

## RESEARCH-TO-PRACTICE SUMMARY

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### Asthma and Academic Achievement: How Are Head Start Children Affected?

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Head Start children with asthma represent a unique student population with unique needs. This study examined the ways in which a diagnosis of asthma can affect the later academic achievement of these students in a sample of 788 children identified as having asthma. Results indicated statistically significant group differences in standardized reading and mathematics scores, with students with asthma performing worse than students without this diagnosis in both academic areas. In reference to reading abilities among students with asthma, indicators of socioeconomic status, gender, and level of school absences were found to be predictive of reading scores. Regarding mathematics abilities, results indicated the significant contribution of both socioeconomic status and level of school absences in predicting the math scores of students with asthma. Variables regarding the family environment (access to resources and family routines also contributed to explaining the asthma-academic achievement relationship in a full model including all these variables. Recommendations for Head Start practitioners for adequately serving the needs of students with asthma are also discussed.

*Keywords:* asthma, academic achievement, Head Start

Asthma is the most prevalent respiratory chronic illness for American school-aged children, with an estimated 7.1 million children (9.6%) diagnosed with the condition (Bloom, Cohen, & Freeman, 2010). Of this group, children under the age of five are diagnosed with the condition at higher rates than any other age group (Akibani &

Schoendorf, 2002). Therefore, it is important to understand the influence of the condition on children's school outcomes.

Research suggests children with asthma are at greater risk for physical and mental health outcomes when compared to their healthy peers. These difficulties include poorer general health outcomes (Collins, Gill, Chittleborough, Martin, Taylor, & Winefield, 2008), more frequent nighttime waking and subsequent sleep deprivation from asthma symptoms (Fiese, Everhart, and Wildenger, 2009), and a higher incidence of internalizing behavior problems, including anxiety and depression (Fiese et al., 2009; Röder, Kroonenberg, & Boekaerts, 2003). Whereas studies have documented higher school absenteeism in children with asthma (Dean, Calimlim, Kindermann, Khandker, & Tinkelman, 2009; Moonie, Sterling, Figs, & Castro, 2008, other aspects of school functioning, particularly academic achievement, are less clear. Given this fact, it was to goal of this study to to examine the academic achievement of former Head Start children with asthma, with a particular emphasis on the role that family factors, including access to resources and regular family routines, might play in potentially playing a role in this relationship.

## ASTHMA AND ACADEMIC ACHIEVEMENT

Research regarding the effects of asthma on academic achievement is largely inconclusive. Some studies indicate children with asthma perform more poorly than their healthy peers on measures of academic functioning, particularly reading (Kohen, 2010; Liberty, Pattermore, Reid, & Tarren-Sweeney, 2010), whereas others have found that these children perform just as well or even better on measures of reading and math achievement when compared to healthy peers (Moonie et al., 2008; Moricca et al., 2012). Given these different findings, it's important to recognize the factors that might contribute to the academic achievement of Head Start students with asthma

### Disease Related Variables

One mechanism by which asthma could adversely affect the academic achievement of Head Start students is in the disease process itself. It is well established that many children with chronic health difficulties face challenges in academic functioning at as a result of associated cognitive deficits. In children with asthma, these effects can often occur as a result of medication (corticosteroid) use and associated side effects, which can include mood disturbance in the form of depression, hyperactivity, and increased behavior problems in the classroom (e.g., agitation, aggressiveness, and oppositional behavior); all which can lead to poor academic performance at school (Cerullo, 2006; Taras & Potts-Datema, 2005). Studies examining more direct cognitive effects of inhaled corticosteroid use have found prolonged use of these medications to be associated with deficits related to verbal memory (Brown, Rush, & Mcewen, 1999), declarative memory (Newcomer, Craft, Hershey, Askins, & Bardgett, 1994), and attention deficits (Chen et al., 2013).

## Demographic Factors: Gender, Ethnicity, and Socioeconomic Status

Koinis-Mitchell, Murdock, and Berz (2004) found that gender differences are apparent in the child's emotional response to asthma with girls with asthma often reporting lower perceptions of self-competence in disease management. Moreover, social-emotional difficulties such as these are recognized to place school-age children at risk for poor academic outcomes, including broader learning difficulties and school dropout (Quiroga, Janosz, Bisset, & Morin, 2013). Despite this fact, the direct role that gender might play in the association between asthma and academic achievement is less clear. Some researchers examining this relationship have controlled for gender, to adequately address research questions of interest (Kohen, 2010). Others have found no relationship between gender and outcome variables related to achievement among students with asthma (Koinis-Mitchell, Adams, & Murdock, 2005).

Regarding ethnicity, some studies have demonstrated that African American and Hispanic families experience greater functional limitations as well as higher levels of poverty resulting from asthma when compared to their non-Hispanic White counterparts, potentially pointing to a more direct effect of ethnicity (Koinis-Mitchell et al., 2010). Most studies attempt to control for ethnicity variables when examining asthma effects on academic achievement, as few have looked beyond the role of such variables as potential markers for achievement (Liberty et al., 2010). Furthermore, some still argue that any effects of minority status observed are largely still a function of related variables, namely issues of socioeconomic status (SES) (Taras & Potts-Datema, 2005).

Research consistently demonstrates that students from economically disadvantaged families are at a greater risk for poorer school outcomes and that these effects are particularly apparent when the child begins school (Arnold & Doctoroff, 2003). Associated characteristics of low-SES families, which have been demonstrated to contribute to the asthma-academic achievement relationship, include greater parent distress resulting from economic strain, less access to educational materials (e.g., books) in the home, and less overall importance placed on education by parents (Aikens & Barbarin, 2008). As a result, children coming from lower-SES families sometimes do not achieve the same level of early academic success as those children from higher-SES families, who are more likely to have received a greater level of early academic preparedness at home (Arnold & Doctoroff, 2003). It is expected this relationship would similarly hold for students with asthma.

## Absences and Asthma Severity

Students with asthma, particularly those with less well-controlled forms of the disease, tend to miss more school days than healthy peers and more than peers with better-controlled asthma (Moonie et al., 2006). As reported in the literature, estimates of the difference in average days absent annually range anywhere from 1.3 (Moonie et al., 2006) to 22 (Lodha, Puranik, Kattal, & Kabra, 2003) more days missed by these students. Students with asthma miss more school days for a number of reasons including doctors' appointments, increased severity of asthma symptoms (e.g., labored breathing, fatigue), and proactive avoidance of potential contact with asthma triggers at school (Taras &

Potts-Datema, 2005). Research suggests school absences in students with asthma are associated with multiple indicators of poor academic achievement including poorer mathematics performance (Kohen, 2010) and word reading scores (Liberty et al., 2010) as measured by standardized achievement tests.

### The Family Environment, Access to Resources, and Family Routine

Exposure to adverse sociodemographic events could place children with asthma at risk for a host of negative outcomes including less access to community resources including quality health care (Eggleston et al., 1999), and fewer opportunities to participate in developmentally appropriate activities (Eggleston et al., 1999). Furthermore, more recent evidence indicates that family-related variables may serve an important role in moderating the effects of SES in the form of lower family income on the educational success of children living in these environments (Aikens & Barbarin, 2008).

Furthermore, the presence of family routines in daily activities such as mealtimes, nighttime curfews, and homework is also accepted as an integral element to promoting a sense of cohesion in the family, while also serving a protective role in the health and well-being of children (Roche & Ghazarian, 2012). Characteristics of low SES neighborhoods that might contribute to a lack of consistent family routines include less social organization and economic constraints (e.g., parents working long hours to support the family; Leventhal & Brooks-Gunn, 2005). It is therefore apparent how aspects of more advantageous home environments in the form of higher access to community resources and the existence of family routines might play a role in contributing to the positive educational outcomes of students. However, the role of such variables in moderating this relationship among students with asthma is not clear. It was the goal of this study to address this question.

## SUMMARY OF RESEARCH METHODS

For the purposes of the current study, data from a group of former Head Start children enrolled in the National Head Start/Public School Early Childhood Transition/Demonstration Study (Ramey et al., 2000) whose parents/caregivers completed the question of whether or not they had received a doctor's diagnosis of asthma were examined ( $N = 5711$ ). Of this group, 788 were identified by their parents as having an asthma diagnosis (14% of the sample). Data regarding demographic characteristics (e.g., gender, ethnicity, SES, school absences) were inspected within the sample of students with asthma to determine the role that each might play in contributing to the ultimate academic achievement of former Head Start students with asthma.

Information was also collected regarding families' level of access to resources within their community using the Family Resource Scale (Leet & Dunst, 1985) and current levels of family routines using the Family Routines Inventory (Boyce, Jensen, James, & Peacock, 1983) in order to determine the influence of these characteristics above and beyond basic demographic characteristics on the academic achievement of former Head Start students with asthma. To adequately address research questions,

children's academic achievement data from a standardized test of academic achievement within the areas of reading and mathematics (Woodcock-Johnson Psychoeducational Battery-Revised) administered at the end of the third grade school year was examined.

## MAJOR FINDINGS

Overall, differences were observed in the academic abilities of Former Head Start children with and without an asthma diagnosis. Regarding reading abilities, a slight significant difference was observed between reading scores on the WJ-R for students without asthma and students with an asthma diagnosis. In reference to mathematics abilities, there was also a significant difference between the mathematics scores on the WJ-R between students without asthma. In both cases, former Head Start students with an asthma diagnosis performed worse on standardized measures of reading and mathematics abilities in comparison to healthy peers; although these overall differences were slight.

In reference to reading achievement, gender, socioeconomic status and number of school absences served as significant predictors of reading scores for students with asthma with boys, those living above the federal poverty line, and lower numbers of annual school absences performing better on this measure. In reference to mathematics achievement, socioeconomic status and number of school absences served as significant predictors of mathematics scores for students with asthma with those living above the federal poverty line and with lower numbers of annual absences performing better on this measure.. Finally, a full model including both family-related variables (access to resources and level of family routines) was statistically significant in predicting reading and mathematics abilities in former Head Start student with an asthma diagnosis; indicating the potential importance in considering these family characteristics.

Taken together, results of the current study point to the importance of examining other factors (i.e., demographic and other family characteristics) beyond solely the effects of having received an asthma diagnosis in determining disease effects at school.

## IMPLICATIONS FOR PRACTICE

This study adds to the growing body of knowledge regarding how chronic health conditions including asthma can affect the ultimate school success of children. In addition, this is one of the first studies to examine such effects in former Head Start children, a population already vulnerable to negative school outcomes. The results of the current study suggest that variables including SES, school absences, and gender all contribute to an explanation of academic achievement in this group. The fact that family-related variables (i.e., access to resources and family routines at home) also played a role in contributing to the prediction of achievement scores among students with asthma might portray the importance of considering the influence of these variables as well. Of note, these are all variables that have been shown to contribute to overall school success in the general school population as a whole, suggesting that students with asthma are perhaps not so different. The following recommendations are suggested:

1. Look above and beyond the fact that a student has received an asthma diagnosis in order to determine what might be holding back that student from achieving academically in school.
2. Be aware of potential barriers to school success that may exist for Head Start students with asthma (i.e., increased absences, less well-controlled asthma symptoms, reduced family support). To the extent possible, work hard in conjunction with families, other school staff, and community agencies to attempt to remove these barriers.
3. As with all students, ensure that the needs of Head Start students with asthma are adequately addressing in the school environment. While the school functioning of students with asthma may not always be compromised, unique needs can often be met by the implementation of 504 plans or more specialized asthma action plans to provide students with such services as access to medication at school or accommodating for increased levels of fatigue in students with less-controlled forms of asthma.

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