Why do personality traits predict scholastic performance? A three-wave longitudinal study

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Abstract

The present three-wave longitudinal study undertaken among 836 Chinese secondary school students (M age = 15.35), tested the Big Five-Narrow Trait model (BSNT, Zhang & Ziegler, 2016). The BSNT model suggests that students’ personality traits influence scholastic performance via their impact on learning approaches and self-beliefs. Utilizing the longitudinal nature of the data, the assumed lagged effects were tested for Chinese, Mathematics, and English. Structural equation modeling indicated that controlling for fluid intelligence, students’ personality traits still contributed to their scholastic performance and, importantly, that these influences were mediated by learning approaches and self-beliefs. Our findings support the BSNT model. We also discuss the theoretical and empirical contributions of this study, potential model extensions, and make suggestions for future research.

1. Introduction

The determinants of scholastic performance have captured the attention of many scholars over the last decades (Robbins et al., 2004). Intelligence is well known to be a strong predictor of scholastic performance (Deary, Strand, Smith, & Fernandes, 2007; Gottfredson, 2002; Kuncel, Hezlett, & Ones, 2004). There is also ample evidence that personality traits as defined in the Five-Factor Model (Big Five) contribute to scholastic performance incrementally to cognitive ability (De Raad & Schouwenburg, 1996; Poropat, 2009). However, very few studies have addressed the underlying mechanisms that might explain why the broad Big Five domains predict scholastic performance. To deepen the understanding of why personality traits contribute to scholastic performance, Zhang and Ziegler (2016) have recently proposed the Big Five-Narrow Traits (BSNT) model with two key classes of intervening variables between personality and scholastic performance: learning approaches and a self-belief system (i.e., subject-specific self-efficacy and self-concept). So far, the BSNT model has only been tested cross-sectionally, which limits the conclusions that can be drawn. The main aim of this study was to further examine the BSNT model from a longitudinal perspective and we do so among 836 Chinese secondary school students

within a three-wave cross-lagged panel design. Below, we will present the theoretical bases and explain the BSNT model in detail.

1.1. Personality traits and scholastic performance

A large body of research has documented that the Big Five traits, especially Openness and Conscientiousness, contribute to scholastic performance independent of intelligence (Poropat, 2009; Zhang & Ziegler, 2015). Openness is a trait that assesses individual differences in aesthetic interests, creativity, and intellectual curiosity (Digman, 1990). The effect of Openness on scholastic performance has often been interpreted in terms of its overlap with cognitive ability (Ackerman & Heggestad, 1997). Alternatively, Openness was also found to be associated with an effective learning style (Duff, Boyle, Dunleavy, & Ferguson, 2004) and learning motivation (Tempelaar, Gijselaers, Schim van der Loeff, & Nijhuis, 2007). Conscientiousness reflects one’s responsibility, and such students are more likely to be diligent, self-disciplined, and achievement-striving. The effects of Conscientiousness have been explained in terms of motivation to learn (e.g., Colquitt & Simmering, 1998; Komarraju, Karau, & Schmeck, 2009). Moreover, the influences of the Big Five traits on scholastic performance were shown to be subject-specific (Furnham & Monsen, 2009; Spinath, Freudenthaler, & Neubauer, 2010; Zhang & Ziegler, 2015). Neuroticism was found to be negatively predictive of grades in Mathematics, Science, and foreign language but not for one’s native language. Conscientiousness (positive) and Neuroticism (negative) were more important for Math performance and Extraversion (positive)
was more helpful for language learning. These findings can be understood in terms of different contents that are being emphasized in different subjects (e.g., Spinath et al., 2010). In language subjects, where oral performance plays a vital role, high levels of Extraversion could be more beneficial. In particular, people might learn their native language through everyday interactions and what they have to learn has a higher degree of familiarity. Contents in other subjects like Mathematics, Science, and foreign languages are relatively new, which may require more Conscientiousness and lower levels of Neuroticism in order to manage the amount of rote learning.

Notably in previous studies, the dominant measures of academic performance were course grades and grade point averages (GPA). Course grades are often understood as different grade rankings each reflecting a student's mastery of what was taught (Ormrod, 2009). Thus, although reliability and validity of grades have been questioned because of a grade inflation factor (Johnson, 1997), course grades still remain a useful measure of scholastic performance, making it appropriate to use in the present study.

1.2. Learning approaches and self-beliefs as mediators

Although the studies cited above showed rather convincingly that personality traits contributed to scholastic performance, the exact mechanisms involved in this relationship were less well documented. Understanding how personality traits influence scholastic performance is crucial. One of the mediating mechanisms often discussed is through the adoption of learning approaches. Biggs, Kember, and Leung (2001) identified two major learning approaches: A deep and a surface learning approach. The former involves seeking a real understanding of what is learned with deep learners tending to have higher intrinsic motivation. The later involves seeking only a reproduction of what is taught to meet the minimum requirements with surface learners applying shallow cognitive strategies in combination with an extrinsic motivation to learn. Zhang's (2003) study of Chinese students found that those high in Conscientiousness and Openness adopted more deep learning approaches, whereas those high in Neuroticism used more surface learning approaches to deal with their school tasks. Duff et al. (2004) indicated that a deep learning approach was positively associated with Extraversion and Openness, whereas a surface learning approach was positively associated with Neuroticism and Agreeableness. Two cross-sectional studies (Shokri, Kadivar, Farzad, & Sangari, 2007; Swanberg & Martinson, 2010) have rather consistently indicated that the influences of Openness and Conscientiousness on scholastic performance were positively mediated by a deep learning approach but negatively by a surface learning approach. In addition, Neuroticism had a significant mediation effect on performance through a surface learning approach. A longitudinal study by Corker, Oswald, and Donnellan (2012) demonstrated that Conscientiousness related to increases in academic performance over time through the adoption of effortful strategies like deep-learning.

Another important mediating mechanism suggested by Zhang and Ziegler in their B5NT model (2016) is through self-beliefs, especially academic self-efficacy and academic self-concept. Academic self-efficacy is defined as students' beliefs about their abilities to successfully perform given academic tasks at designated levels (Schunk, 1991). Academic self-concept refers to individuals' knowledge and perceptions about themselves in academic settings (Bong & Skaalvik, 2003). Both constructs gained much attention from educational researchers because of their influence on students' scholastic performance. Shams, Mooghali, and Soleimanpour (2011) indicated that Openness and Agreeableness contributed to the generation of positive math self-efficacy, which in turn helped to achieve better math performance. Hair and Graziano (2003) showed that Openness and Agreeableness of the Big Five traits predicted changes in scholastic performance over time through self-esteem.

The mediating roles of learning approaches and self-beliefs just summarized have mostly been investigated in isolation. However, neglecting the overlap between learning approaches and self-beliefs might have led to an overestimation of the individual mediation effects. To overcome these limitations, Zhang and Ziegler (2016) proposed and tested their B5NT process model with learning approaches and self-beliefs simultaneously included as potential mediators and thereby controlled for the overlaps by using a multivariate method. They hypothesized that personality traits would contribute to scholastic performance through the adoption of learning approaches and the generation of self-belief systems.

1.3. B5NT model

The B5NT model was derived from the analysis level model of personality (Graziano, Jensen-Campbell, & Finch, 1997; McAdams & Pals, 2006; McAdams & Pals, 1995). There is it suggested, individual differences in personality can be described in three levels, called "dispositional traits", "characteristic adaptations", and "integrative life narratives". The first level is dispositional traits, which capture "broad individual differences in behavior, thought, and feeling that account for general consistencies across situations and over time" (McAdams & Pals, 2006, p. 212). The second level is characteristic adaptations, which taps "more specific motivational, social-cognitive, and developmental variables that are contextualized in time, situations, and social roles (e.g., goals, values, coping strategies, relational patterns, domain-specific schemas)" (McAdams & Pals, 2006, p. 212). The third level is integrative life narratives, which capture "internalized and evolving life stories that reconstruct the past and imagine the future to provide a person's life with identity (unity, purpose, meaning)" (McAdams & Pals, 2006, p. 212). In a similar vein, Marsh and Craven (2006) proposed a core-surface traits theory, calling the Big Five traits core traits (stable and high immunity to environmental influences), and self-concept a surface trait (unstable and high susceptibility to environmental influences). They assume that the influences of core traits on behavior are mediated, at least in part through surface traits. Taken together, it is reasonable to consider the Big Five traits, learning approaches and self-beliefs, as well as scholastic performance, as different layers of a process model, in which learning approaches and self-beliefs operate in an intermediate level between the Big Five traits and scholastic performance (see also Caprara, Alessandri, Di Giunta, Panerai, & Eisenberg, 2010).

Drawing on the aforementioned theories, Zhang and Ziegler (2016) proposed the B5NT model to explain how the Big Five traits influence scholastic performance (see Fig. 1). In the model, they assumed (a) that students' personality (i.e., the Big Five traits) will steer them toward a learning approach and thereby affect scholastic performance and (b) the Big Five traits will also trigger motivational impulses or blocks (i.e., self-beliefs) and thereby improve or decrease performance, as well as (c) the mediation effects of learning approaches and self-beliefs will differ across different school subjects.

Results of the original study by Zhang and Ziegler (2016) showed support for each of the assumptions. In particular it could be shown that (a) across three subjects (Mathematics, Chinese, English), subject-specific self-concept positively and significantly mediated the influences of Openness and Conscientiousness on grades while a surface-learning approach negatively mediated the influences of Openness, Extraversion, and Neuroticism. (b) A deep-learning approach positively and significantly mediated the relations of Openness and Conscientiousness with grades but only in Mathematics and Chinese. (c) Neuroticism also influenced Math