



Relations among peer acceptance, inhibitory control, and math achievement in early adolescence

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ABSTRACT

This study examined relations among peer acceptance, inhibitory control, and math achievement in ninety-nine 4th and 5th grade early adolescents. Teachers rated students on peer acceptance and students completed a computerized executive function task assessing inhibitory control. Math achievement was assessed via end of year math grades. Results indicated that both inhibitory control and peer acceptance were positively and significantly related to math achievement. In addition, peer acceptance significantly mediated the relationship between inhibitory control and math grades when all three variables were entered simultaneously in a linear regression model. These results suggest that peer acceptance is an important indicator of social functioning and plays a significant part in academic success in the classroom. Results also suggest that indicators of social functioning – such as peer acceptance – need to be included in addition to cognitive functioning, when examining academic achievement in early adolescence.

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Positive peer relationships become increasingly important in young people's overall development and well-being during early adolescence (Oberle, Schonert-Reichl, & Thomson, 2010; Rubin, Bukowski, & Parker, 2006). Decades of research seem to suggest that peer acceptance – the degree to which a child is socially accepted and liked by his or her peers – emerges as a core indicator for social and emotional well-being and academic success during the early adolescent years (Nangle & Erdley, 2001; Oberle et al., 2010; Wentzel, 2003, 2005, 2009). Particularly, studies on peer acceptance during the middle school years indicate that early adolescents who are popular, accepted, and have positive relationships with their peers also tend to be socially well-adjusted, and academically more successful than those who are rejected by their peers (e.g., Bierman, 2004; Furrer & Skinner, 2003; Véronneau & Vitaro, 2007; Wentzel, 1991; Wentzel & Caldwell, 1997). Explanations for the critical role of peer acceptance in academic achievement have centered around the notion that belonging to a friendship group in school can increase motivation to engage in classroom and school activities, and be a valuable source of social support for students in the school context, particularly during early adolescence (Véronneau, Vitaro, Brendgen, Dishion, & Tremblay, 2010; Wentzel, 2003).

One contributor to peer acceptance is inhibitory control, an executive function which is related to the ability to regulate one's own emotions and behavior, thus being a core ability needed to function socially and to form and maintain positive social relationships (Eisenberg, Fabes,

Guthrie, & Reiser, 2000; Hughes, White, Sharpen, & Dunn, 2000). Inhibitory control is an executive control process that contributes to organizing, sequencing, and regulating behavior in adults as well as children and adolescents (Best & Miller, 2010; Reimers & Maylor, 2005). Together with the other executive control processes – working memory and cognitive flexibility – inhibitory control skills play a crucial role in everyday activities and functioning such as planning, holding, and managing multiple goals, and maintaining cognitive flexibility (Davidson, Amso, Cruess Anderson, & Diamond, 2006; Zelazo & Müller, 2002). Inhibitory control as an indicator of social and emotional functioning plays a significant role in both academic achievement and overall functioning and adjustment in social settings such as school (Bierman, Nix, Greenberg, Clair, & Domitrovich, 2008; Greenberg, 2006; Rhoades, Greenberg, & Domitrovich, 2009). The research conducted by both Bierman et al. (2008) and Rhoades et al. (2009), however, focused exclusively on 3- to 5-year-old children in preschool settings from low-income families. Hence, the findings from these studies indicating positive relationships among inhibitory control, social adjustment, and positive academic growth have limited generalizability beyond the developmental period of early childhood, and may be specific to young children from low-income families attending a Head Start preschool program.

Much of the research investigating the interplay of cognitive, social, and academic development has focused either on peer relationships in relation to academic achievement (e.g., Véronneau & Vitaro, 2007; Wentzel, 2003; Wentzel & Caldwell, 1997) or on inhibitory control in relation to academic achievement (e.g., Blair & Razza, 2007; Espy et al., 2004), and studies that bring these three constructs together in one investigation are relatively rare. To our knowledge only one study

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has examined relations among inhibitory control, peer acceptance, and academic achievement simultaneously in a sample of pre- and early adolescents (see Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). Accordingly, the aim of this investigation was to further elucidate the ways that cognitive and social factors influence academic achievement by examining relations among peer acceptance, inhibitory control, and math achievement in early adolescence. Merging these fields of research is important for two reasons. First, both successful peer relationships and inhibitory control skills have in common the underlying ability to self-regulate (e.g., Blair & Diamond, 2008; Davidson et al., 2006; Olsen, Lopez-Duncan, Lunkenheimer, Chang, & Sameroff, 2003; Patrick, 1997; Valiente et al., 2008). Second, both peer relationships and inhibitory control play a crucial role in academic achievement throughout adolescence (Nichols & White, 2001). Valiente et al. (2008) suggest that further research is needed that bridges extant literatures on various indicators of self-regulatory competencies in relation to academic achievement, and simultaneously investigates cognitive indicators alongside social relationships.

Inhibitory control: a predictor of social and academic functioning

Inhibitory control is a core executive function dimension that contributes to the successful formation of peer relationships from an early age (Hay, Payne, & Chadwick, 2004; Hughes et al., 2000). The importance of inhibitory control in peer acceptance and positive peer relationships can be explained by the contention that successful peer relationships require self-regulatory skills such as suppressing inappropriate social responses in a given situation (e.g., telling a secret, invading someone's space, taking away what belongs to someone else, getting aggressive when being disappointed by a friend) (Rotenberg, Michalik, Eisenberg, & Betts, 2008). There is evidence that inhibitory control matters to social adjustment in the school context. For instance, it has been established that greater capacities for inhibitory control are associated with fewer internalizing and externalizing problems, greater sympathy for others, and overall superior social and emotional competence in kindergarten through to 5th grade (Eisenberg et al., 2000; Lengua, 2003). Furthermore, Blair and Razza (2007) found that the inhibitory control aspect of self-regulation was significantly related to math skills in three to five year olds. Similarly, Espy et al. (2004) found that inhibitory control was a significant predictor of math achievement in a sample of preschool students.

Considering both academic and social adjustment at the same time, Rotenberg et al. (2008) found that trustworthiness – a characteristic that is positively related to having friends and being accepted – partially mediated the relationship between inhibitory control and adjustment among 3- to 5-year old children. Last, Valiente et al. (2008) found that teacher–child relationship partially mediated the relation between parent-reported effortful control – a skill related to inhibitory control – and academic achievement in 7- to 12-year-old elementary school students. The Valiente et al. study is important because it reveals the power of social relationships for academic achievement, and suggests that social aspects may partially account for the link between executive skills and academic success.

Current findings are promising but subject to certain limitations. Chief among these is the fact that little research has been done jointly examining relations among inhibitory control, social relationships, and school achievement. We are aware of only one study merging the three fields of research (see Valiente et al., 2008); however, the authors focused on teacher–child relationships in the classroom when investigating the link between executive skills and academic success, and their executive skill of focus was effortful control as reported by students' parents. The study's main findings were that teacher–child relationships, social competence, and classroom participation partially mediated the relation between effortful control and change in academic grades throughout the school year. In addition, they found that teacher–child relationships and classroom participation were also partial mediators for change in school absences across

the year. Because peers become increasingly important for social well-being and academic achievement in early adolescence (Bierman, 2004; Wentzel & Caldwell, 1997), the present study focuses on peer acceptance in relation to inhibitory control and academic achievement, and therefore allows for an examination of the relations among these three important developmental areas.

Peer relationships and positive development in early adolescence

Becoming part of a peer group is an important developmental task to be mastered in adolescence (Newman & Newman, 1976). Positive peer relationships are considered an asset that promotes thriving and successful pathways through life within the theoretical framework of Positive Youth Development (PYD; Lerner, von Eye, Lerner, Levin-Bizan, & Bowers, 2010). Peer acceptance in particular has been identified as a core indicator for multiple domains of success and well-being – including social, emotional, and mental well-being, and academic success (Anderman & Freeman, 2004; Furlong et al., 2003; Haynes, Emmons, & Ben-Avie, 1997; Osterman, 2000; Whitlock, 2006). In fact, researchers have noted that having friends and positive relationships with peers in school contributes to a feeling of belongingness to school, which in itself is a key to academic achievement motivation and success (e.g., Roeser, Midgley, & Urdan, 1996). Young people can benefit in their academic development from being part of a peer group with high achievement motivation and a high level of academic success (Hartup, 1996; Ryan, 2001). A group of high achieving peers reflects an established value of academic achievement and school engagement in the group, which sets a positive norm for group members (Witkow & Fuligni, 2010).

Being accepted in school and having friends has a powerful impact on school experiences and contributes to an overall positive school experience, making school a desirable place to go (Larson, 2000). Witkow and Fuligni (2010), for example, found that having friends in school significantly predicts higher GPA in adolescence, and that this relationship could be explained by having shared academic experience with in-school peers, identifying with the in-school peer group and therefore feeling more connected to aspects of school life in general than those who have predominately out-of-school peers. This finding aligns with previous research suggesting that positive peer relationships in school play a significant role in academic success (e.g., Bierman, 2004; Furrer & Skinner, 2003; Véronneau & Vitaro, 2007; Wentzel, 1991; Wentzel & Caldwell, 1997).

Overall, research has indicated that the social aspect of academic success cannot be ignored. Particularly during early adolescence, when the social focus shifts away from the family and toward the peer group (Larson & Richards, 1991), being accepted and having friends at school emerges as an important aspect for positive growth in school. Peer acceptance and friendships in the school setting contribute to the formation of a positive school identity and therefore need to be considered part of the pathway to academic success (Cooper, Valentine, Nye, & Lindsay, 1999). Overall, the present study addresses a gap in the literature on the social and cognitive foundations of academic success. First, our study is one of the few combining three crucial fields of development, namely cognitive, social, and academic development (see Valiente et al., 2008). Second, we focus on the developmental period of early adolescence in contrast to previous research in this field that has predominately been conducted with younger children (e.g., Bierman et al., 2008). Last, our study investigates the role of peer acceptance in relation to executive control skills and academic achievement. Both theory and research indicate that being accepted by one's peers is a particularly salient and important dimension of social functioning given the strong focus on the peer group during the early adolescent age-period, and therefore needs to be considered when understanding academic outcomes (Eccles & Roeser, 2009).

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