Influence of personality and emotional competences on academic performance: direct and indirect pathways mediated by perceived stress

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Abstract

Among the factors influencing academic performance (AP), individual differences at the trait level such as personality and emotional competences (EC) have been found to play a critical role, similarly to state variables such as perceived stress (PS). The aim of this study was to clarify whether the influence of personality (big five) and EC on AP (general point average) is direct and/or mediated via PS. 537 undergraduate students from a French university (112 male and 425 female, M_{age} = 19.84 years, SD_{age} = 1.74 years, range = 18 - 30 years; first year: n = 293 – 55%; second year: n = 162 – 30%, third year: n = 82 – 15%) filled out the test battery around three weeks before final examination. Path analysis showed that AP was directly predicted by conscientiousness (+), neuroticism (+), extraversion (-) and perceived stress (-), while perceived stress was predicted by neuroticism (+) and by intrapersonal EC (-). Results illustrate the robust influence of conscientiousness on AP, while EC was not found to influence directly AP, but indirectly via its effect on PS.

Introduction

Understanding the predictors of academic performance is of utmost interest for educational researchers, teachers, and of course for students themselves (Droppert et al., 2019; Kim et al., 2017; Stajkovic et al., 2018). Academic performance can be influenced by factors beyond intelligence such as meta-cognitions (Ohtani & Hisasaka, 2018), health (Shaw et al., 2015), class attendance and social support (Kassarnig et al., 2018), behavioral and emotional characteristics (Park et al., 2019), and also by personality traits, e.g., the Big Five (McCrae & Costa, 2008), and emotional dispositions (e.g., Saklofske et al., 2012). The current study focuses on the latter. We aim to clarify whether the influence of the big five and emotional competences (EC) on academic performance is direct, or mediated via a state affective variable, perceived stress.

Perceived stress, reflecting an appraisal of the situation where demands tax or overcome resources (Lazarus & Folkman, 1984). University students usually perceive academic life to be stressful and demanding (Hammer et al., 2010; Kausar, 2010; Wan et al., 1992). Specifically, they report experiencing a range of emotional and cognitive reactions to this perceived stress, in particular due to external pressures and self-imposed expectations, involving adjusting to both academic and social demands (Misra & McKean, 2000). In students, perceived stress was found to be negatively associated with academic performance (Duchesne & Larose, 2018; Frazier et al., 2019; Gustems-Carnicer et al., 2019). Among students, perceived stress is also negatively associated with performance-related factors such as coping self-efficacy, resilience, and social support (Frazier et al., 2019). Students perceiving less stress use less avoidant-coping strategies and more problem-focused coping strategies (Gustems-Carnicer et al., 2019). Understanding how individual differences affect perceived stress and appraisal is therefore relevant to understand how to deal with it (Kilby et al., 2018). In an academic context (Saklofske et al., 2012), the five subcomponents (self-

perception, interpersonal, decision making, self-expression, and stress management) measured with the Emotional Quotient Inventory (Bar-On, 2002) were found to be negatively related to perceived stress, while for the big five, extraversion, agreeableness, and conscientiousness were found to be negatively related, and neuroticism positively related. However, whether perceived stress mediates the relationship between individual differences and academic performance has not yet been examined, thus we aim to address this gap.

According to meta-analyses, the big five has been consistently found to be related to academic performance (Poropat, 2009; Stajkovic et al., 2018; Vedel, 2014). Specifically, a positive association was reported between grade point average and agreeableness, and openness, with the strongest relationship found with conscientiousness. Conscientious students usually show greater motivation and effort toward their studies (Chamorro-Premuzic & Furnham, 2014; De Raad & Schouwenburg, 1996). Neuroticism and extraversion seem to be less connected with academic achievement, and hypotheses about potential connections are rather ambiguous (Tetzner et al., 2019). Among the big five traits, neuroticism may be most relevant when considering potential mediation via perceived stress, while the other traits may be mediated by other mechanisms. Neuroticism is expected to increase perceived stress in students due to focusing on negative affectivity (Schmidt et al., 2013), which may in turn influence negatively academic performance.

EC refer to how individuals differ in the way they identify, express, understand, regulate, and use own (i.e., intrapersonal) and others' (i.e., interpersonal) emotions (Brasseur et al., 2013). They are assessed with self-report measures such as the profile of emotional competences (PEC; Brasseur et al., 2013). The theory of EC builds on emotional intelligence (EI) research, but uses the concept of competences, given competences contrary to intelligence can be taught and learned. The current study is to our knowledge, the first based on the theory of EC using the PEC to investigate its relationship with academic performance.

To date, previous research showed that trait EI was related positively to academic performance, as found in a meta-analysis (Perera & DiGiacomo, 2013). Several pathways have been suggested to explain this relationship (Perera, 2016), specifically its association with perceived stress (Laborde et al., 2010; Watson & Watson, 2016).

Regarding the respective influence of the big five and EC on academic performance, previous research showed that trait EI - measured via self-report - (Di Fabio & Palazzeschi, 2009, 2015; Downey et al., 2013; Mancini et al., 2017; Saklofske et al., 2012; Siegling et al., 2015) and ability EI - measured with performance tests - (Di Fabio & Palazzeschi, 2009) usually predict additional academic performance variance beyond the big five. Trait EI was also found to predict academic motivation beyond the big five (Siegling et al., 2015). Some contrary evidence exists as well, for example, academic performance was predicted by conscientiousness and openness positively, and neuroticism negatively, while only one of the EI subcomponents (adaptability) was found to be related to academic performance, with a small effect size (Saklofske et al., 2012). Two drawbacks can be identified in this line of research: first, so far, differences between intrapersonal and interpersonal EC on the way they influence academic performance has received little attention (for an exception see Saklofske et al., 2012), while this may help to better understand how EC may be related to academic performance. Second, potential mediators were not taken into account, and we focus in this research on perceived stress.

To sum up, this study aims to clarify the pathways linking the big five and EC to academic performance, and to clarify whether some of these relationships may be mediated via perceived stress. Using path analysis and based on theory and on previous research findings, we hypothesize that for the big five and academic performance, direct positive relationships with conscientiousness, agreeableness, and openness will be found (Poropat, 2009; Vedel, 2014), while no direct relationships are expected with neuroticism and

extraversion. In addition, we predicted that neuroticism will have an influence on academic performance via perceived stress (Schmidt et al., 2013; Tetzner et al., 2019). Regarding intrapersonal and interpersonal EC, we hypothesize both a direct pathway to academic performance as well as an indirect pathway mediated via perceived stress (Brasseur et al., 2013; Di Fabio & Palazzeschi, 2009, 2015; Downey et al., 2013; Mancini et al., 2017).

Method

Participants

537 undergraduate psychology students from a French university (112 male and 425 female, M_{age} = 19.84 years, SD_{age} = 1.74 years, range = 18 - 30 years; first year: n = 293 – 55%; second year: n = 162 – 30%, third year: n = 82 – 15%) participated in the study and gave permission for their exam results to be retrieved at the end of the academic year. In order to determine mediation effects with bias-corrected bootstrapping, Fritz and Mackinnon (2007) recommend a minimum sample of 400 participants for medium indirect effects. The study was approved by the Ethics committee of the local university (N° 07/2017).

Materials

The Profile of Emotional Competences (PEC; Brasseur et al., 2013)

The PEC comprises 50 items and encompasses 10 subscales (intrapersonal identification, intrapersonal expression, intrapersonal comprehension, intrapersonal regulation, intrapersonal utilization, interpersonal identification, interpersonal expression, interpersonal comprehension, interpersonal regulation and interpersonal utilization) of 5 items each, grouped into two factors (intrapersonal EC and interpersonal EC) and one global EC score. Each item consists of a short statement, to which participants are asked to indicate how closely they identify using a five-point scale, from 1 “The proposal does not fit you at all or that you never react in this way” to 5 “you recognize yourself completely in what is described or that it happens to you very often”. Sample items are: “I use my feelings to improve my

choices in life" or "I feel uncomfortable if people tell me about their problems, so I try to avoid it".

Big-Five Inventory (Plaisant et al., 2010)

The French version of the Big Five Inventory (Plaisant et al., 2010) is a 45-item self-reported scale, reflecting the five main dimensions: extraversion, conscientiousness, openness, agreeableness, and neuroticism. The Big Five Inventory French version (BFI-Fr) does not use single adjectives as items because such items are answered less consistently than when they are accompanied by definitions or elaboration. It uses 45 short phrases based on the trait adjectives known to be prototypical markers of the Big Five. Each item consists of a short statement begin with "I see myself as someone who…", to which participants are asked to indicate how closely they identify using a five-point scale, from 1 "Disagree strongly" to 5 "Agree strongly". Sample items are: "Tends to be lazy" or "Can be somewhat careless".

Perceived Stress Scale (PSS; Bellinghausen et al., 2009)

Compared to the original 14-item scale (Cohen et al., 1983), this 10-item version of the French adaptation is validated within the French working population. The scale comprises two distinct factors: perceived work overload and perceived personal efficacy. Each item consists of a short statement, to which participants are asked to indicate how often they felt or thought a certain way by using a five-point scale, from 1 "Never" to 5 "Very often". Sample items are: "In the last month, how often have you felt that things were going your way?" or "In the last month, how often have you felt nervous and stressed?".

Procedure

A convenience sampling procedure was used in 2018. The students participated in the study during class settings around three weeks before end of year examination. The survey included the instruments listed above, a set of demographic questions, and a section where students could give their student ID number and allow this to be used to retrieve their final

result (grade point average) at the end of academic year. Students gave also their permission for their end-of-the-year grade to be accessed. The grade point average was based on a scale from 0 to 20, and corresponds to the average of exam results related to a certain number of subjects (see Table 1 for the detail of the subjects). For the first and second academic year, there were 8 exams counting each for 6 ECTS (European Credit Transfer and Accumulation System), and 6 exams counting for 2 ECTS each. In the third academic year, there were 10 exams counting for 6 ECTS each. The full description of subjects can be seen in Table 1. The full test battery took around 20 minutes to complete. Students were informed that participation in the study was voluntary, and that they could withdraw their participation in the study at any point without giving explanations, and without consequences.

Insert Table 1 here

Data analysis

First zero-order Pearson correlations were computed. Then we tested the hypothesized model via path analysis with the software AMOS 22.0 (see Figure 1). Goodness of fit was assessed with the χ^2 index, the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA). Following recommendations (Hu & Bentler, 1999), values below 0.08 for the SRMR and below 0.06 for the RMSEA show an acceptable fit. Regarding CFI and TLI, values higher than 0.95 indicate an acceptable model fit (Hu & Bentler, 1999). In addition we provide the χ^2value as a subjective index of fit, with small values indicating a good fit (Jöreskog, 1993).

Insert Figure 1 here

Results

All variables indicated acceptable internal consistency scores. Full descriptive statistics and zero order correlations can be seen in Table 1. Zero-order correlations indicated

that four variables were significantly related to academic performance: conscientiousness (r = .34, p < .001), extraversion (r = -.10, p = .020), neuroticism (r = .12, p = .004), and perceived stress (r = -.10, p = .020). No correlations were found with global EC, inter-EC or intra-EC and academic performance (p > .05). However, they were correlated with perceived stress, for global EC (r = -.37, p < .001), intra-EC (r = -.48, p < .001), and inter-EC (r = -.12, p = .006).

Insert Table 2 here

The hypothesized model did not yield satisfactory fit. Based on estimates and modifications indices suggestions fitting our theoretical background, we adapted the hypothesized model (see Figure 2). The final model fit was $\chi^2(5) = 19.544$, CFI = .98, TLI = .93, RMSEA = .07, SRMR = .04. Path analysis showed that academic performance was directly predicted by (standardized estimates are provided): conscientiousness (.33), neuroticism (.21), extraversion (-.11) and perceived stress (-.18), while perceived stress was predicted positively via neuroticism (.46) and negatively by intrapersonal emotional competences (-.24).

Insert Figure 2 here

Discussion

Our study aimed to investigate the direct influence of the big five traits and emotional competences on academic performance, as well as a potential mediation via perceived stress. Specifically, we hypothesized a direct pathway to academic performance for three of the big five traits (i.e., openness, agreeableness, and conscientiousness) as well as for intra- and interpersonal emotional competences, and an indirect pathway for neuroticism, as well as for intra- and interpersonal emotional competences via perceived stress. As our hypothesized model did not show a good fit to the data, we refined our model based on estimates and modification indices analysis suggested by AMOS, in line with our theoretical background.

The final model showed a direct positive pathway between academic performance with conscientiousness, neuroticism, and a direct negative pathway with extraversion and perceived stress. In addition, an indirect pathway was found with perceived stress, predicted positively by neuroticism and negatively by intrapersonal emotional competences.

The findings regarding the direct pathway between conscientiousness and academic performance is the most robust of the literature (Poropat, 2009; Stajkovic et al., 2018; Vedel, 2014). Regarding extraversion and neuroticism, their relationship with academic performance is considered as rather ambiguous (Tetzner et al., 2019). For extraversion, it may be that the negative relationship found here could be explained by the fact extroverted students may be distracted by non-relevant academic tasks (Bidjerano & Dai, 2007). The positive relationship with neuroticism may be explained by the additional efforts put by students high in neuroticism into exam preparation in order to cope with a potential threatening event (Rosander et al., 2011). The fact that openness and agreeableness did not appear as predictors in our sample, contrary with what was found in previous meta-analyses (Poropat, 2009; Vedel, 2014), may be due to the fact that the characteristics of the end of year exams (e.g., mostly multiple choice questionnaires) did not rely on aspects related to openness such as curiosity (Gatzka & Hell, 2018), or regarding agreeableness that cooperation with peers and teachers had little influence on exam results (Miller et al., 2003).

The negative relationship between perceived stress and academic performance is in line with previous research (Duchesne & Larose, 2018; Frazier et al., 2019; Gustems-Carnicer et al., 2019). Pre-stress examination may be detrimental to academic performance in that it hinders learning and memory retrieval during the exam. Two traits were found to influence perceived stress, negatively with intrapersonal EC, and positively with neuroticism. Dealing optimally with one's own emotions may certainly help in reducing perceived stress, with the implementation of effective coping strategies (Saklofske et al., 2012); while dealing with

others' emotions was not found to have any influence here, which is potentially linked to the finding with agreeableness noted above. Regarding neuroticism, the focus on negative affectivity tends to increase perceived stress (Schmidt et al., 2013), potentially due to increased anxiety and negative cognitions (Gallagher, 1990). The case of neuroticism is interesting, given it was found to have either a positive direct influence on academic performance, and a negative influence when mediated via perceived stress, which speaks for the ambiguity of the relationship between neuroticism and academic performance as pointed out in previous research (Tetzner et al., 2019).

Regarding the relationship between EC and academic performance, no direct relationship was found, contrary to previous research with EI (Di Fabio & Palazzeschi, 2009, 2015; Downey et al., 2013; Mancini et al., 2017; Perera & DiGiacomo, 2013). Our findings are rather similar to the ones of Saklofske et al. (2012), who found that academic performance was more associated to the big five traits than with EI. Future research has to investigate whether the questionnaires used to assess EI/EC may play a role in the findings, given they reflect different theoretical backgrounds (Laborde & Allen, 2016). Also differentiating self-report (trait perspective) and performance measures (ability perspective) of EC may prove helpful, given previous research showed that ability EI predicted academic performance more in comparison to trait EI (Di Fabio & Palazzeschi, 2009).

The main limitations of our study is that we did not control for cognitive ability (Meyer et al., 2019; Ohtani & Hisasaka, 2018) or previous academic performance (Thomas et al., 2017). Further, only psychology students of one university took part to this study, which makes it difficult to generalize the findings regarding academic performance. Additionally, we could not check the distribution of achievement for each separate subject constituting the grade point average. This issue should be investigated in future research, given different emotion regulation factors will be involved in challenging (i.e., where few students achieve

high grades) vs. less challenging exams (i.e., where most students achieve high grades). Finally, our design was cross-sectional, which impedes any causal interpretation of the data.

Conclusion

Our study investigated the influence of the big five and EC on academic performance, and specifically whether the relationship with specific traits would be mediated via perceived stress. We found that academic performance was directly predicted by conscientiousness (+), neuroticism (+), extraversion (-) and perceived stress (-), while perceived stress was predicted by neuroticism (+) and by intrapersonal emotional competences (-). Future research should clarify whether these results extend to other samples, and also to which extent the EI/EC assessment (choice of instrument; self-report vs. performance test) influences the results. These findings provide a further understanding about how individual differences may influence academic performance, and may therefore inform the development of interventions, identifying the students who may benefit most from a stress management intervention to prepare them for exams and future related outcomes.

At the practical level, the development of stress management interventions can be informed by the findings of a recent meta-analysis (Amanvermez et al., 2020) showing that stress management interventions for college students were particularly effective in reducing stress, depression, and anxiety, and specifically for students reporting high-stress levels. Based on the categorization used in this meta-analysis, the stress management interventions may target the following aspects: cognitive-behavioral therapy with for example cognitive restructuring and stress inoculation; third-wave concepts[1] focusing on acceptance, defusion, values, and mindfulness; mind-body interventions, including meditation, muscle relaxation,

[1] In short, first wave therapy refers to the first "wave" of scientifically-based psychotherapy, and corresponds to behavioral therapy as developed in the 1950's, second wave therapy refers to cognitive behavioral therapy as developed in the 1970's, and third wave therapy is seen as an evolution of traditional cognitive behavioral therapy emphasizing contextual and experiential change strategies in addition to more direct and didactive ones (for a detailed discussion, see Ost, 2008).

breathing exercises, guided imaginary techniques, and biofeedback, and finally skills training interventions focusing at improving social, academic, or coping skills. As we see, the range of potential stress interventions addressing students' needs is quite large. Although some of them could be potentially learned autonomously by the students themselves, we would strongly recommend educational institutions and universities to provide a dedicated support service to help students coping with stress, given the impact it has on their academic performance.

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