4)	18 (19.1)	**<.0001**	χ^2=33.531, df =2

Table 2. Time Spent on Essential and Non-essential Internet Use Grouped by Internet Addiction Test Score Category

	Limited Use	Mild Use	Moderate and Severe Use	p-value	Test statistic
ESSENTIAL INTERNET USE					
Duration of use					
6 or more hours	41 (17.5)	345 (23.1)	24 (25.8)	.1212	χ^2=4.22, df =2
NON-ESSENTIAL INTERNET USE					
Duration of use					
6 or more hours	37 (15.9)	354 (23.7)	39 (41.9)	<.0001	χ^2=25.01, df =2
College GPA, Mean (SD)	3.38 (0.54) n=229	3.36 (0.49) n=1479	3.19 (0.49) n=94	**.006**	F(2,1802)=5.214
Meet adult CDC recommendations for physical activity	133 (58.3)	824 (56.4)	39 (41.9)	**.018**	χ^2=8.028, df =2
Body Mass Index, Mean (SD)	23.52 (3.64) n=228	23.72 (4.88) n=1458	24.23 (5.33) n=91	.488	F(2,1777)=0.719

Caffeine use to prolong time on Internet	24 (10.4)	246 (16.7)	30 (34.4)	**<.0001**	χ^2=22.841, *df* =2
Stimulant use to prolong time on Internet	2 (0.9)	33 (2.2)	7 (7.4)	**.001**	χ^2=13.146, *df* =2
PHQ-9 (Score 0-27), Mean (SD)	3.52 (3.27) n=214	4.78 (4.36) n=1374	8.54 (6.64) n=87	**<.0001**	F(2,1675)=42.181
Perceived Stress Score (Score 0-40), Mean (SD)	13.10 (6.04) n=214	16.13 (6.56) n=1388	22.03 (6.32) n=87	**<.0001**	F(2,1689)=59.319

All scores are n (%) unless stated otherwise