

Study Addiction: A Cross-Cultural Longitudinal Study Examining Temporal Stability and Predictors of Its Changes

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Background and aims: “Study addiction” has recently been conceptualized as a behavioral addiction and defined within the framework of work addiction. Using a newly developed measure to assess this construct, the Bergen Study Addiction Scale (BStAS), the present study examined the 1-year stability of study addiction and factors related to changes in this construct over time, and is the first longitudinal investigation of study addiction thus far. *Methods:* The BStAS and the Ten Item Personality Inventory were administered online together with questions concerning demographics and study-related variables in two waves. In Wave 1, a total of 2,559 students in Norway and 2,177 students in Poland participated. A year later, in Wave 2, 1,133 Norwegians and 794 Polish, who were still students completed the survey. *Results:* The test–retest reliability coefficients for the BStAS revealed that the scores were relatively stable over time. In Norway, scores on the BStAS were higher in Wave 2 than in Wave 1, whereas in Poland, the reverse pattern was observed. Learning time outside classes at Wave 1 was positively related to escalation of study addiction symptoms over time in both samples. Being female and scoring higher on neuroticism was related to an increase in study addiction in the Norwegian sample only. *Conclusions:* Study addiction appears to be temporally stable, and the amount of learning time spent outside classes predicts changes in study addiction 1 year later.

Keywords: longitudinal study, personality, study addiction, test–retest reliability, workaholism, work addiction

INTRODUCTION

“Study addiction” was recently anchored as a type of behavioral addiction (Atroszko, Andreassen, Griffiths, & Pallesen, 2015) and was conceptualized within contemporary theories of “work addiction” (i.e., workaholism). Study addiction was defined as “being overly concerned with studying, to be driven by an uncontrollable motivation to study, and investing so much energy and effort into studying that it impairs private relationships, spare-time activities, and/or health” (Andreassen, Hetland, & Pallesen, 2014, p. 8). In spite of the possible problematic nature of overstudying, one has to be cautious with overpathologizing excessive behaviors (Billieux, Schimmenti, Khazaal, Maurage, & Heeren, 2015; Maraz, Király, & Demetrovics, 2015). However, some currently identified addictions appear to be subtypes of more general classes of behavioral addiction, such as dance addiction being conceptualized as a type of exercise addiction (Bavli et al., 2016; Maraz, Urbán, Griffiths, & Demetrovics, 2015). Study addiction has been conceptualized as a precursor for another behavioral addiction, work addiction, which has been recognized by some as a behavioral addiction for decades (e.g., Oates, 1971). In a recent study of a representative sample of working people in Norway, it was demonstrated that around 8.3% of the population were addicted to work (Andreassen et al., 2014). A similar prevalence of study addiction was found in several student samples in Norway and Poland (Atroszko, 2015). Viewed from this

perspective, it can be argued that study addiction deserves focus as a potential behavioral addiction.

In order to assess the study addiction, the Bergen Study Addiction Scale (BStAS) was developed (Andreassen et al., 2013; Atroszko et al., 2015). The BStAS reflects seven core addiction symptoms applied to studying: salience, mood modification, tolerance, withdrawal, conflict, relapse, and problems. Recently, a cross-cultural study among Norwegian and Polish students demonstrated good psychometric properties of the scale as well as study addiction being related to higher learning engagement, longer learning time, lower academic performance, key personality traits (higher neuroticism and conscientiousness, and lower extraversion), impaired general health, decreased quality of life, poor sleep, and higher perceived stress (Atroszko et al., 2015). These results were in line with findings often reported in the more developed work addiction literature (Andreassen, 2014; Andreassen & Pallesen, 2016).

A crucial criterion for the validity of a psychiatric disorder is its temporal stability (Atroszko, 2012; Robins & Guze, 1970). In previous studies, work addiction has been shown to be relatively stable over time (Andreassen et al., 2014). Therefore, one of the main aims of the present study

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was to investigate whether study addiction demonstrates similar temporal stability to that of work addiction. Since studying is considered as the behavioral equivalent of “the drug of choice,” the amount of time devoted to studying outside classes is likely to be a predictor of the progression of addictive symptoms (Dennis & Scott, 2007; Koob & Volkow, 2010). Study addiction has been linked to ineffective coping with stress and is congruent with the notion that addictions initiate and then develop as a way of regulating mood by ingesting a specific psychoactive substance and/or engaging in a specific behavior (Atroszko, 2015). This suggests that susceptibility to experiencing negative emotions and emotional instability (i.e., neuroticism) should be positively related to escalation of study addiction symptoms with time. In addition to this, studies have consistently shown that women progress faster than men from the initiation of substance use to the onset of dependence and first admission to treatment (Greenfield, Back, Lawson, & Brady, 2010). This effect is called “telescoping.” Gender differences in compulsive behaviors have also been observed, suggesting that women more often use specific substances or activities to self-medicate their depression and/or to reduce stress (Becker & Hu, 2008; Becker, Perry, & Westenbroek, 2012; Fattore, Melis, Fadda, & Fratta, 2014; Mitchell & Potenza, 2015).

Based on the preceding literature, it was hypothesized that (a) the BStAS would show high long-term stability of study addiction (H1); (b) study addiction scores would increase with time (H2); (c) neuroticism and time devoted to studying outside university classes would predict escalation of study addiction over time (H3); and (d) study addiction would progress faster in women (H4).

METHODS

Participants

Norwegian sample. The Norwegian sample comprised 2,559 students of different faculties, courses, modes, and years of studies in Norway; 45.5% came from the University of Bergen and 55.5% were from the Bergen College. The sample comprised 68.2% females and 31.8% males with a mean age of 24.67 years ($SD = 6.01$). In Wave 2, 1,560 students completed the survey. Almost three-quarters (72.6%) were still studying, while 24.3% had started to work professionally, and 3.0% were unemployed. The overall response rate was 61.0%. Of those still studying, 72.9% were females and 27.1% were males, with a mean age of 24.63 years ($SD = 4.78$). Attrition analysis by means of logistic regression model showed that those who took part in Wave 2, in comparison to those who did not, were more often women ($p < .001$, odds ratio [OR] = .63) and older ($p < .001$, $OR = 1.03$), had lower scores on study addiction ($p = .002$, $OR = .97$) and extraversion ($p = .014$, $OR = .96$), and higher scores on conscientiousness ($p < .001$, $OR = 1.07$).

Polish sample. The Polish sample comprised 2,177 students of diverse faculties, courses, modes, and years of studies at nine different universities in Poland. The sample comprised 74.3% females and 25.7% males, with a mean

age of 21.97 years ($SD = 3.12$). In Wave 2, 1,264 students completed the survey. Of these, almost two-thirds (62.8%) were still studying, while 31.7% had begun to work professionally, and 5.5% were unemployed. The overall response rate was 58.1%. Those who were still students comprised 82.2% females and 17.8% males, with a mean age of 22.01 years ($SD = 1.70$). Attrition analysis by means of logistic regression model showed that those who took part in Wave 2, in comparison to those who did not, were more often women ($p < .001$, $OR = .51$) and older ($p = .046$, $OR = 1.03$), had lower scores on study addiction ($p = .006$, $OR = .98$) and extraversion ($p = .002$, $OR = .95$), had higher scores on conscientiousness ($p = .039$, $OR = 1.04$) and spend more time on learning outside classes ($p = .002$, $OR = 1.02$).

Measures

Demographics. At Wave 1, both samples were asked about their age and gender (female = 0, male = 1), and to provide estimates of the total number of hours they devoted weekly for studying at the college/university both in and outside of classes (e.g., at home or library).

Study addiction. The BStAS is an adaptation of the Bergen Work Addiction Scale (BWAS; Andreassen, Griffiths, Hetland, & Pallesen, 2012) and includes seven items that are based on core addiction components (Brown, 1993; Griffiths, 2005; Leshner, 1997). The questions concern symptoms experienced during the past 12 months. The responses are provided on a Likert scale ranging from “never” (1) to “always” (5). The scale has demonstrated good construct validity (one factor structure, content, concurrent, and discriminant validity) and reliability (internal consistency) in previous studies (Atroszko et al., 2015). Also, a one-factor solution has been found for the BWAS (Andreassen et al., 2012), and it has been translated into several languages and has demonstrated good reliability and validity across studies (Andreassen et al., 2012, 2013, 2014; Molino, 2012; Orosz et al., 2016). In Wave 1, the Cronbach’s alphas for the BStAS were .80/.78 in the Norwegian and Polish sample, respectively, and .81/.82 in Wave 2.

Personality. The “Ten Item Personality Inventory” (TIPI) was included in Wave 1 to assess the five-factor model of personality (Gosling, Rentfrow, & Swann, 2003). The TIPI comprises 10 items that each is scored from “strongly disagree” (1) to “strongly agree” (7). Each dimension of the big five (extraversion, agreeableness, conscientiousness, neuroticism, and openness) is represented by two items. In the present study, the Spearman–Brown coefficients for the five subscales were .75/.71, .38/.36, .59/.66, .65/.70, and .38/.42, respectively, in the Norwegian and Polish sample. Spearman–Brown formula was used, because it gives (on average) less biased coefficients than Cronbach’s alpha for the reliability of a two-item instruments (Eisinga, Te Grotenhuis, & Pelzer, 2013). The originally reported Cronbach’s alpha coefficients were .68, .40, .50, .73, and .45, respectively, and test–retest reliability coefficients with a two-week interval between measurements were .77, .71, .76, .70, and .62. The scale also had good convergent and criterion validity in previous studies (Gosling et al., 2003).

Procedure

In both countries, students were invited to participate in an online two-wave survey via their faculties/universities. Convenience sampling was used. An invitation to the study was put either on the faculties' web pages with description of the study and link to the survey or directly via internal university e-mailing system. Those who were willing to participate entered the survey through the link and agreed to participate via the informed consent form on the first page. In Norway, data collection in both waves took place during September to December 2013 and 2014, respectively. In Poland, the corresponding data collection was conducted during October to January of 2013/2014 and 2014/2015. A prize draw of 60 gift cards in Norway (value 500 NOK) and 100 gift cards in Poland (value 50 PLN) was provided for each wave as an incentive to complete the survey.

Statistical analysis

An intraclass correlation coefficient (ICC) using a two-factor mixed effects model and type consistency along with the 95% confidence interval (CI) was calculated as a measure of the long-term stability of study addiction (McGraw & Wong, 1996). Student's *t*-tests for dependent samples were used to test if there were significant differences in study addiction between the two waves of the study. Cohen's *d* for matched groups was calculated as an effect size measure (Dunlap, Cortina, Vaslow, & Burke, 1996). To examine the associations between the study variables, Pearson's product-moment correlation coefficients were calculated. Hierarchical multiple regression analyses were conducted with study addiction at Wave 2 as dependent variable, for both samples. Gender, age, and study addiction at Wave 1 were entered as independent variables in the first step of the regressions. In the second step, the personality traits of extroversion, agreeableness, conscientiousness, neuroticism, and openness were entered. Finally, the amount of time spent studying during classes and outside of classes at Wave 1 was entered in Step 3. All tests were two-tailed, and the significance level was set to $\alpha = 0.05$. For all linear regression analyses, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. All analyses were conducted using IBM SPSS.22.

Ethics

Since major health outcomes were not assessed in the present study, the Regional Committee for Medical and Health Research Ethics deemed the project to fall outside their jurisdiction. Ethical principles were carried out in accordance with the Declaration of Helsinki. The project was approved by both the Norwegian Data Protection Official for Research and the Research Ethics Committee at the Psychology Department of the University of Gdańsk in Poland. Attaining formal and written informed consent was not regarded as necessary by either of these committees as voluntary completion of the questionnaires was regarded as providing consent.

Table 1. Mean scores and standard deviations, percentages, and correlations between the study variables in Norwegian ($n = 1133$) and Polish ($n = 794$) samples

| Variable | Mean (SD)/ Percentages, | | Correlations | | | | | | | | | | | |
|--|-------------------------|---------------|--------------|-------|--------|--------|--------|--------|--------|--------|-------|-------|--------|--|
| | Norwegian sample | Polish sample | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
| 1 Gender ^{a,b} | 72.9% females | 82.2% females | | | | | | | | | | | | |
| 2 Age | 23.53 (4.55) | 21.03 (1.71) | .02 | .10** | -.19** | -.19** | -.13** | -.16** | -.10** | -.27** | -.03 | .04 | -.06* | |
| 3 BSTAS Wave 1 | 16.24 (4.83) | 17.53 (5.07) | -.15** | -.02 | .10** | .06 | .01 | -.01 | -.02 | -.04 | .11** | -.02 | .14** | |
| 4 BSTAS Wave 2 | 16.81 (4.87) | 16.94 (5.15) | -.12** | .04 | .66** | .56** | -.07* | .02 | .07* | .34** | .02 | .13** | .26** | |
| 5 Extroversion | 9.25 (2.82) | 8.79 (2.93) | -.12** | -.08* | -.10** | -.10** | -.01 | -.02 | .05 | .27** | .01 | .07* | .19** | |
| 6 Agreeableness | 9.71 (2.04) | 9.75 (2.2) | -.05 | -.02 | .03 | -.01 | .01 | -.02 | .10** | -.11** | .17** | .03 | -.14** | |
| 7 Conscientiousness | 10.72 (2.26) | 9.94 (2.55) | -.08* | .06 | .13** | .13** | .06 | .06 | .17** | -.11** | .12** | .04 | -.05 | |
| 8 Neuroticism | 6.88 (2.67) | 8.02 (2.74) | -.21** | -.01 | .20** | .15** | -.06 | -.37** | -.20** | -.15** | .01 | .13** | .12** | |
| 9 Openness | 10.15 (2.01) | 10.37 (2.1) | -.05 | .01 | -.03 | .01 | .34** | -.07* | .08* | .05 | -.04 | -.07* | .05 | |
| 10 Time learning at the university classes | 22.2 (11.42) | 22.51 (11.48) | -.04 | .08* | .20** | .20** | -.03 | .06 | .13** | -.02 | -.01 | -.08* | .07* | |
| 11 Time learning outside classes | 10.41 (8.44) | 14.45 (11.98) | -.06 | -.01 | .40** | .36** | -.08* | .02 | .16** | -.01 | -.06 | .34** | -.18** | |

Note. Above diagonal are results for Norwegian sample, below diagonal are results for Polish sample. ^a0 = women, 1 = men. ^bThe correlation coefficients are point-biserial correlation coefficients. * $p < .05$. ** $p < .01$.

Table 2. Results of hierarchical multiple regression analyses in which age, gender, study addiction Wave 1, the five-factor model dimensions (neuroticism, extroversion, openness, agreeableness, and conscientiousness), and learning time during and outside university classes were entered as independent variables for study addiction Wave 2

| Step | Predictor | Study addiction Wave 2 (Norway) ^a | | Study addiction Wave 2 (Poland) ^b | |
|-----------------------------------|----------------------------------|--|--------------|--|--------------|
| | | β | ΔR^2 | β | ΔR^2 |
| 1 | Gender ^c | -.088** | .325** | -.018 | .442** |
| | Age | .014 | — | .055* | — |
| | Study addiction Wave 1 | .546** | — | .661** | — |
| 2 | Gender ^c | -.072** | .008* | -.016 | .004 |
| | Age | .018 | — | .048 | — |
| | Study addiction Wave 1 | .522** | — | .649** | — |
| | Extroversion | .026 | — | -.041 | — |
| | Agreeableness | -.040 | — | -.015 | — |
| | Conscientiousness | .023 | — | .046 | — |
| | Neuroticism | .082** | — | .017 | — |
| | Openness | .000 | — | .035 | — |
| 3 | Gender ^c | -.070** | .002 | -.014 | .011** |
| | Age | .013 | — | .047 | — |
| | Study addiction Wave 1 | .507** | — | .601** | — |
| | Extroversion | .033 | — | -.034 | — |
| | Agreeableness | -.035 | — | -.014 | — |
| | Conscientiousness | .014 | — | .033 | — |
| | Neuroticism | .087** | — | .027 | — |
| | Openness | -.003 | — | .037 | — |
| | Study time during classes Wave 1 | .020 | — | .035 | — |
| Study time outside classes Wave 1 | .050 | — | .102** | — | |
| Total R^2 | | .336* | | .458** | |

^aNorwegian sample. ^bPolish sample. ^c0 = women, 1 = men. * $p < .05$. ** $p < .01$.

RESULTS

Descriptive statistics

Table 1 presents mean scores and standard deviations for all the study variables as well as their inter-relationships in Norwegian and Polish samples.

Test-retest stability

The ICC was .72 (95% CI = .69–.75, $p < .001$) and .80 (95% CI = .77–.82, $p < .001$) for the Norwegian sample and the Polish sample, respectively. In the Norwegian sample, the scores on the BStAS were significantly higher in the Wave 2 ($M = 16.81$, $SD = 4.87$) than in the Wave 1 ($M = 16.24$, $SD = 4.83$), $t_{1132} = 4.21$, $p < .001$, $d = .12$. In the Polish sample, the scores on the BStAS were significantly lower in the Wave 2 ($M = 16.94$, $SD = 5.15$) than in the Wave 1 ($M = 17.53$, $SD = 5.07$), $t_{793} = 3.92$, $p < .001$, $d = .11$.

Predictors of changes in study addiction with time

The regression analysis for study addiction in the Norwegian sample showed that the independent variables explained a total of 33.6% of the variance ($F_{10,1113} = 56.23$, $p < .001$). Significant independent variables in the third and final step were gender ($\beta = -.07$), study addiction Wave 1 ($\beta = .51$),

neuroticism ($\beta = .09$), and marginally study time ($p = .061$) outside classes Wave 1 ($\beta = .05$) (see Table 2). The regression analysis for study addiction in the Polish sample showed that the independent variables explained a total of 45.8% of the variance ($F_{10,773} = 65.28$, $p < .001$). Significant independent variables in the third and final step were study addiction at Wave 1 ($\beta = .60$) and study time outside classes Wave 1 ($\beta = .10$) (see Table 2).

DISCUSSION

This is the first study to investigate study addiction longitudinally. The BStAS (Atroszko et al., 2015) demonstrated high long-term stability, and in both samples, study addiction at Wave 1 predicted study addiction at Wave 2. Therefore, Hypothesis 1 was supported. These results correspond well with the results from studies on work addiction (Andreassen et al., 2014), providing some initial support for the validity of study addiction as a potential addictive entity (Atroszko, 2012; Robins & Guze, 1970).

In the Norwegian sample, an increase in the scores on the BStAS increased from Wave 1 to Wave 2, whereas the opposite effect was observed for the Polish sample. The decrease in study addiction among Polish students, as they progressed with their course of studies, may tentatively be attributed to gradually decreasing gratification from

studying due to growing awareness of the unfavorable labor market situation among graduates in Poland as well as deteriorating education standards, and the interaction between them (Atroszko, 2013b). For these reasons, Polish students may also feel motivated to engage in other activities rather than studying to regulate their mood (Atroszko & Atroszko, 2013b). Hypothesis 2 was therefore only supported by findings in the Norwegian sample, and not the Polish sample.

In line with Hypothesis 3, neuroticism and time devoted to studying outside classes at Wave 1 were expected to predict increase in study addiction from Wave 1 to Wave 2. Support for this hypothesis was found for neuroticism and marginally for time devoted to studying outside classes in the Norwegian sample, whereas only the latter of these two predictors was significant in the Polish sample. The relationship of neuroticism and escalation of study addiction may be associated with the interplay between academic pressures, socioeconomic factors, and vulnerability to negative emotions, as some of these factors were associated with Polish students' learning-related attitudes, beliefs, and behaviors in previous research (Atroszko, 2013a; Atroszko & Atroszko, 2013a). A more direct relationship between overall academic performance and future job opportunities in Norway may account for the positive relationship between neuroticism and higher scores in study addiction.

Hypothesis 4, that study addiction would increase relatively more for females than males, was supported by data from the Norwegian sample only. This may reflect gender role differences related to labor market and attitudes to work between Norway and Poland (Fortin, 2005).

Strengths and limitations

In terms of limitations, both the Norwegian and the Polish sample comprised predominantly females and non-representative samples; therefore, the results of the present study cannot be generalized to other populations without some reservation. Furthermore, all data were self-reported and are therefore open to the usual weaknesses of such data (e.g., social desirability bias and recall biases). There may also have been a slight bias related to the fact that participants in Wave 2 somewhat differed from those who did not participate in the follow-up on some of the relevant variables, gender being the most salient among them.

Regarding the strengths, the present study was longitudinal, comprised relatively large sample sizes, and is the first to investigate the long-term temporal stability of study addiction and factors related to its changes over time. Samples included students from both Norway and Poland, thus allowing some degree of cross-cultural comparison. Valid and reliable measures of study addiction and personality were used. Consequently, the present study significantly adds to the existing literature on behavioral addictions and provides further insights into the nature of study addiction.

Conclusions and future research directions

The BStAS showed good long-term stability. These findings add support for the validity of study addiction as a

behavioral addiction. As expected, study addiction escalation was positively related to the amount of learning time outside college/university classes, and in Norway, it was also associated with neuroticism and being female. However, more studies examining these areas are warranted as the results were not entirely consistent across countries. Potential cultural and socioeconomic factors accounting for the observed difference should therefore be examined. Future research should also investigate the transition from studying to work in order to explore the relationship between study addiction and later work addiction and as such investigate whether study addiction is a precursor and/or predictor of being a prodromal symptom of work addiction.

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Authors' contribution: PAA assisted with obtaining funding, literature search, study design and concept, data collection, statistical analyses, data interpretation, generation of the initial draft of the manuscript, manuscript preparation and editing, and final editing; CSA assisted with literature search, data interpretation, manuscript preparation and editing, and final editing; MDG assisted with literature search, data interpretation, manuscript preparation and editing, and final editing; SP assisted with obtaining funding, literature search, study design and concept, data collection, statistical analyses, data interpretation, manuscript preparation and editing, and final editing.

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