



Achievement-relevant personality: Relations with the Big Five and validation of an efficient instrument

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ABSTRACT

Many achievement-relevant personality measures (APMs) have been developed, but the interrelations among APMs or associations with the broader personality landscape are not well-known. In Study 1, 214 participants were measured on 36 APMs and a measure of the Big Five. Factor analytic results supported the convergent and discriminant validity of five latent dimensions: performance, mastery, self-doubt, effort, and intellectual investment. Conscientiousness, neuroticism, and openness to experience had the most consistent associations with APMs. We constructed a more efficient scale— the Multidimensional Achievement-Relevant Personality Scale (MAPS). In Study 2, we replicated the factor structure and external correlates of the MAPS in a sample of 359 individuals. Finally, we validated the MAPS with four indicators of academic performance and demonstrated incremental validity.

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1. Introduction

Beyond the well-established connection between academic achievement and general cognitive ability, a number of individual differences in terms of general patterns of academically-relevant behavior impact trajectories of learning. For example, [Ackerman and Rolfhus \(1999\)](#) point out that “abilities are only one part of the complex causal framework that determines whether a student pursues the acquisition of knowledge and skills within a particular domain” (p. 176). In addition to ability, determinants of typical performance such as personality, motivation, or interest may influence academic achievement. To tap these determinants of typical performance, a diverse array of achievement-relevant personality measures (APMs) have been developed by differential and educational psychologists. Developing APMs has been somewhat successful with meta-analytic evidence that APMs, such as effort, intellectual investment, approaches towards learning, and self and school values, predict variance in academic achievement ([Huang, 2012](#); [Hulleman, Schrager, Bodmann, & Harackiewicz, 2010](#); [Poropat, 2009](#); [Richardson, Abraham, & Bond, 2012](#); [von Stumm & Ackerman, 2013](#)). However, these APMs remain studied relatively independently of one another with little empirical or theoretical examination of factor overlap. This critical gap in the literature has hindered the construction of useful

theories of academic achievement because of the inability to aggregate knowledge across study domains.

1.1. A need for integration

Many APMs are in use, but little has been done to integrate findings driven by different theoretical backgrounds. Several recent reviews have commented on the need for a multivariate examination of the interrelations among the many APMs in order to establish the convergent and discriminant validity of different operationalizations. In [Ackerman and Heggstad's \(1997\)](#) influential meta-analysis of investment traits, they concluded that the various investment constructs are “isolated personality measures ... with no linkage to any personality theory” (p. 222). Citing this rather clear call for future research, [von Stumm, Chamorro-Premuzic, and Ackerman \(2011\)](#) quizzically determined that “a unifying research endeavor is yet to be undertaken” despite the clear interest in the topic and the length of time between the initial and the recent review (p. 225). Recently, [von Stumm and Ackerman \(2013\)](#) assessed the state of the intellectual investment literature and found a “scarcity of data” despite “the large number of identified investment constructs” (p. 852). [Wigfield and Cambria \(2010\)](#) comprehensively described the many APM constructs commonly used by educational psychologist and noted that there is little information about how different operationalizations relate. In their review, a table spanning three pages was required to display all of the commonly used APMs. Despite these calls for unification, a multivariate, cross-domain synthesis has yet to be undertaken.

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Four meta-analytic studies are noteworthy for moving the field in this direction. Richardson et al. (2012) conducted the most comprehensive, in terms of content breadth, meta-analysis of individual difference correlates of academic performance and found that many APMs significantly predict achievement. Richardson et al. (2012), however, did not examine the factor structure underlying the multivariate relations among APMs. In fact, the authors concluded that the “development of an improved multimeasure assessment instrument would provide more parsimonious and reliable assessments” (p. 374). This task may be more difficult than simply aggregating previous studies. For example, Hulleman et al. (2010) and Huang (2012) performed meta-analyses on the approaches towards learning domains. Huang (2012) found that very small proportions of variance in achievement were accounted for by approaches towards learning, but Hulleman et al. (2010) found evidence of heterogeneity in patterns of association between approaches to learning and achievement. Hulleman et al. (2010) rationally coded item content of different scales and found evidence that different research groups had given similar labels to different constructs. The same label (e.g., performance-approach orientation) had both positive and negative associations with achievement, and this heterogeneity was partly associated with the item content. Thus, the largely null findings of Huang (2012) may have resulted from aggregating such psychometrically confused measures. Finally, von Stumm and Ackerman (2013) found similar meta-analytic evidence for the intellectual investment domain. In light of heterogeneous effect sizes being assigned to supposedly the same construct, the authors concluded that “some investment traits have been assessed by different scales with different foci despite supposedly assessing the same trait dimension” (p. 856). Although the methods applied by Hulleman et al. (2010) and von Stumm and Ackerman (2013) convincingly demonstrate measurement confusion, the interpretation relies on face validity. We will complement these findings by assessing the empirical associations between instruments.

We emphasize that these meta-analytic studies were specifically designed to test the predictive or criterion validity of APMs. However, as these authors and critics have pointed out, building a consistent framework of APMs depends on settling psychometric issues of content, convergent, and discriminant validity before any evidence of criterion validity can reasonably be integrated. Furnham (2011) argued that APM research could flourish by placing these constructs within the well-established Big Five framework. This consistent taxonomy of individual differences provides a construct map that can ground APM research. To address these limitations in the previous literature, we test the convergent and discriminant validity of many APMs drawn from the differential and educational psychology traditions and place them within the context of the Big Five.

1.2. The differential psychology tradition

The Big Five personality traits – extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience – are thought to provide a fairly comprehensive description of variation in human behavioral tendencies (John, Naumann, & Soto, 2008). The codification of five simple, replicable, and highly predictive personality traits unified what was previously a “chaotic plethora” of different measures (Funder, 2001, p. 200). The Big Five traits have proven to be extremely productive constructs for personality researchers interested in academic achievement and provide a model for the benefit of unified and relatively universal construct measurement. Poropat (2009) performed a meta-analysis that assessed the predictive validity of the Big Five for academic achievement. This study found substantial associations between academic performance (typically course grades or GPA) and conscientiousness (r corrected for unreliability = .22) and openness (r corrected for unreliability = .12). For comparison, the corrected r for intelligence was estimated at .25. Students that are more diligent in their coursework (i.e., high in conscientiousness) and those that are more curious

or intellectually engaged (i.e., high in openness) tend to perform better at school.

Several explanations for the association between conscientiousness and achievement have been advanced: conscientiousness may reflect strength of character, a general sense of willpower, or a compensation strategy for lower levels of cognitive ability (von Stumm, Hell, & Chamorro-Premuzic, 2011; von Stumm et al., 2011). Little progress has been made in determining what aspect of conscientiousness is most influential, but academic effort has received considerable attention (Chamorro-Premuzic & Furnham, 2005). Effort refers to an individual's care and persistence in a given activity. Different measurement perspectives have been used to assess effort including constructs ranging from procrastination to perfectionism (Frost, Marten, Lahart, & Rosenblate, 1990; Lay, 1986).

Intellectual investment, conceptually related to openness, is also linked to achievement (von Stumm & Ackerman, 2013). Following from Cattell's (1971, 1987) investment hypothesis, individuals that possess a hungry mind tend to invest their intelligence in learning activities and thus facilitate achievement. However, disagreement exists in the choice of preferred instrument. Initial organizing work has been conducted to show that different measures of intellectual investment lack discriminant validity, and a content analysis of different scales reveals many semantically identical items (Mussel, 2010, 2013; von Stumm et al., 2011).

We include narrow measures of effort and intellectual investment in the current study to further clarify the convergent and discriminant validity of these outcomes. Although the Big Five and associated traits provide a consistent framework from which to judge the relations between individual differences and academic achievement, there is considerable evidence for traits that are *outside* Big Five factor space (Paunonen & Jackson, 2000). This is particularly the case for traits that are thought to be highly influenced by situations or that only apply in certain contexts. Behavioral tendencies that primarily occur in the schooling context are crucial for understanding achievement. Such tendencies have traditionally been neglected in personality research but strongly focused on in educational research.

1.3. The educational psychology tradition

Educational researchers place importance on motivational or emotional qualities of students that relate to perceptions, attitudes, and goals within the school context (for a recent review, see Mega, Ronconi, & De Beni, 2013). Theories of academic goal orientation describe various approaches to learning that emerge from challenging educational experiences that instill differing levels of motivation to demonstrate or obtain competence (Ames, 1984; Dweck, 1999; Elliot, 1999). Approaches to learning are thought to influence academic achievement by way of guiding interactions with the educational environment (Elliot & Murayama, 2008). Although different labels have been used in this literature, the most common distinction is between performance and mastery orientations. Performance goal oriented individuals have a desire to demonstrate their competencies. Mastery goal oriented individuals, in contrast, have a desire to complete challenging tasks that may increase their competence. Goal orientations are further subdivided into approach tendencies, where the student is driven to display indicators of competence, or avoidant tendencies, where the student is driven to hide indicators of a lack of competence (Elliot & Harackiewicz, 1996). Thus, a student who possesses a performance-approach orientation would desire to outperform other students, and a student with a performance-avoid orientation would desire to avoid giving an incorrect answer. Goal orientations focus on why students study, but there are also individual differences in how students study. For example, deep and surface study processes describe students who seek to learn course material completely and those who seek to only learn the minimum requirement, respectively (Biggs, Kember, & Leung, 2001).

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