The Role of Self-Efficacy as a Mediator on the Axis Personality Traits–Self-Efficacy–Academic Stress

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ABSTRACT

Several studies have linked university students' personality traits and self-efficacy to perceived academic stress. However, there is a lack of knowledge about more complex interactions of these constructs. The present paper aims to explore the relationship between the Big Five personality traits, self-efficacy and academic stress, and the possible mediating role of self-efficacy among Czech university students of education. The sample consisted of 443 university students of education. The participants completed the General self-efficacy questionnaire, Ten Item Personality Measure, and Olomouc Questionnaire of Academic Stress. The GSE was positively correlated with TIPI personality traits, and negatively correlated with academic stress domains. The TIPI personality traits were negatively correlated with academic stress domains. A path analysis showed that extraversion (β=.09, CI=.025-.163), emotional stability (β=-.12, CI=-.198 to -.053), and openness to experience (β=.09, CI=-.168 to -.021) predicted learning-related academic stress. Agreeableness predicted social life-related academic stress (β=-.16, CI=-.241 to -.067). Finally, extraversion (β=-.04, CI=-.087-.018), emotional stability (β=-.16, CI=-.213 to -.105), and openness to experience (β=-.11, CI=-.165 to -.064) predicted self-efficacy, which was predictive of learning-related (β=-.24, CI=-.311 to -.168) and social life-related academic stress (β=-.22, CI=-.151-.014). Also, social life-related stress predicted learning-related stress (β=.18, CI=.107-.248) and time-related stress (β=.44, CI=.369-.506), which predicted learning-related stress (β=.36, CI=.298-.426). The final model explained 42 % of learning-related (R^2=.423), 24 % of time-related (R^2=.244), and 13 % of social life-related (R^2=.129) academic stress. The results of the study indicate that personality traits and self-efficacy affect mainly learning-related academic stress, and that self-efficacy acts as a significant mediator of the relationship between personality and academic stress.

Keywords

personality traits, Big Five, self-efficacy, academic stress, mediation

Introduction

Academic stress is one of the most prominent factors that negatively affects academic performance and achievement. It represents a mental distress related to anticipated frustration associated with academic failure or even awareness of the possibility of such failure (Lal, 2014). In fact, university environment and studies are associated with a broad variety of stressors such as the necessity to assimilate a large amount of academic materials in a short period, studying for exams, family-related pressures, failures and poor relationships with other students or teachers,

necessity of changing own habits, demands for adjustment to the social environment, competition in classes, high bureaucratic university administrative procedures financial burdens, and the lack of time management skills (Campbell, Svenson, & Jarvis, 1992; Cheng, Leong, & Geist, 1993; Forehand et al., 1991; Sarita, 2015). This can manifests as anxiety, anger, depression, frustration, inability to concentrate, and exhaustion, which have a negative impact on university students' health and their academic performance (Pearlin, 1999; Perlberg & Keinan, 1986). The level of experienced stress is affected by the resources available for the person in order to deal with specific stressful events and situations (Campbell et al., 1992; Zeidner, 1992). These also include mental resources, such as personality traits and self-efficacy.

A vast number of studies confirmed the relationship between personality and stress (academic as well as general). Most frequently reported traits associated with stress were extraversion and neuroticism (emotional stability), where higher extraversion was connected to lower perceived stress (Ahadi & Narimani, 2010; Chu, Ma, Li, & Han, 2015; Shokri et al., 2007; Tyssen et al., 2007), whereas high neuroticism (low emotional stability) was positively associated with higher stress levels (Afshar et al., 2015; Ahadi & Narimani, 2010; Ebstrup, Eplov, Pisinger, & Jørgensen, 2011; Fornés-Vives, García-Banda, Frías-Navarro, Hermoso-Rodríguez, & Santos-Abaunza, 2012; Kaur, Chodagiri, & Reddi, 2013; Mazé & Verlhiac, 2013; Nandrion, Reveillere, Sailly, Moreel, & Beaune, 2003; Shokri et al., 2007). Several studies also found the associations (of various directions) with other personality traits. In example, agreeableness was found to positively (Panchu, Ali, & Thomas, 2016), as well as negatively (Ahadi & Narimani, 2010; Ebstrup et al., 2011; Khodamoradi & Farahnaz, 2016) correlate with stress.

Less is known about the role of self-efficacy on the axis personality traits–self-efficacy–academic stress, given that previous studies focused mainly on the single interactions between individual pairs of these constructs. In example, conscientiousness, openness to experience, and extraversion showed a positive association with self-efficacy as well as a negative association with neuroticism (Brown &

Cinamon, 2016; Hartman & Betz, 2007). The effect of self-efficacy on academic stress was described as inverse, with higher levels of self-efficacy associated with lower academic stress (Cheraghi, Dasta, Ghorbani, Abidizadegan, & Arabzade, 2009; Khodamoradi & Farahnaz, 2016; Madnani & Pradhan, 2013; McKay, Dempster, & Byrne, 2014), especially in the social and learning domains.

Intriguingly, self-efficacy may allow inherent personality traits to be expressed as a behaviour (Fosse, Buch, Säfvenbom, & Martinussen, 2015). Furthermore, self-efficacy is a very advantageous feature in the university environment because it gives a confidence that a person is able to successfully complete a given university related task (Fouladi & Wallis, 2014; Solberg, O'Brien, Villareal, Kennel, & Davis, 1993). Given that self-efficacy is accessible for intervention, but personality traits are essentially innate, the indirect effect of personality traits on academic stress through affecting self-efficacy may play even a greater role in academic achievement than its simple direct effect.

The aim of this study was therefore to examine complex and joint effect of personality and self-efficacy on perceived academic stress. Several reasons justify purpose of this study. First, the lack of knowledge about more complex interactions of personality traits, self-efficacy, and academic stress creates gap in our understanding of processes that affect university studies. Second, academic stress has potential to hamper and worsen mental health, as well as academic performance and success of students, which might lead to the study failure and early termination of the study. Third, self-efficacy, compared to personality traits, is accessible for interventions, and thus represents a viable path not only to the improvement of students' study performance, but also to the beneficial personal development. Last, but not least, identification and understanding these intervention-accessible mechanisms becomes even more important during exceptional and extremely challenging circumstances like current global COVID-19 pandemic that hampers the course of study and raises study obstacles hitherto rather unknown.

Methodology

The study was conducted in compliance with applicable ethical principles. The research study involved university students on a voluntary basis; the participants were informed about the possibilities to terminate their participation at any stage of the research without giving a reason. The participants consented to anonymous data processing and use of data for scientific purposes. All participants signed an informed consent.

The data were collected using a Google Forms online survey consisting of several parts. The first part contained demographic questions and general information regarding the course of study. The second part consisted of a battery of 3 psychological tools. *General self-efficacy questionnaire* (GSE) (Schwarter & Jerusalem, 1995) is a 10-item self-report scale designed to assess optimistic self-beliefs to cope with a variety of difficult demands in life. The reliability of the questionnaire reaches an acceptable level of ω=.848. *Ten Item Personality Measure* (TIPI) (Gosling, Rentfrow, & Swann, 2003) is a short 10-item questionnaire assessing personality traits based on the Big Five. It measures five traits: Extraversion, Emotional stability (Neuroticism), Agreeableness, Conscientiousness, and Openness to experience. Although short, the questionnaire has proved its usefulness and validity compared with longer scales (Gosling et al., 2003; Vorkapić, 2016), although the psychometric characteristics are not excellent due to the TIPI design (Kline, 1993; Woods & Hampson, 2005). *The Academic Stress Inventory* (ASI) is a newly developed scale for assessing three aspects of perceived stress in the university environment. The three domains of academic stress encompass learning-related stress (including experienced stress as a result of exams and exam preparation, amount of information to learn etc.), time-related stress (lack of time to learn, fulfilling assignments in time etc.) and social life-related stress (need to combine study and personal life, lack of support in study, acquiring new social skills, establishing and maintaining relationships). The reliability of questionnaire reaches acceptable to good levels, with ω=.853 (total score), .788 (learning stress), .663 (time stress), and .745 (social life-related stress).

The data were analysed in JASP 0.9.1, SPSS v.21 and AMOS v.21 using descriptive statistics calculation, correlation analysis and structural equation modelling (path analysis with bootstrapping (ML). The assumptions for use were verified beforehand.

Results

The study sample consisted of 443 university students of the Faculty of Education of whom 355 (80.1%) were females and 88 (19.9%) were males, with mean age=24.59 ±6.05 years, ranging from 18-54years. Most of the participants were in the first year of bachelor or master studies and studied the teaching program in the full-time form of study (Table 1).

The associations were analysed using structural equation modelling (path analysis) with personality traits as independent variables, self-efficacy as a mediator, and academic stress domains as dependent variables. The initial theory-driven model is shown in Figure 1, descriptive statistics for the individual scales is shown in Table 2.

Table 1. Descriptive for variables included in structural equation (N=443)

		Total (N=443)	Female (N=355)	Male (N=88)
Age[a]		24.6 ±6.0	24.1 ±5.7	26.7 ±6.7
Study year[b]	1st (B.A.)	158 (35.7)	150 (42.3)	8 (9.1)
	2nd (B.A.)	59 (13.3)	40 (11.3)	19 (21.6)
	3rd (B.A.)	19 (4.3)	7 (2.0)	12 (13.6)
	1st (M.A.)	203 (45.8)	157 (44.2)	46 (52.3)
	2nd (M.A.)	5 (.9)	1 (.3)	3 (3.4)

Form of study[b]	full-time	325 (73.4)	261 (73.5)	64 (72.7)
	distance	118 (26.6)	94 (26.5)	24 (27.3)
Type of program[b]	teaching	373 (84.2)	294 (82.8)	79 (89.8)
	non-teaching	70 (15.8)	61 (17.2)	9 (10.2)

[a]mean ±SD, [b]count (%)

A correlation analysis indicated multiple strong relationships between all variables (see Table 3). In most cases, self-efficacy is negatively correlated with academic stress and positively correlated with personality traits with strong relationships. Personality traits are also negatively correlated with all academic stress domains except for conscientiousness.

Table 2. Descriptive statistics for variables included in structural equation (N=443)

	Mean (±SD)
Extraversion	2.89 (±0.54)
Agreeableness	4.15 (±1.50)
Conscientiousness	4.32 (±0.91)
Emotional stability	5.24 (±1.20)
Openness to experience	4.21 (±1.42)
Self-efficacy	5.26 (±1.12)
Learning-related academic stress	28.83 (±4.34)
Time-related academic stress	3.12 (±0.66)
Social life-related academic stress	3.27 (±0.72)

The goodness-of-fit of the initial model was not sufficient (see table 4) so the model was adjusted based on modification indices. The paths between personality traits, self-efficacy and academic stress domains were rearranged and paths between the individual domains of academic stress were added. The final model had the desirable goodness-of-fit. CFI, TLI a IFI are higher than .9 (Byrne, 1994; March, Balla, & Hau, 1996), relative X^2 is lower than .2 (Ullman, 2001), and RMSEA is lower than .5 (Steiger, 1990) (see Table 4).

The final model reveals several direct and indirect effects (see Figure 2). Self-efficacy affects learning-related (β=-.24, 90 % CI=-.311 to -.168, P<.01) and social life-related (β=-.22, 90 % CI=-.151 to .014, P<.01) academic stress. Extraversion affects directly and indirectly learning-related stress (β=.09, 90 % CI=.025 to .163 for direct effect and β=-.04, 90 % CI=-.087 to .018 for indirect effect, P<.05) and indirectly social life-related stress (β=-.02, 90 % CI=-.046 to -.005, P<.05) with self-efficacy as a mediator.
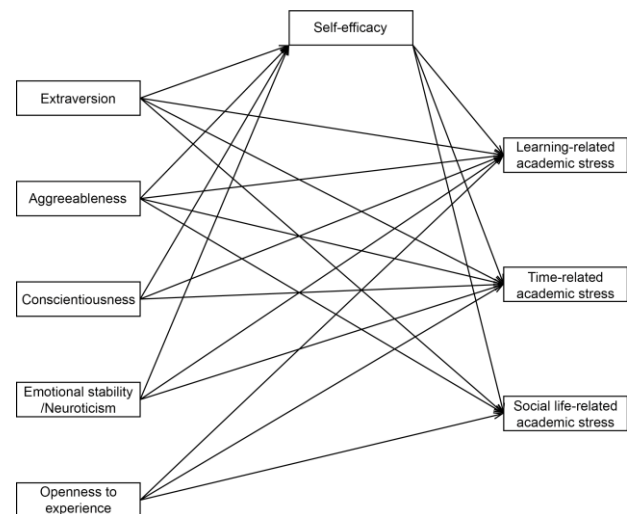

Figure 1. Theory-driven model of direct and indirect effects between personality traits, self-efficacy, and individual domains of academic stress

Agreeableness affects directly social life-related stress (β=-.16, 90% CI=-.241 to -.067, P<.01). Emotional stability affects directly and indirectly learning-related stress (β=-.12, 90% CI=-.198 to -.053, P<.05 for direct effect and β=-.16, 90% CI=-.213 to -.105 for indirect effect, P<.01). Finally, openness to experience affects directly and indirectly learning-related stress (β=-.09, 90% CI=-.168 to -.021 for direct effect and β=-.11, 90% CI=-.165 to -.064 for indirect effect, P<.05). At the same time, relatively strong direct and indirect effects between the individual dimensions of academic stress emerged. Social life-related stress affects directly and indirectly

learning-related stress (β=.18, 90% CI=.107 to .248 for direct effect and β=.16, 90% CI=.126 to .203 for indirect effect with time-related stress as a mediator, P<.01) and directly time-related stress (β=.44, 90% CI=.369 to .506, P<.01). Finally, time-related stress affects directly learning-related stress (β=.36, 90% CI=.298 to .426, P<.01).

Table 3. Correlation analysis of the relationships between personality, self-efficacy, and academic stress (N=443)

	GSE	LRNG S	TIME S	SOC S	TOT S	TIPI EX	TIPI A	TIPI C	TIPI ES	TIPI O
GSE	1									
LRNG S	-.437[**]	1								
TIME S	-.230[**]	.525[**]	1							
SOC S	-.297[**]	.450[**]	.480[**]	1						
TOT S	-.408[**]	.820[**]	.767[**]	.832[**]	1					
TIPI EX	.347[**]	-.153[**]	-.139[**]	-.169[**]	-.192[**]	1				
TIPI A	.172[**]	-.135[**]	-.162[**]	-.234[**]	-.223[**]	.275[**]	1			
TIPI C	.054	.000	.009	-.008	-.001	.022	.053	1		
TIPI ES	.474[**]	-.332[**]	-.201[**]	-.222[**]	-.316[**]	.391[**]	.313[**]	.164[**]	1	
TIPI O	.415[**]	-.275[**]	-.162[**]	-.236[**]	-.286[**]	.492[**]	.344[**]	.049	.365[**]	1

GSE: general self-efficacy, LRNG S: learning-related academic stress, TIME S: time-related academic stress, SOC S: social life-related academic stress, TOT S: total academic stress, TIPI EX: extraversion, TIPI A: agreeableness, TIPI C: conscientiousness, TIPI ES: emotional stability, TIPI O: openness to experience, ** significant at level p=.01
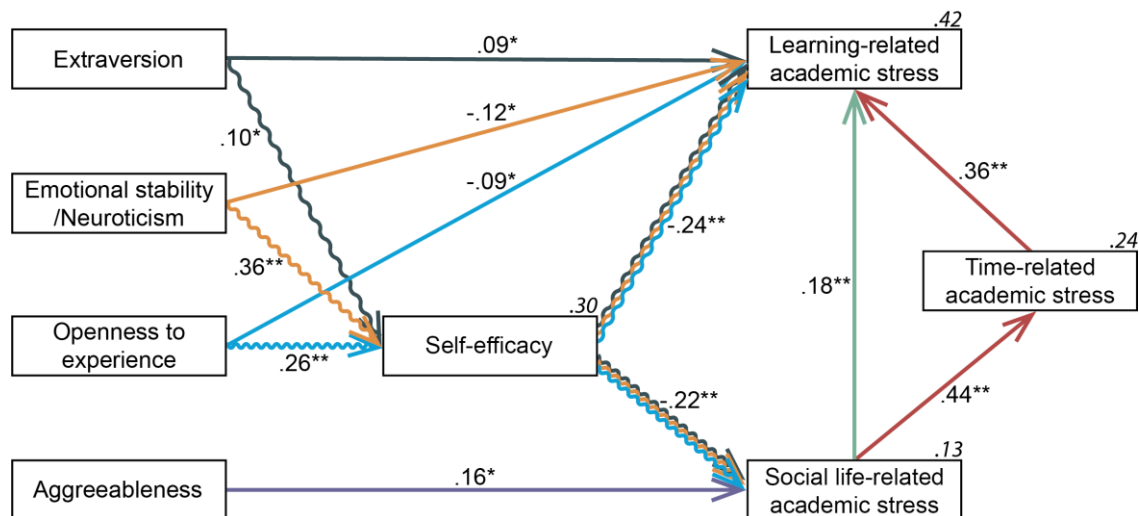

Figure 2. Observed direct and indirect significant effects of personality traits on individual domains of academic stress with self-efficacy as mediator. Straight lines demonstrate direct effects, wavy lines indicate indirect effects. Line values represent standardized beta coefficients (* significant at level P=.05, ** significant at level P=.01), italic values show explained variance for individual mediating and outcome variables.

The final model explains 42%, 24%, and 13% of learning-related (R^2=.423), time-related (R^2=.244), and social life-related (R^2=.129) variance of academic stress, respectively.

Discussion

The goal of this study was to critically examine joint effect of personality and self-efficacy on perceived academic stress and mediating role of intervention-accessible self-efficacy in the axis personality traits–self-efficacy–academic stress.

First, we assessed the effect of personality traits on academic stress. The results showed that personality traits have a significant impact on perceived academic stress. Several traits (namely Extraversion, Openness to Experience and Emotional Stability) demonstrated strong effect on learning-related academic stress, suggesting that the direct effect of personality traits is most pronounced in situations associated with the learning process and learning-related circumstances. It is likely that these activities are the most important to students because they are directly related to their learning outcomes. At the same time, the desired learning outcomes are the most significant source of stress as they have a direct impact on academic achievement and success.

Table 4. Goodness-of-fit indicators of the initial and final model

Parameter	Initial model	Final model
Number of parameters	45	50
X^2	250.696	1.660
Relative X^2 (X^2/df)	27.855	.415
P	.000	.798
Degrees of freedom	9	4
Comparative fit index (CFI)	.719	1.000
Tucker Lewis index (TLI)	-.123	1.024
Increment fit index (IFI)	.728	1.003
Root mean square error of approximation (RMSEA)	.246	.000

These findings support the results of other studies (Bembenutty, 2009; Bidjerano & Dai, 2007; Brown & Cinamon, 2016). Openness to experience is thought to be correlated with effective learning styles and higher academic aspirations (Duff, Boyle, Dunleavy, & Ferguson, 2004), as well as critical thinking, learning motivation, and intellectual curiosity (Bidjerano & Dai, 2007; Chamorro-Premuzic & Furnham, 2003; Tempelaar, Gijselaers, Schim van der Loeff, & Nijhuis, 2007). These attributes correspond with the exhibition of positive self-esteem and self-efficacy. Extraversion and emotional stability (neuroticism), despite rather inconsistent findings from previous studies (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011), we observed significant association of higher neuroticism (i.e. lower emotional stability) with academic stress. This suggests that negative affections and a tendency to unstable emotions increase perceived stress as well as negative beliefs about one's ability to handle the situation (Trapmann, Hell, Hirn, & Schuler, 2007; Tu & Shi, 2008). Extraversion, which was associated with a more positive setting and better usage of internal and external sources, acts in the opposite way. Similarly, higher agreeableness allowed students function better in university societies and handle demanding social aspects of studying. Intriguingly, the findings showed that the more the academic stress domain is distant from learning itself, the weaker the direct impact of personality traits is present. It seems that diverse factors other than personality itself affect the non-learning aspects of academic stress (compared with learning-related stress).

The main focus of the study was the mediating role of self-efficacy on academic stress. First, we examined the direct effect of self-efficacy on academic stress. The results showed that self-efficacy affects primarily two domains of academic stress, namely learning-related and social life-related academic stress. These findings strongly correspond to previous studies, which stated that the effect of self-efficacy is pronounced mainly in learning and social domains of academic stress (Arslan, 2017; Khodamoradi & Farahnaz, 2016; Madnani & Pradhan, 2013; McKay et al., 2014). Given that self-efficacy refers to one's beliefs and judgement about own capability to organize and affect the course of action to attain given goals, it was expected that that lower self-efficacy was associated with higher academic stress. In fact, beliefs about own inability to handle study demands and achieve desired academic goals may

increase anxiety and stress (Bembenutty, 2009; Galla & Wood, 2012; Wang & Liu, 2000).

Based on the path analysis model, self-efficacy also acted as a mediator between Extraversion, Openness to Experience, and Emotional Stability on the one side and learning-related academic stress and social life-related academic stress on the other. The mediating indirect effects were stronger than direct effects of personality traits. Self-efficacy therefore seems to be an important factor through which most personality traits affect academic stress. We can conclude that self-efficacy acts as a partial as well as full mediator and in most cases it reinforces (multiplies) the effect of personality traits on perceived academic stress (compare Caprara et al., 2011; Ebstrup et al., 2011; Keng Cheng & Law, 2015; Park et al., 2016)). There is also evidence of associations between individual domains of academic stress itself. These findings suggest that besides the factors related to students' academic self-perceptions (personality traits, self-efficacy), various aspects of studying themselves affects the level of perceived stress. Specifically, it seems that stressful situations regarding broader circumstances (social aspects of learning, time management, work-life balance etc.) exacerbate the ability to handle learning demands itself and intensify academic stress. Better time management abilities (and maybe social skills in some cases) thus help reduce academic stress and increase academic performance and achievement (Al Khatib, 2014; Balduf, 2009; Macan, Shahani, Dipboye, & Phillips, 1990; Misra & McKean, 2000).

Limitations and Future Studies

The present study has a few limitations. The first limitation is the study sample, which consists of a distinctive set of university students of education. The sample was chosen deliberately with respect to the objectives of the research project. Given the specific study focus and its characteristics (expected higher prosocial orientation, emphasis on verbal and social intelligence rather than nonverbal and technical, perception of teacher education as the second ("safe") choice for application, higher rates of students with lower previous learning/academic performance etc.), the results should be understood in the context of the respondents' specifics (compare e.g. Goel & Bardhan, 2016) for differences in the relationship between self-efficacy and academic stress among humanities and science students).

The second limitation is the cross-sectional nature of the study, which does not allow to assess the course of interactions between individual variables in time. As some authors state (Goel & Bardhan, 2016; Safarzaie, Nastiezaie, & Jenaabadi, 2017; Sarkar & Chattopadhyay, 2018), exposition to demanding situations, perceived stress and the actual ability to handle these demands retroactively affect the level of self-efficacy and sense of confidence in own ability to handle the demanding situation. A longitudinal study providing data assessing the process of interactions between individual variables in time (especially between self-efficacy and perceived academic stress) would be beneficial.

Conclusion

In conclusion, our findings shed more light on the factors that affect and modify the academic stress. In fact, the present study indicated that the direct effect of personality traits on academic stress is rather weak. More significant is the effect of personality on self-efficacy and, above all, the positive effect of self-efficacy on academic stress reduction. This supports the idea that self-efficacy mediates the expression of personality-based behaviour. There is also a substantial effect of non-learning aspects of academic stress on learning-related stress. As it seems, stress resulting from broader circumstances of studying pours into learning itself. These findings provided strong support for more intensive development and use of interventions aimed at both projection of personality traits through self-efficacy and self-efficacy itself, which may help reduce academic stress perceived by university students.

Acknowledgements

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