Journal of Applied Developmental Psychology 33 (2012) 311–319

Contents lists available at SciVerse ScienceDirect

Journal of Applied Developmental Psychology

The implications of early attentional regulation for school success among low-income children ☆

Rachel A. Razza [a,*], Anne Martin [b], Jeanne Brooks-Gunn [b]

[a] Department of Child and Family Studies, Syracuse University, 426 Ostrom Avenue, Syracuse, NY 13244, USA
[b] National Center for Children and Families, Teachers College, Columbia University, 525 West 120th Street, Box 39, New York, NY 10027, USA

ARTICLE INFO

Article history:
Received 14 December 2011
Received in revised form 24 July 2012
Accepted 25 July 2012
Available online 3 September 2012

Keywords:
Focused attention
Impulsivity
Academic achievement
Behavioral competence
Low-income children

ABSTRACT

This study examined the longitudinal associations between attentional regulation in preschool and children's school success in later elementary school within an at-risk sample ($N = 2595$). Specifically, two facets of attention (focused attention and lack of impulsivity) at age 5 were explored as independent predictors of children's achievement and behavioral competence at age 9. Overall, the pattern of results indicates specificity between the facets of attention and school success, such that focused attention was predictive of achievement outcomes whereas impulsivity was predictive of behavioral outcomes. Both facets of attention predicted the teacher ratings of children's approaches to learning, which suggests that they jointly influence skills that span both domains of school success. Poverty status, maternal warmth, and infant temperament did not moderate these associations. Implications of these findings for interventions targeting school readiness and success among at-risk children are discussed.

The extant literature suggests that attention-related self-regulatory skills have significant implications for children's school readiness, as difficulties in attention regulation are linked with poor academic performance (Alexander, Entwisle, & Dauber, 1993; Horn & Packard, 1985; Raver, Smith-Donald, Hayes, & Jones, 2005) and increased problem behaviors (Campbell, Pierce, March, Ewing, & Szumowski, 1994; Eisenberg et al., 2000; Rothbart & Bates, 2006) across the preschool and early elementary years. Not surprisingly, there is also growing evidence that early attention skills are predictive of children's school success in the longer term. For example, longitudinal research supports associations between children's attention in early elementary school and externalizing behavior in the later elementary grades (Belsky, Pasco Fearon, & Bell, 2007). Moreover, the results of a meta-analysis across six studies identified attention skills at school entry as a unique predictor of later math and reading achievement (Duncan et al., 2007). Collectively, these studies highlight attention as a potential target for early intervention efforts aimed at promoting children's school readiness and later school success in both the academic and behavioral domains.

Two attentional processes that have received increased interest in recent years are focused attention and lack of impulsivity, which reflect the ability to intentionally focus on a particular stimulus and to avert prepotent response tendencies, respectively (Derryberry & Rothbart, 1997). Although both facets are likely to contribute to school success, it is possible that they are differentially implicated in achievement and behavior. For example, among predominantly socioeconomically advantaged families, children's focused attention at 54 months accounted for more variance in academic achievement than in behavior, whereas impulsivity accounted for more variance in behavior than academic achievement (NICHD Early Child Care Research Network [ECCRN], 2003). Moreover, some evidence suggests that associations between focused attention and impulsivity and later child outcomes may vary by socioeconomic status. Within a low-income sample, focused attention at age 5 was associated with receptive vocabulary among all children, whereas impulsivity predicted vocabulary and behavior problems for poor but not near-poor children (Razza, Martin, & Brooks-Gunn, 2010). These findings suggest the need for further research on attention processes among low-income children, who demonstrate lower school readiness than their more advantaged peers (Klebanov, Brooks-Gunn, McCarton, & McCormick, 1998; Lengua, 2002; McLoyd, 1998).

In the present study, we address three limitations of the extant literature linking attention with school success. First, with the exception of the two above-mentioned studies (i.e., NICHD ECCRN, 2003; Razza et al., 2010), there has been little research examining the independent contributions made by the individual facets of attention to children's achievement and social behavior. In fact, most of the studies in this area focus exclusively on the link between impulsivity and externalizing behavior (e.g., Belsky et al., 2007). Second, the limited research that does exist is cross-sectional, and thus the long-term associations between attention and academic and behavioral competence remain unknown. Third, most of the research linking attention and school readiness have

☆ Credit to NICHD grant; Child Care and Employment in Fragile Families (512127); R01HD040933.

* Corresponding author.
E-mail addresses: rrazza@syr.edu (R.A. Razza), arm53@columbia.edu (A. Martin), jb224@columbia.edu (J. Brooks-Gunn).

0193-3973/$ – see front matter © 2012 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.appdev.2012.07.005

been generated from a single data set representing a predominantly white, advantaged sample — the NICHD Study of Early Child Care and Youth Development (SECCYD; Belsky et al., 2007; Dilworth-Bart, Khurshid, & Vandell, 2007; NICHD ECCRN, 2003). Given recent evidence suggesting that the implications of attention may vary by poverty status (Razza et al., 2010), it is imperative that we continue to investigate how attentional processes behave within at-risk samples. Thus, the current study examines the independent contributions of focused attention and lack of impulsivity at 5 years to children's academic and behavioral competence at age 9 within a low-income sample.

The association between attentional processes and school success

The importance of attention for children's school success is not surprising, given that attentional processes underlie controlled cognitive activities and social behavior (Calkins & Fox, 2002; Lawson & Ruff, 2004), and thus directly influence both children's engagement in learning activities and their interpersonal relationships (Ladd, Birch, & Buhs, 1999; Pianta & Stuhlman, 2004). Notably, attention skills at school entry are uniquely predictive of later school success independent of other indices of readiness, including prior cognitive ability (McClelland, Morrison, & Holmes, 2000; Yen, Konold, & McDermott, 2004) and social–emotional competence (Duncan et al., 2007; Hinshaw, 1992; Konold & Pianta, 2005).

We focus on two aspects of attentional regulation, focused attention and impulsivity, which have been significantly and differentially associated with achievement and behavioral competence. While both facets of attention predicted outcomes in both domains within a sample of predominantly socioeconomically advantaged children, focused attention accounted for more unique variance than impulsivity did in reading and math achievement, whereas impulsivity accounted for more variance in problem behaviors and social skills (Belsky et al., 2007; NICHD ECCRN, 2003). Thus, although focused attention may promote successful interpersonal interactions by allowing children to observe and process social cues (Andrade, Brodeur, Waschbusch, Stewart, & McGee, 2009; Davies, Woitach, Winter, & Cummings, 2008), its primary domain of influence appears to be achievement. Specifically, focused attention may be particularly critical for the acquisition of reading and language skills, as it facilitates learning (Ruff & Lawson, 1990) by allowing children to concentrate on relevant material and avoid distraction (Tamis-LeMonda & Bornstein, 1989; Velting & Whitehurst, 1997). Inversely, although children's impulsivity may influence achievement by disrupting the learning process, it appears to be particularly critical for behavioral outcomes. Specifically, the ability to control behavioral impulses underlies successful peer interactions and reduces the likelihood of externalizing problems (Eisenberg et al., 2009; NICHD ECCRN, 2003). For example, children who are able to abide by rules or social conventions are more likely to be perceived as acting fairly and competently by others (Andrade et al., 2009).

A limitation of previous research examining the links between individual facets of attention and school success is that the few studies that do exist are restricted in their longitudinal scope. Specifically, the only two studies (NICHD ECCRN, 2003; Razza et al., 2010) to examine these facets of attention simultaneously assessed the dependent variables contemporaneously (at 54 months and 5 years, respectively). Thus, while these studies suggest that attention at school entry is associated with children's early academic achievement and behavioral competence, they do not address the long-term implications of these attentional processes for children's later school success. However, broad measures of attention skills have been found to predict long-term reading and math achievement (Duncan et al., 2007), as well as increased prosocial skills and reduced problem behavior (Davies et al., 2008). Moreover, there is evidence that children who are unable to pay attention or control their impulses by first grade, when the learning environment becomes more structured, demonstrate difficulties with teachers and peers (Liew, Eisenberg, & Reiser, 2004; Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Pianta, Steinberg, & Rollins, 1995). Thus, while early attention skills appear to set the stage for later functioning, it is unclear whether focused attention and lack of impulsivity are both necessary for later achievement and behavioral outcomes.

Additionally, neither Razza et al. (2010) nor NICHD ECCRN (2003) examined the association between attention and children's internalizing behavior. Both focused attention and impulsivity have been implicated in children's internalizing behavior, although in different directions. Specifically, focused attention is thought to protect children from depression and other internalizing problems by preventing rumination and facilitating effective coping strategies, whereas a lack of impulsivity may contribute to internalizing problems by limiting interactions with peers and opportunities to develop coping mechanisms (Calkins, 2007). To date, however, research has not tested whether focused attention and lack of impulsivity, captured in a laboratory task, predict internalizing problems in the early school years.

Potential moderators of associations between attention and school success

The negative implications of poverty for children's attention are well established, as the adverse conditions associated with poverty are thought to reduce the brain's ability to engage in attentive behavior (for review, see Mirsky, 1995). Indeed, studies find that low-income children score lower than their peers on attentional regulation in early childhood (Dilworth-Bart et al., 2007; Entwisle, Alexander, & Olson, 2005; Miech, Essex, & Goldsmith, 2001). What is unclear, however, is whether associations between specific facets of early attention and domains of later school success vary by poverty status. Interestingly, the only study to date examining poverty as a moderator suggests that the specificity in these pathways may diverge for children at the lowest levels of family income. Specifically, Razza et al. (2010) found that among all low-income 5-year-olds, focused attention was associated with receptive vocabulary; however, lack of impulsivity was also associated with receptive vocabulary only among children who fell below the poverty threshold. The greater vulnerability of the children living in poverty was striking because the sample was exclusively low-income. Past research suggests that the association between income and negative outcomes is strongest among the poorest children, such that children from the most impoverished backgrounds demonstrate higher levels of problem behaviors than their more advantaged peers who are also living below the poverty line (Dearing, Taylor, & McCartney, 2006; McLeod & Shananhan, 1996). These findings are consistent with evidence that exposure to multiple stressors within the context of poverty is associated with increased mental health and self-regulation problems among children (Evans, 2003). Thus, it may also be the case that internal resources, such as the ability to control impulsive behavior, exert a stronger or wider scope of influence on developing capacities among children in poverty. Therefore, we test whether poverty status remains a moderator of attention skills at age 9 within a low-income sample, as it was in this data set at age 5.

Developmental theory also suggests that proximal processes, particularly the mother–child interaction, have the greatest effect on child outcomes within the most disadvantaged environments (Bronfenbrenner & Ceci, 1994). Thus, we test whether two other potential sources of vulnerability interact with attention in predicting school success within a low-income sample, starting with the quality of parenting the children receive. Higher maternal warmth predicts both academic and behavioral competence in early childhood (Hubbs-Tait, McDonald Culp, Culp, & Miller, 2002; Landry, Smith, Swank, Assel, & Vellet, 2001; Leventhal, Martin, & Brooks-Gunn, 2004). We therefore test whether children who are vulnerable because their mothers score low in warmth demonstrate a stronger association between sustained attention in preschool and later school success. An additional source of vulnerability is difficult (i.e., fussy, irritable) temperament, as research suggests that negative affectivity