Available online at www.sciencedirect.com
ScienceDirect
ELSEVIER
Personality and Individual Differences 42 (2007) 1503–1514
PERSONALITY AND INDIVIDUAL DIFFERENCES
www.elsevier.com/locate/paid

Fluid intelligence, memory span, and temperament difficulties predict academic performance of young adolescents

Roberto Colom [a,*], Sergio Escorial [b], Pei Chun Shih [a], Jesús Privado [a]

[a] *Facultad de Psicología, Universidad Autónoma de Madrid, 28049 Madrid, Spain*
[b] *CES Colegio Universitario Cardenal Cisneros, Madrid, Spain*

Received 8 June 2006; received in revised form 25 September 2006
Available online 8 January 2007

Abstract

There are several candidate measures when asking which psychological construct significantly predicts academic performance. Hundreds of studies have addressed this issue by measuring intelligence, basic cognitive processes, or personality. However, the simultaneous consideration of a broad and varied array of measures is much less common. Here we consider several cognitive and personality measures concurrently to define latent factors representing six constructs of presumed interest: fluid intelligence, short-term memory, working memory, processing speed, controlled attention, and temperament difficulties. One hundred and thirty-five secondary school students were tested. Their academic performance was measured by average grades in the nine scholastic areas of their curriculum. The main finding shows that a latent factor defined by fluid intelligence and memory span along with a latent factor defined by impulsiveness, sensation seeking, and lack of fear account for an impressive figure of 60% of the variance in academic performance.

Keywords: Fluid intelligence; Short-term memory; Working memory; Processing speed; Controlled attention; Temperament; Academic performance

* Corresponding author. Tel.: +34 91 497 41 14.
E-mail address: roberto.colom@uam.es (R. Colom).

0191-8869/$ - see front matter
doi:10.1016/j.paid.2006.10.023

1. Introduction

The prediction of academic performance has been an important research topic in psychological science for almost one century (Boekaerts, 1995; Furnham & Chamorro-Premuzic, 2004; Gagne & St Pere, 2002; Jensen, 1998; Lubinski, 2004; Petrides, Chamorro-Premuzic, Frederickson, & Furnham, 2005; Vigil-Colet & Morales-Vives, 2005). Various venerable psychological constructs have shown significant associations with academic performance, but perhaps psychometric intelligence can be nominated as the most frequently considered. Indeed, after a comprehensive review of the published literature, the seminal report by Neisser et al. (1996) concluded that psychometric intelligence is the best single predictor of academic performance (Kuncel, Hezlett, & Ones, 2001).

Nevertheless, personality variables can also play a role. Thus, for instance, Wolfe and Johnson (1995) measured 32 personality variables, finding that self-discipline predicts college grade point average. Recently, Duckworth and Seligman (2005) reported that self-discipline out did psychometric intelligence in predicting academic performance in adolescents. Specifically, their results indicated that self-discipline accounted for more than twice as much variance as intelligence in final grades.

Beyond intelligence and personality, constructs from the human information processing approach have been considered as predictors of academic performance also. Several studies have shown that measures of processing speed and working memory correlate significantly with academic performance (Daneman & Carpenter, 1980; Luo, Thompson, & Detterman, 2003). Gathercole, Pickering, Knight, and Stegmann (2004) found that achievement in the curriculum areas of mathematics and science is significantly related with working memory capacity. Interestingly, they distinguish between basic cognitive abilities and previous knowledge, stating that basic cognitive abilities are germane for learning situations such as those encountered in schools. Baddeley and Gathercole (1999) suggest that these basic mental processes could estimate future abilities to learn.

Luo, Thompson, and Detterman (2006) examined the criterion validity of processing speed and working memory, because both are related to psychometric intelligence (Ackerman, Beier, & Boyle, 2002, 2005; Colom, Abad, Rebollo, & Shih, 2005; Colom, Rebollo, Abad, & Shih, 2006; Colom, Rebollo, Palacios, Juan-Espinosa, & Kyllonen, 2004; Fry & Hale, 1996; Salthouse, 1996). They measured academic performance also. Their results indicated that these basic cognitive processes along with crystallized intelligence account for about 60% of the variability in academic performance.

In summary, the majority of studies analyze the relationship between cognitive or personality measures and academic performance. With rare exceptions, these measures are treated in isolation. Therefore, contrary to most studies, here we consider several cognitive and personality measures concurrently, in order to define latent factors intended to represent several psychological constructs that are reasonable candidates to predict academic performance. These constructs are fluid intelligence, short-term memory, working memory, processing speed, controlled attention, and temperament difficulties. To our knowledge, there are no previously published studies testing the predictive validity, at the latent variable level, of such a broad array of constructs.