EFFECTS OF THE INTERNET, OTHER MEDIA AND STUDY TIME ON WELLBEING AND ACADEMIC ATTAINMENT OF UNIVERSITY STUDENTS

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ABSTRACT
There has been considerable research on the effects of the internet and other media on the academic attainment of university students. Less is known about effects on wellbeing, and studies have rarely controlled for other established predictors of attainment (e.g. conscientiousness) and wellbeing (e.g. stressors; negative coping; positive personality and social support). Three hundred and thirteen university students completed an online survey involving the Student Wellbeing Process Questionnaire and questions about internet use, interference from the internet, and studying time. Grade Point Average (GPA) scores for the students were added to the database. The results showed that hours of internet/media use were significantly correlated with negative wellbeing, lower GPA scores, and negative coping. Hours studying were significantly correlated with GPA scores and conscientiousness. Internet interference with studying was the strongest predictor. It was negatively correlated with GPA and positive outcomes and positively correlated with negative wellbeing. It was also positively correlated with established predictors of negative wellbeing (stressors and negative coping) and negatively correlated with predictors of positive wellbeing (positive personality; conscientiousness). When the established predictors were statistically controlled, hours spent on the internet and other media were associated with lower academic attainment scores. None of the associations between internet use, internet interference, studying time and wellbeing remained significant when established predictors were controlled for. These results show that many negative outcomes attributed to internet use reflect other correlated attributes. Reduced academic attainment remained significantly associated with internet use, and further research with longitudinal designs (preferably with interventions) is required to investigate underlying causal mechanisms.

Key Words: Internet use, internet interference, study time, academic attainment, wellbeing.

1. INTRODUCTION

Internet and media use, academic attainment and wellbeing
There is no doubt that the internet has changed the lives of many people in the developed world, so it is logical to look at any relationships between internet use, wellbeing and academic attainment. A study by Kubey, Lavin and Barrows (2001) involved 576 students completing a survey on internet use and study behaviour. It was found that heavy recreational internet use predicted more academic impairment, especially when applications such as instant messaging were running at the same time as studying. The researchers also found that loneliness was

correlated with impairment, emphasising the link between wellbeing and academic performance. However, a limitation of their survey was that instead of using an objective attainment score such as the Grade Point Average (GPA), they asked: "About how often has your school work been hurt because of the time you spend on the Internet?" (p. 373) and used this as their measure of academic impairment. Similar findings were found in Taiwan with a sample of 49,609 participants; heavy internet users were more likely to have impaired grades (Chen & Peng, 2008). Further analysis suggested that it is not the total time spent on the internet that was detrimental to academic performance, but how that time was spent. Chen and Fu (2009) found that time spent searching for information improved performance on a high school entrance exam, whilst socialising and gaming contributed to lower examination scores. Overall, this research shows that the more time spent on recreational internet activities, the lower a student's academic achievement will be.

Research on the relationship between recreational internet use and wellbeing is lacking, but the research on social media use and wellbeing is more prominent. Lup, Trub and Rosenthal (2015) referred to Instagram (a photography-based social networking website) usage in their wellbeing research. They measured four different variables in a sample of 18 to 29-year- olds (N = 117): Instagram use, strangers- followed, social comparison and depressive symptoms. They found that participants who spent more time on Instagram had more depressive symptoms, especially when they followed more strangers. Social- comparison made a difference, as those with positive social comparison had lower depressive symptoms, even when they used Instagram for longer times and followed a higher percentage of strangers. Prolonged use of social media can even distort one's perceptions on life, as those who used Facebook more frequently were more likely to disagree with the phrase "Life is fair" (Chou & Edge, 2012). More frequent Facebook users even reported that other people were happier than them and had better lives. Although Chou and Edge (2012) did not directly measure wellbeing in their study, there are hints of life dissatisfaction, which is a predictor of negative wellbeing. Recent research supports this idea as Tandoc, Ferrucci, and Duffy (2015) found that there was a relationship between Facebook use and depression symptoms, which was mediated by envy. One study even found that people with more "friends" on Facebook, had increased chances of getting upper respiratory infections (Campisi et al., 2009). Social networking is a form of recreational internet use, but it could be seen as a distinct type of internet use as it has high social challenges. The societal pressure associated with social media may be the key factor in having a negative effect wellbeing.

Social media use does not only affect wellbeing, as research suggests that it also has a negative effect on academic achievement. Many of the studies in this area have used self-reported attainment and categorical social media use measures, making their findings questionable. However, Junco (2012) provides strong evidence for time spent on Facebook being strongly correlated with lower GPA. GPA was objectively measured, instead of self-reported, and time on Facebook was measured with continuous variables (e.g. "How much time did you spend on Facebook yesterday?"). A strength of this study is that a variety of social media behaviours were measured, such as how many times one checks Facebook and how many minutes one spends playing Facebook games such as 'FarmVille'. The most significant finding was that overall Facebook use time, checking Facebook more often, communicating on "Facebook Chat" more,

and higher frequencies of posting status updates were all negatively correlated with GPA. A study by Kirschner and Karpinski (2010) helped explain why there is this negative relationship between social media and academic performance. Facebook users obtained lower GPAs than non-Facebook users, but, more importantly, total time on the internet did not differ. This again suggests that the internet itself does not predict impaired GPA, but how one uses it can affect academic performance. In the study mentioned previously, Junco (2012) found no significant relationship between Facebook use and study time. This means that those who had a lower GPA were still studying for the same amount of time as students getting higher GPAs. An explanation of why this happens could be that social media leads tp interference whilst one studies, as most social networking is synchronous. As discussed earlier, synchronous applications are related to poorer academic attainment (Kubey, Lavin & Barrows, 2001); the interference with studying caused by these applications may act be responsible for this phenomenon.

Constant advancements in technology mean that there are a multitude of ways that internet interference can affect studying, and one device in particular has seen a steep increase in popularity amongst university campuses: the mobile phone. As smartphones have the ability to connect to the internet and download social media apps, the capacity for distractions increase. Lepp, Barkley and Karpinski (2015) studied cell phone usage in 536 undergraduate students and found that increased cell phone use was significantly and negatively correlated with GPA. This research has similarities to the current study as the experimenters controlled for predictors of GPA, which were self-efficacy for academic achievement, self- efficacy for learning, high school GPA, and some demographic and lifestyle variables (e.g. gender and smoking habits). The researchers concluded that more research is required to identify the mechanisms underlying this phenomenon. The ability to connect to the internet from a device that fits in one's pocket also means that people can access recreational content more easily and as discussed earlier, recreational internet use is associated with lower GPA. Smartphones also allow users to download more video games; moreover, research has shown that playing video games is correlated with lower academic performance, particularly if the games are violent (Harris & Williams, 1985; Anderson, Gentile & Buckley, 2007). Thus, mobile phone use appears to have a negative impact on academic attainment as it is another path to recreational content and social media, distracting the user from studying.

Academic attainment is not the only variable affected by mobile phone use, and many studies show that certain wellbeing factors are also negatively affected. A Spanish study of 1,328 13 to 20-year-olds revealed that intensive phone use was associated with depression and school failure (Sánchez-Martínez & Otero, 2009). Jenaro et al. (2007) failed to find any correlation between phone use and depression using the Beck Depression Inventory (Beck, Steer & Brown, 1996), but did find a relationship with anxiety using the Beck Anxiety Inventory (Beck et al., 1988). Lepp, Barkley and Karpinski (2014) report similar findings with an American sample of 496 students. They found that cell phone use was positively correlated with anxiety and negatively correlated with GPA. It was argued that satisfaction with life (SWL) was the mediating factor, as SWL was positively correlated with GPA and negatively correlated with both anxiety and phone use. Lee (2015) found the same relationship between heavy smartphone use and anxiety but there was no correlation with the "big five" personality traits. As mobile phones are a source of

interference, it seems that internet interference can result in negative wellbeing too, though it is often unclear how this occurs.

The Wellbeing Process

Wellbeing involves many different factors and is difficult to define. The "wellbeing process model" attempted to provide a holistic theoretical framework and the development of a questionnaire that could be useful in policy and practice. The background to this approach was the Demands-Resources-Individual Effects (DRIVE) model (Mark & Smith, 2008). This measured job characteristics, perceived stress, coping styles and anxiety and depression. A later version of the model (Smith, et al. 2011; Wadsworth, et al., 2010) also measured positive variables such as self-esteem, self-efficacy, optimism, life satisfaction, happiness and negative affect. Happiness, positive affect and life satisfaction are key components in most models of subjective wellbeing.

The above approach led to a questionnaire with both positive and negative variables. An initial issue was that this model required many variables and the use of all of these scales led to a very long survey that was not acceptable to the volunteers. Short scales were developed and these were significantly correlated with the questionnaires from which they were developed. This Wellbeing Process Questionnaire (WPQ - Williams & Smith, 2012, 2016, 2018a, 2018b; Williams, Pendlebury & Smith, 2017; Williams, Thomas & Smith, 2017) was subsequently modified for research with university students (Williams, Pendlebury, Thomas & Smith, 2017). This Student WPQ has good validity and reliability. It has been widely used in cross-sectional studies and also research with a longitudinal design which can give a better idea about causal relationships (Galvin, 2016). Overall, the results confirmed the utility of the Student WPQ and confirmatory results have been found with similar measures derived from the wellbeing process model (e.g. the Smith Wellbeing Questionnaire, SWELL, Smith & Smith, 2017a, 2017b, 2017c; Fan & Smith, 2017a, 2017b, 2018; Alharbi & Smith, 2109; Nor & Smith, 2019).

The present study

The current study aimed to identify the relationships between a combination of internet use behaviours and wellbeing and academic attainment. The Student WPQ was used to measure the concept of wellbeing because it includes established predictor scores, namely exposure to stressors, positive personality, coping strategies and social support which can then be statistically controlled when assessing the effects of internet usage. Actual GPA (a combination of examination and coursework scores) was used, as it is an objective measure of academic attainment and is preferable to self-reported attainment ratings. A selection of internet use and study behaviours were measured, including a variety of recreational internet activities, self-reported internet interference and social media usage.

Six hypotheses were proposed based on past research:
Hypothesis 1: Recreational internet use will be significantly negatively correlated with GPA scores.

Hypothesis 2: Recreational internet use will be significantly negatively correlated with positive wellbeing.

Hypothesis 3: There will be a significant negative correlation between internet interference and GPA scores.

Hypothesis 4: There will be a significant negative correlation between internet interference and positive wellbeing

Hypothesis 5: There will be a significant negative correlation between social media use and GPA scores.

Hypothesis 6: There will be a significant negative correlation between social media use and positive wellbeing.

(Hypothese for negative wellbeing were the opposite to those for positive wellbeing).

2. METHOD

Participants
The sample consisted of 313 Cardiff University psychology students (37 male, 276 female) aged between 18 and 41 years (M =19.43 SD =1.96), recruited via the Experimental Management System (EMS) in exchange for research participation credits. One-hundred and fifty-two (48.6%) were first-year students, and the remaining 161 (51.4%) were in their second year.

Materials

All participants were given an online version of the Student Wellbeing Process Questionnaire (Williams et al., 2017) to complete, along with questions on internet-related and studying behaviours. Established predictors of wellbeing, and academic attainment were derived from the WPQ and these were:

• Exposure to stressors
• Negative Coping
• Positive personality
• Social support
• Conscientiousness

The dependent variables from the WPQ were positive wellbeing (happiness, positive affect, life satisfaction) and negative affect (stress, negative affect, anxiety and depression). Internet use and studying questions are shown in Table 1. A 10 point rating scale (1=Disagree strongly to 10 Agree strongly) was used to answer many of these questions. Others required the number of hours spent on a particular activity.

Table 1: Internet use and studying behaviour

Approximately how many hours per average DAY do you spend studying? Please write in number.
Approximately how many hours per average DAY do you actively spend on the internet? Please write in number.

Approximately how many hours per average DAY do you use the internet to communicate/interact with other people? Please write in number.

Approximately how many hours per average WEEK do you spend watching video content via the internet? (e.g. Television Programmes, Films, YouTube) Please write in number.

Approximately how many hours per average WEEK do you spend browsing the internet for things to purchase? (e.g. Amazon, eBay, ASOS) Please write in number.

Please state how much you agree or disagree with the following statements: The internet interferes with the amount of time I spend studying.
When I study, I will have unrelated applications connected to the internet running in the background.

Design and Procedure

Qualtrics was used to host the survey for data collection. Academic attainment was measured using the most recent examination and coursework results, which participants gave consent for the researchers to obtain. The grade point average of every participant was calculated. The current study was approved by the Cardiff University School of Psychology Ethics Committee. All participants had to give informed consent and all the data was anonymised, including the GPA scores when merged with the wellbeing responses. The participants had the right to skip any question they were not comfortable to answer and they were also given the right to withdraw without prejudice as stated in the Code of Ethics and Conduct of the British Psychological Society (2009). At the end of the study, each subject was issued a debrief describing the detailed aims of the study.

Analysis Plan

The sample was reduced to 313 from a total of 327 participants, with 14 participants being removed from the statistical analyses. Four of these participants failed to complete any of the internet/studying questions and 10 participants entered invalid responses (e.g. one participant inputted that they studied for 30 hours a day; one participant gave an invalid response of 240 hours of watching video content whilst another gave an unrealistic estimate of 100 hours; three participants recorded 20 hours of communication time a day, and another four stated 24, 30, 40 and 70 hours. Whe there were missing values (of which there were 56), the mean value was used to replace them. A factor analysis was used to examine the structure of the internet/studying items. After this, multiple regression analyses examined the relationships between the factor scores and the dependent variables (GPA and wellbeing), whilst controlling for their established predictors.

3. RESULTS

Descriptive statistics

Students spent a mean time of 3.92 hours (SD = 3.20) of their day communicating with others online and 2.97 hours (SD = 1.60) studying. In their weekly internet activities, students spent the most time watching video content (M = 10.75 hours, SD = 8.79), followed by browsing for things to purchase (M = 2.18 hours, SD = 3.06). Participants reported that they spent a mean of 3.89 hours online every day (SD= 2.14). On average, students received a GPA of 63.05 (SD = 7.45) which is an upper second- class degree classification. Most students agreed that the internet interferes with their studying (median = 7.00, SD = 2.41), yet also agreed that they had unrelated background applications running whilst they studied (median = 6.00, SD = 2.66).

Factor analysis of the internet and studying data

A principal components analysis with a varimax rotation was carried out on the internet and studying data. This led to a 3-factor solution that accounted for 68% of the variance. The first factor, which explained 30.1% of the variance, included hours spent on the various internet/media activities. The second factor accounted for 23.5% of the variance and included items relating internet use to causing interference with studying. Finally, the third factor accounted for 14.3% of the variance and had a single item, namely hours studying. These factor scores were used in the subsequent analyses.

Univariate correlations

Hours of internet/media use were significantly correlated with negative wellbeing (r=0.13) and lower GPA scores (r =-0.14). There was also a significant correlation with negative coping (r=0.13). Hours studying was significantly correlated with GPA scores (r=0.12) and conscientiousness (r=0.19). Internet interference with studying was the strongest predictor. It was negatively correlated with GPA (r=-0.17) and positive outcomes (r=-0.14) and positively correlated with negative wellbeing (r=0.13). It was also positively correlated with established predictors of negative wellbeing (stressors: r =0.28; negative coping: r=0.19) and negatively correlated with predictors of positive wellbeing (positive personality: r=-0.13; conscientiousness: r=-0.14).

The next set of analyses controlled for established predictors and examined whether the internet/studying factors were still associated with the wellbeing and GPA outcomes.

Regression analyses

GPA was the dependent variable in the first regression. The established predictors of conscientiousness and exposure to stressors had significant effects, as did hours spent on the internet/media. Interference from the internet and hours studying had borderline levels of significance. These results are shown in Table 2.

Table 2: GPA regression

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig
1	(Constant)	65.360	4.294		15.220	.000
	Stressors	-.127	.049	-.163	-2.578	.010
	Social Support	.084	.085	.062	.983	.326
	Negative Coping	.010	.100	.006	.096	.924
	Positive Personality	-.169	.078	-.146	-2.179	.030
	Conscientiousness	.709	.220	.187	3.216	.001
	Internet hours	-1.061	.403	-.142	-2.633	.009
	Interference from the internet	-.784	.412	-.105	-1.904	.058
	Study hours	.679	.400	.091	1.697	.091

In the negative wellbeing regression the established predictors had their usual significant effects. None of the internet/studying variables were significant, and this is shown in Table 3.

Table 3: Negative wellbeing regression

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	sig
(Constant)	24.071	2.762		8.716	0.000
Stressors	.201	.032	.285	6.189	0.000
Internet hours	.202	.263	.030	.769	0.442
Interference from internet	-.247	.270	-.037	-.914	0.361
Hours of Study	.293	.259	.043	1.135	0.257
Negative coping	.258	.065	.174	3.959	0.000
Positive personality	-.501	.051	-.478	-9.832	0.000
Social Support	.047	.055	.038	.855	0.393

In the positive wellbeing regression, the established predictors had their usual significant effects. None of the internet/studying variables were significant, and this is shown in Table 4.

Table 4: Positive wellbeing regression

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	
(Constant)	6.082	1.876		3.242	0.001
Stressors	-.111	.022	-.211	-5.043	0.000
Internet hours	.282	.179	.056	1.577	0.116
Negative coping	-.059	.044	-.054	-1.343	0.180
Interference from internet	.005	.183	.001	.030	0.976
Hours of study	.072	.176	.014	.408	0.683
Social support	.110	.037	.120	2.956	0.003
Positive personality	.453	.035	.579	13.092	0.000

4. DISCUSSION

The results from the present study show that hours spent on the internet and other media are associated with negative wellbeing, lower GPA scores and negative coping. Interference from the internet showed an even stronger pattern of negative outcomes but was also associated with the established predictors of these outcomes. Analyses controlling for the effects of established predictors showed no significant effects of internet use on wellbeing outcomes. However, the effects of internet use remained significant in the analyses of GPA scores.

These results show that it is essential to control for other predictors of wellbeing when assessing the effects of internet use. The effects of internet use on attainment were independent of the effects of other predictors. However, as this study used a cross-sectional design, it is difficult to argue that a causal relationship has been demonstrated. A better approach would be to use a longitudinal design, preferably with an intervention manipulating internet use. In addition, it is important to measure the specific type of internet-use rather than just the time spent on it.

In conclusion, the present study showed a robust association between academic attainment and internet use. In contrast, associations between internet use and wellbeing were found to reflect correlations between these variables and other components of the wellbeing process (e.g. exposure to stressors; negative coping; positive personality and social support).

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