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A longitudinal multilevel model analysis of the within-person and between-person effect of effortful engagement and academic self-efficacy on academic performance ☆

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ABSTRACT

Using data from an accelerated longitudinal study, we examined the within-person and between-person effect of effortful engagement and academic self-efficacy on academic performance across students ($N = 135$) in elementary school. Teachers assessed participants' effortful engagement and participants rated their academic self-efficacy once per year for 3 years. Academic performance was assessed through standardized test scores in reading and math. Multilevel models indicated that within-person change in Effortful Engagement and Academic Self-Efficacy scores significantly predicted concomitant within-person change in reading test scores, $B = 2.71$, $p = .043$, Pseudo-$R^2 = .02$ and $B = 4.72$, $p = .005$, Pseudo-$R^2 = .04$, respectively. Participants with higher between-person levels of Effortful Engagement had higher initial reading test scores, $B = 10.03$, $p = .001$, Pseudo-$R^2 = .09$, and math test scores, $B = 11.20$, $p < .001$, Pseudo-$R^2 = .15$, whereas participants with higher between-person levels of Academic Self-Efficacy showed a faster rate of increase in math test scores across elementary school, $B = 10.21$, $p = .036$, Pseudo-$R^2 = .25$. At the between-person level, Effortful Engagement mediated the association between Academic Self-Efficacy and both reading and math test scores, although no support was found for mediation at the within-person level. Collectively, results suggest that trait-level psychological factors can vary meaningfully within school-aged children and that both within-person change and between-person individual differences in these traits have important consequences for academic performance.

1. Introduction

Education research has traditionally focused on how traits such as intelligence and prior academic competencies influence children's academic performance. In recent years, more research has been devoted to studying how psychological traits, such as self-efficacy, self-regulation, and academic engagement impact children's academic performance (Eisenberg, Valiente, & Eggum, 2010;

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Fredricks, Blumenfeld, & Paris, 2004; Pajares, 1996). An increasing amount of empirical research supports the predictive validity of psychological traits on academic performance. However, much of this research focuses on stable, between-person associations among these constructs. Fewer studies have investigated how these psychological traits change within the individual, and furthermore, how these changes may influence academic performance. In the current study, we employed longitudinal multilevel model analyses to examine whether time-varying academic self-efficacy and effortful engagement (our index of self-regulated learning) predicted academic performance in elementary school. We also examined whether effortful engagement and academic self-efficacy accounted for unique (additive) variance in academic performance, or if their effect on performance was better explained via mediational pathways.

1.1. Effortful engagement and academic performance

Academic engagement is a multidimensional construct that describes children's investment and involvement in learning activities (Appleton, Christenson, & Furlong, 2008; Fredricks et al., 2004). Although consensus regarding the number of distinct facets that compose academic engagement has yet to be reached, it is generally agreed that engagement with learning activities requires the coordination of behaviors, emotions, and cognition (Appleton et al., 2008; Fredricks et al., 2004). The study of academic engagement in elementary school age youth has focused mostly on engaged behaviors (as opposed to engaged emotions or cognition) and is the focus of the current study. Some definitions of engaged behaviors highlight classroom conduct, such as disruptive behaviors (Finn, Pannozzo, & Voelkl, 1995) and school compliance (Wang & Eccles, 2012), whereas others focus on active involvement with and participation in classroom learning activities (Skinner, Kindermann, & Furrer, 2009). In this latter conceptualization, the one we adopt in the current investigation, engaged behaviors largely reflect children's self-regulation—the ability to voluntarily monitor and manage behavior to meet goal-directed aims (Eisenberg, Smith, Sadovsky, & Spinrad, 2004). During academic learning, children must draw upon their capacity for self-regulation to exert effort on challenging tasks, to inhibit momentary distractions, to pay attention, to contribute to class activities, to persist in the face of setbacks, and so forth (Hughes, Luo, Kwok, & Loyd, 2008; Li-Grining, Votruba-Drzal, Maldonado-Carreno, & Haas, 2010; Wolters & Taylor, 2012).

A self-regulatory perspective of behavioral engagement is consistent with prior research. For example, McClelland, Acock, and Morrison (2006) argued that academic engagement (termed "learning-related skills") involves a suite of self-regulatory behaviors that include attention focusing, resistance to distraction, following instructions, and coming prepared for class, among others (see also, McClelland et al., 2007). Li-Grining et al. (2010) similarly argued that engagement (termed "approaches to learning") encompasses a set of self-regulatory skills which may manifest as persistence, attentiveness, and flexibility. The current work follows most closely to Hughes et al.'s (2008) conceptualization of behavioral engagement. Drawing from both the child temperament and personality literatures, they derived a construct called "effortful engagement," which they defined as volitional involvement in learning activities and included behaviors such as effort, persistence, attention, and class participation. Across several studies (e.g., Hughes & Kwok, 2007; Hughes, Wu, & West, 2011; Hughes et al., 2008), classroom teachers assessed effortful engagement using questionnaire items tapping the Big Five personality trait Conscientiousness as well as cooperative participation in learning activities. Building on this work, in the current study, we use aspects of effortful control (attention focusing and inhibitory control) and self-regulated behavioral engagement (attention and effort) in our conceptualization of effortful engagement to predict academic performance over the course of elementary school.

Effortful engagement predicts academic performance in both cross-sectional and longitudinal studies (Alexander, Entwisle, & Dauber, 1993; Hughes et al., 2008; Li-Grining et al., 2010; Normandeau & Guay, 1998; Skinner, Wellborn, & Connell, 1990). For example, Li-Grining et al. (2010) showed that higher engagement, measured during kindergarten, was linked with better reading and math trajectories through fifth grade, with effect sizes in the moderate range (0.35 *SD* for reading and 0.26 *SD* for math). In a 3-year longitudinal study of first grade students, Hughes et al. (2008) used a structural equation modeling approach to examine the within- and across-year associations between measures of teacher–student relationship quality, effortful engagement, and standardized test scores in reading and math. They reported evidence of small to medium associations, within- and across-years, between effortful engagement and reading ($\beta = .04$ to .29) and math ($\beta = .03$ to .21) scores. More importantly, they also showed that effortful engagement measured in second grade fully mediated the association between teacher–student relationship quality measured in first grade and test scores measured in third grade, again with small-to-medium effect size estimates for the mediation effect (ΔR^2 of .01 for math and .10 for reading).

1.2. Academic self-efficacy, effortful engagement, and academic achievement

According to Bandura's (1986) social-cognitive theory, beliefs and attitudes about the self are intimately connected with personal agency and motivated behavior. Chief among these beliefs is self-efficacy, which is the belief in one's capabilities to exercise control over their environment and to perform a given activity (Bandura, 1993, 1997). In the current study, we focus on academic self-efficacy, which relates to the perceived ability to master academic subjects, manage learning, and fulfill academic expectations (Muris, 2001). The measure used in the current study focuses both on children's perceptions of their ability to do well in school (e.g., Can I pass tests?), as well as their ability to engage in self-regulated learning (e.g., Can I study when there are other interesting things to do?). As with effortful engagement, ample evidence demonstrates the predictive validity of academic self-efficacy beliefs on various aspects of academic performance (for a review see, Pajares, 1996), with meta-analytic estimates of effect sizes in the medium range for both performance (.38 average effect size) and persistence (.34 average effect size; Multon, Brown, & Lent, 1991).[3]

[3] These effects are similar in magnitude to those reported for the associations between academic self-concept (a construct similar to self-efficacy) and academic performance. For example, a recent meta-analysis by Huang (2011) showed moderately-sized longitudinal correlations of $r = .20$ to .27 between self-concept and later academic performance.