



Effortful control is associated with children's school functioning via learning-related behaviors



Noelia Sánchez-Pérez^a, Luis J. Fuentes^b, Nancy Eisenberg^c, Carmen González-Salinas^{a,*}

^a University of Murcia, Department of Developmental Psychology and Education, Faculty of Psychology, Espinardo Campus, CP 30100 Murcia, Spain

^b University of Murcia, Department of Basic Psychology and Methodology, Faculty of Psychology, Espinardo Campus, CP 30100 Murcia, Spain

^c Arizona State University, Department of Psychology, College of Liberal Arts and Science, Tempe, AZ 85281, USA

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ABSTRACT

The goal of the current study was to identify factors that contribute to individual differences in school functioning. We proposed a model including direct effects of Effortful Control (EC) on Spanish 6- to 12-year olds' ($N = 142$) academic achievement and social adaptation at school, with these relations partially mediated by learning-related behaviors (LRBs). Parents rated children's EC; teachers reported children's LRBs and children's social adaptation in school; children's social preference was assessed through classmates' nominations. Children's academic achievement was measured through standard tests and grades. Analyses were run using structural equation models, controlling by gender, intelligence, age, socioeconomic status, and school. EC was positively and directly related to social adaptation in school. EC was also indirectly related to academic achievement and social adaptation through LRBs. The findings highlight the potential relevance of children's EC and LRBs for adjustment in elementary school.

1. Introduction

In modern societies, school education is expected to provide students with the key knowledge and skills essential for full participation as citizens. In support of this notion, researchers have found that school success is related to long-term consequences for the individuals such as emotional wellbeing and prosocial values (Bryant, Schulenberg, Bachman, O'Malley, & Johnston, 2000), educational attainment (Marjoribanks, 2005), employment aspirations (Caspi, Wright, Moffitt, & Silva, 1998), and socioeconomic position (Guglielmi, 2008).

However, in every country, some students fail to reach a baseline level of acceptable performance. The Programme for International Student Assessment (PISA) reported that, on average, more than one in five students in Organization for Economic Cooperation and Development (OECD) countries did not reach a minimum level in mathematics, reading, or science, and most of these students were not expected to continue their education beyond compulsory schooling (Instituto Nacional de Evaluación Educativa, 2016). As stated by PISA report, 10.3% of students are low performers in Spain but more dramatically, the percentage of school leavers is much higher (21.85%) in comparison with the average percentage in the European Union (11.1%) (Instituto Nacional de Estadística, 2015). Given the relevance of schooling for children's future development, we sought to identify

factors that contribute to individual differences in school functioning with the ultimate goal of implementing interventions designed to prevent children from experiencing school failure.

Two main aspects of school functioning were considered in this study: academic achievement and social adaptation. Academic achievement represents performance outcomes that indicate the extent to which a student has accomplished specific goals that were the focus of activities in the instructional environment (Steinmayr, Meißner, Weidinger, & Wirthwein, 2014). At school, it includes the acquisition of knowledge and the understanding of a variety of intellectual domains. Among them, reading and mathematics abilities are considered of special relevance for academic success because they provide the instrumental basis for further complex knowledge.

Social adaptation status “refers to the adequacy of behavioral responses of the individual to the social task demands in particular social fields and at particular stages of life” (Kellman, 1994, p. 149). Among other aspects, adaptive behaviors at school include those related to social skills, which involve the deployment of positive interactions with teachers and peers (Raver & Knitzer, 2002; Rimm-Kaufman & Chiu, 2007). Additionally, children's social status among their classmates has been deemed a marker of social adaptation (Parker & Asher, 1987; Rubin, Bukowski, & Parker, 1998). Peers' reports of students' social acceptance have been related to helpfulness, rule conformity,

* Corresponding author at: Departamento de Psicología Evolutiva y de la Educación, Facultad de Psicología, Universidad de Murcia, Campus de Espinardo, 30100 Murcia, Spain.
E-mail addresses: n.sanchezperez@um.es (N. Sánchez-Pérez), cgonzale@um.es (C. González-Salinas).

friendliness, and prosocial interactions (Coie, Dodge, & Kupersmidt, 1990; Powers, Bierman, & Conduct Problems Prevention Research Group, 2013). In contrast, aggressive behaviors exhibited in the school setting are strongly related to failure in interactions with peers (Coie & Dodge, 1988; Crick & Grotpeter, 1995) and are considered maladaptive (Reynolds & Kamphaus, 2004).

In analyzing the factors which contribute to children's academic success and social adaptation in school, researchers have focused on effortful control (EC; Duckworth & Allred, 2015; Eisenberg, Valiente, & Eggum, 2010b; Posner & Rothbart, 2007; Rueda, 2015). EC represents the tendency to be able to employ top-down control to self-regulate (Nigg, 2017; Rothbart, 2011). The main components of EC include attentional control processes, the inhibition of prepotent behaviors in response to instructions or social demands, and the capacity to perform an action when there is a strong tendency to avoid it (Rueda, 2015). These abilities, which can be observed by parents in daily situations, are proposed to reflect individual differences in the efficiency of the executive attention network (Rothbart, Sheese, & Posner, 2007). Although EC overlaps in part with the operations covered by executive functions (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Eisenberg & Zhou, 2016; Liew, 2012), EC has shown a unique contribution to school functioning other than that predicted by executive functions (e.g., Blair & Razza, 2007; Neuenchwander, Röthlisberger, Cimeli, & Roebbers, 2012), a difference that might be partly due to some differences in the typical measures used to assess EC and executive functioning.

Individual differences in EC have been associated with academic performance (Neuenchwander et al., 2012; Valiente et al., 2011, 2013; Valiente, Lemery-Chalfant, & Castro, 2007). According to Zhou, Main, and Wang (2010), students with high EC likely perform better academically than their counterparts with low EC due to their greater ability to focus, maintain, and self-regulate their attention, and to effortfully inhibit prepotent responses as needed. Moreover, associations between EC and diverse aspects of social adjustment such as prosocial behavior, social competence, and low levels of externalizing behaviors have also been found (Alessandri et al., 2014; Chang, Olson, Sameroff, & Sexton, 2011; Mintz, Hamre, & Hatfield, 2011; Zorza, Marino, de Lemus, & Acosta Mesas, 2013; for a review, see Eisenberg, Spinrad, and Eggum, 2010a). Eisenberg et al. (2010b) suggested that children's abilities to manage attention, emotion, and behavior likely contribute to their tendencies to behave in constructive and socially appropriate ways in social interactions at school.

EC covers a set of dispositional self-regulatory abilities necessary to cope with cognitive and social demands, but success at school will ultimately depend on the actual behaviors children exhibit in the classroom environment. Among the behaviors, learning-related behaviors (LRBs) and classroom participation are especially relevant. LRBs refer to adaptive responses to demands and learning tasks in educational contexts (Morgan, Farkas, Hillemeier, & Maczuga, 2009; Sasser, Bierman, & Heinrichs, 2015). More specifically, we refer to a set of behaviors which involve organizational skills and appropriate habits of study (Reynolds & Kamphaus, 2004). At elementary school, they include behaviors such as attending to teachers' explanations, carefully analyzing problems before solving them, completing the assigned tasks, participating in teamwork, and striving even on non-preferred subjects. LRBs are expected to influence academic achievement and social adaptation because they reflect children's level of engagement in classroom activities (Fantuzzo, Perry, & McDermott, 2004) and allow them to benefit maximally from classroom learning opportunities, which in turn facilitates the performance of domain-specific academic content and social skills (Brock, Rimm-Kaufman, Nathanson, & Grimm, 2009; Neuenchwander et al., 2012). Consistent with this expectation, researchers previously have found that LRBs are associated with better academic achievement (Neuenchwander et al., 2012; Sánchez-Pérez, Fuentes, López-López, Pina, & González-Salinas, 2015; Sasser et al., 2015). Concerning social outcomes, LRBs have been found positively related to good social skills (McDermott et al., 2009; Sasser et al.,

2015), positive peer connections (Fantuzzo et al., 2004), and lower levels of disruptive behaviors (Coolahan, Fantuzzo, Mendez, & McDermott, 2000; Fantuzzo et al., 2004; Sasser et al., 2015).

EC and LRBs are two constructs that reflect different aspects of self-regulatory skills (Neuenchwander et al., 2012). Consequently, they are expected to have unique contributions to school functioning. Whereas EC is theorized to regulate approach and withdrawal behavioral tendencies via attentional, inhibitory control and effortful activation mechanisms, as reported by parents in the context of daily situations (Rothbart, 2011), teachers' ratings of classroom LRBs refer to the actual behaviors exhibited by children in coping with academic tasks, and reflect the use of metacognitive abilities (Reynolds & Kamphaus, 2004) as well as motivation (Neuenchwander et al., 2012).

Moreover, the contribution of EC to school functioning could be mediated in part by LRBs. In fact, LRBs constitute a more proximal gateway to classroom learning compared to EC skills because they support effortful and active participation in learning situations and maximize the child's exposure to classroom instruction (Sasser et al., 2015; Stipek, Newton, & Chudgar, 2010). Additionally, EC and LRBs are partially interrelated. Previous research has shown that EC is associated with LRBs (Neuenchwander et al., 2012; Valiente et al., 2013). As Duckworth and Allred (2015) suggested, the skills involved in EC likely promote self-regulation of work-related impulses, permitting the child to sustain attention and effort despite frustration, boredom, or confusion, which would facilitate the use of LRBs. In turn, the deployment of such behaviors would be expected to have a positive impact on children's academic achievement and social adaptation at school.

In line with this expectation, Neuenchwander and collaborators' (2012) study found in a sample of Swiss children that better EC indirectly predicted higher academic performance through LRBs, a teacher-reported measure composed of task persistence, efficiency in completing homework, and self-reliance. In that study, children's ages corresponded to kindergarten and first years of elementary school. In our study, we tested the mediational role of LRBs in a Spanish sample with a broader and older age range (grade 2 to grade 6).

With respect to social adaptation, to our knowledge, the indirect relation between EC and social adaptation at school via LRBs has not been sufficiently explored. However, Sasser et al.'s (2015) study can be taken as relevant to this issue because they focused on a cognitive measure of self-regulation and addressed the mediational role of LRBs. They assessed pre-kindergarten children's executive functioning (including working memory, inhibitory control, and attentional shifting) and found that it was positively associated with higher social competence and lower aggression in elementary school, and these associations were mediated by LRBs. In our study, we sought to test the mediational role of LRBs in the EC-to-social adaptation association at school in school-age children.

1.1. The present study

The present study was designed to examine the associations between EC and school functioning in a sample of elementary school children. We predicted that EC would relate to individual differences in children's academic achievement and social adaptation in school directly and through partial mediation by LRBs (see Fig. 1). The proposed model may be especially relevant for explaining students' school functioning at the ages considered in this study because both EC and LRBs largely depend on executive control, and middle childhood is considered crucial for the development of metacognitive monitoring and control processes (Metcalf & Finn, 2013).

Additionally, the specific instructional system followed by the schools in this study may rely on particular skills to be successful. Similar to most state-run primary schools in Spain, the two schools in this study presented several characteristics, as reported by their head-teachers. First, classrooms arranged students' seats in parallel rows facing the board most of the time because teachers gave explanations

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