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Factors Related to Emotional Responses in School-aged Children Who Have Asthma

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Abstract

A systematic review of the literature was performed to answer the following questions (a) What factors contribute to the emotional responses of school-age children who have asthma? (b) What are the potential gaps in the literature regarding the emotional responses of school-age children (ages 6–12) who have asthma? (c) Are children with a lower socioeconomic status (SES) and those who are minorities represented in the literature proportionate to their prevalence? Two main focus areas regarding emotional responses were identified: (a) factors related to children who have asthma and (b) factors related to caregivers of children who have asthma. Internalizing disorders were reported consistently for children and caregivers of children who have asthma. Negative consequences of asthma for children included panic and asthma attacks, missed school days, and behavioral problems. Issues for caregivers included higher levels of anxiety and depressive symptoms, asthma management deficits, and lower caregiver warmth and involvement. Gaps in the literature included separated studies for children ages 6–12, a lack of a standardized method to define SES, studies that were of a more experimental nature, and studies of minority children and caregivers commensurate with their asthma prevalence.

THE BURDEN OF ASTHMA IN SCHOOL-AGE CHILDREN

According to statistics presented by the National Interview Survey (2010) there are approximately 7.1 million children in the United States who have asthma (U.S. Department of Health and Human Services [USDHHS], Centers for Disease Control and Prevention National Center for Health Statistics [CDCNCHS], 2010). Asthma is an inflammatory disease that is characterized by airway obstruction and may cause episodes of wheezing, coughing, and difficult breathing. These episodes are often frightening to children, as well as their parents, and are sometimes considered to be life threatening (Akinbami, 2006; Berg, 2007; Horner & Fouladi, 2003).

Asthma is the leading chronic childhood disease in the United States. It may contribute to missed school days as well as emergency room visits for many children (Akinbami, 2006; Berg, Anderson, Tichacek, Tomizh, & Rachelefsky, 2007). Children's play time and parental work time are often diminished because of its exacerbations. Asthma may be a deterrent to sleep and can impact a child's school performance (Akinbami, 2006).

Physiological responses related to asthma can be unpredictable in nature and have potential consequences to the mental health of children (National Institutes of Health [NIH], National

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Heart, Lung, and Blood Institute [NHLBI], 2002; Weil et al., 1999). Studies conducted with children in the mid-1990s reported psychological difficulties for children as well as for the caregivers of children with asthma (Eksi, Molzan, Savasir, & Guler, 1995; Wamboldt, Fritz, Mansell, McQuaid, & Klein, 1998). These earlier findings included an inverse relationship between caregiver mental health and children's asthma morbidity (Weil, Wade, Bauman, Lynn, Mitchell, & Lavigne, 1999).

Other early psychological findings related to childhood asthma were direct associations between asthma severity and behavioral problems. Children with severe asthma were reported to have increased overall observed behavioral problems. Problems with childhood behavior included increased difficulties in interpersonal interactions as asthma severity increased (Klinnert, McQuaid, McCormick, Adinoff, & Bryant, 2000).

More current reports show a proportionate increase in school-age child hospitalizations when compared to their adolescent counterparts (Akinbami, 2006). Minority children also appear to have increased potential for psychological effects of asthma as their prevalence rates have been noted to be 60% higher than those of white children (Akinbami, 2006).

Non-Hispanic black children been reported to be more likely to have ever been diagnosed with asthma (22%) or to still have asthma (17%) than Hispanic children [13% (ever diagnosed) and 8% (still diagnosed)] or non-Hispanic white children (12% and 8%, respectively) (USDHHS, CDCNCHS, 2010). Children in Puerto Rico have been reported with asthma prevalence rates 140% higher than non-Hispanic white children (Akinbami, 2006) and Hispanic school-age children with asthma have been found to have worse emotional functioning quality of life scores when compared to non-Hispanic white and black children (Horner, Brown & Walker, 2012).

Another factor to be considered when conducting research with children who have asthma is the concept of socioeconomic status. Indigent life circumstances have been linked to worse asthma health outcomes and increased parental hardships in the management of asthma (Barr, 2008; Berg, 2007). Data from the *National Interview Survey* (2010) reported that children who were poor were more likely to ever have been diagnosed with asthma (18%) or to still have asthma (14%) than children that were not poor (13% and 8%, respectively) (USDHHS, CDCNCHS, 2010).

Chronic childhood conditions, such as asthma, place a heavy psychological burden on many children (Boyd, 2008). Although it is known that childhood anxiety and depression are often found in the equation of childhood asthma, these conditions are often overlooked when a nursing assessment for asthma is conducted (Ignatavicius & Workman, 2010; Seidel, Ball, Dains, Flynn, Solomon, & Stewart, 2011). Factors relating to emotional or psychological responses of children must be determined in order to be able to develop appropriate nursing assessment methods and tools to holistically assess and intervene with school-age children who have asthma.

The purpose of this paper is to explore current trends in the research studies of school-age children (defined as children ages 6–12) who have asthma, with a particular focus on factors that contribute to the emotional responses of these children. Potential gaps in the literature regarding school-age children will be investigated. Other points of examination will include the scrutiny of populations chosen by researchers to question whether lower SES and minority populations are being equitably represented (Akinbami, 2006; Barr, 2008). The methods of exploration will include a literature review. Recommendations for future nursing studies of childhood asthma and emotional responses will be given.

METHODS

A systematic approach of the current literature on asthma studies of school-age children, with a focus on emotional responses, was used. The search included the last 15 years and was conducted using PUBMED, CINAHL, PsycINFO, Cochrane, Social Sciences Citation Index, and Proquest Dissertations and Theses databases. The selection of a 15-year search cut off aligns with the benchmark date for asthma when the Guidelines for the Diagnosis and Management of Asthma was distributed by the National Heart, Lung, and Blood Institute, National Institutes of Health in 1997. These guidelines incorporated scientific information that was most recent at the time and provided the experts' recommendations for appropriate care for patients with asthma (NIH, NHLBI, 1997).

Key words used in the search were “children,” “asthma,” and “psychiatric” with practical inclusion screening criteria including “English,” “human,” “child 6–12 years old;” 481 articles were retrieved. Some articles overlapped in databases, as the identical search words were used in each database search. Exclusion criteria included letters, editorials, and literature reviews, overlapping studies, and studies that did not examine the relationship between childhood asthma and emotional factors.

After applying the inclusion/exclusion criteria, 30 results remained. An additional 9 articles which came from the reference lists of the original 30 retrieved articles, were added to the literature review. The total yield for review came to 39 articles (see Table 1).

The articles were sorted with a focus on identifying major factors related to emotional responses in children who have asthma. Sorting was done by major findings of each article. After sorting the articles by similar groupings of factors related to emotional responses, the next step was to review the articles using the research process. This included reviewing the research questions or purposes, research designs, sampling methods, major findings, and discussion sections of each article.

Two main groupings of factors contributing to emotional responses of children who have asthma are discussed in the following sections.

RESULTS

Results included the identification of age groups, ethnicity, study designs, and SES used by researchers in the study of asthma and emotional responses of children. Two main groupings of factors related to emotional responses in children who have asthma were identified. These were: (a) factors related to children and their emotional responses; (b) factors related to caregivers and their emotional responses.

Age Groups

Of the total 39 studies included in the literature review, only 11 or 28.2% specifically investigated school-age children or children ages 6–12. Twenty-three (59%) of the studies combined adolescents and children in the methods of the study and had no tables delineating data specific to school-age children (ages 6–12) and adolescent (ages 13–18) groups. Five studies, or 12.8%, combined the ages in the study methods, and then divided their findings in tables differentiating between adolescents and school-age children.

These findings characterize a definite literature gap when seeking data specific to emotional responses, asthma, and school-age children. Combining adolescents and school-age children in studies does not take into account the important different developmental levels of these age groups that can affect important facets of research. Two potential research problems

identified due to developmental differences are symptom interpretation and proper use of standard asthma instruments (Hogan-Quigley, Palm, & Bickley, 2012; Linder, 2008).

Ethnicity

When considering ethnicity, 16 studies (41%) reported predominantly Caucasian participants in their studies. Thirteen (33.3%) of the studies reported predominant African American participants, and 7 (18%) of the studies reported more Hispanics in their studies. Three (7.6%) did not specify the ethnicity of their participants. This demonstrates another potential gap in the literature. Although minority ethnic/racial groups are disproportionately affected by asthma (Akinbami, 2006), they are often not the research focus, as is demonstrated in this review of the literature.

Study Designs

Study designs were predominantly descriptive in nature (37 studies or 94.8%) with two (5%) quasi-experimental designs reported, uncovering another important gap in the literature regarding emotional responses of children who have asthma. Although two quasi-experimental designs were found in the search, this finding demonstrates the lack of experimental design use in testing hypotheses regarding emotional responses of children who have asthma. The quasi-experimental designs retrieved in this review lacked randomization and do not meet the criteria for testing cause and effect in hypotheses, as does the true experimental research design method (Brown et al., 2008; McQuaid et al., 2000; Polit & Beck, 2008).

Several researchers identified in the review used the same research data more than once (Barlett et al., 2001, 2004; Bush et al., 2007; Katon et al., 2006, 2007; Ortega et al., 2003; Ortega, Goodwin, McQuaid, & Canino, 2004; Ortega, Huertas, Canino, Ramirez, & Rubio-Stipec, 2002; Ortega, McQuaid, Canino, Goodwin, & Fritz, 2004; Wood et al., 2006, 2007, 2008) with different research questions and reported results. The use of this method might be referred to as “salami” publishing by some (Baggs, 2008). This finding implies that there are potentially less studies being conducted on children and their emotional responses than would be initially evident by results of a fairly extensive literature search.

Socioeconomic Status

Socioeconomic status was defined using varying methods in the 39 studies, making it difficult to compare findings across studies. Seven studies (18%) did not identify SES. Other methods that were used in the remaining 32 studies for determining SES were household income (16 studies or 41%), Medicaid usage (3 studies or 8%), participant perception (2 studies or 5%), college education (6 studies or 15.3%), perception of researcher (2 studies or 5%), occupation (2 studies or 5%), and computations designed by Green, 1970 (McNelis et al., 2000) (1 study or 3%).

These findings demonstrate an issue when attempting to interpret data. Due to the lack of reporting uniformity, it is difficult to determine if the results of the findings are generalizable to school-age children of lower socioeconomic status. This finding is unfortunate considering that school-age children of low socioeconomic status should clearly be a focus of study with potential generalizability, due to the disproportionate numbers who carry the burden of asthma (Akinbami, 2006).

Factors Related to Children and Emotional Responses

Among the 39 studies analyzed, 27 studies (69.2%) addressed internalizing disorders and their relationship to children who have asthma (Bender & Zhang, 2008; Berz, Murdock, & Mitchell, 2005; Blackman & Gurka, 2007; Bush et al., 2007 Feldman, Ortega, Koinis-

Mitchell, Kuo, & Canino, 2010; Feldman, Ortega, McQuaid, & Canino, 2006; Friedman, 2007; Goldberg, 2011; Goodwin, Messineo, Bregante, Hoven, & Kairam, 2005; Goodwin, Pine, & Hoven, 2003; Katon, Richardson, Russo, Lozano, & McCauley, 2006; Katon et al., 2007; Kean, Kelsay, Wamboldt, & Wamboldt, 2006; Klinnert et al., 2001; Koinis-Mitchell et al., 2009; McCauley, Katon, Russo, Richardson, & Lozano, 2007; Meuret, Ehrenreich, Pincus, & Ritz, 2006; Morrison, Goli, Wagoner, Brown, & Khan, 2002; Ortega, Huertas, Canino, Ramirez, & Rubio-Stipec, 2002; Ortega, McQuaid, Canino, Goodwin, & Fritz, 2004; Ortega et al., 2003; Richardson et al., 2006; Rockhill et al., 2007; Waxmonsky et al., 2006; Wood et al., 2006, 2007, 2008). Twelve (30.8% of total; 44.4% of internalizing) studies that addressed internalizing disorders were similar, reporting anxiety and depressive symptoms linked to youth with asthma with higher prevalence and/or odds ratios than youth who did not have asthma (Feldman et al., 2010; Friedman, 2007; Goodwin et al., 2003, 2005; Katon et al., 2007; Klinnert et al., 2001; Meuret et al., 2006; Morrison et al., 2002; Ortega et al., 2002, 2003; Ortega, McQuaid et al., 2004; Waxmonsky et al., 2006).

Associations between anxiety and asthma were reported with the use of varying statistical methods (Feldman et al., 2010; Katon et al., 2007; Ortega et al., 2002; Ortega, McQuaid et al., 2004). Significant associations were found between anxiety disorders [OR 95% CI = 2.44(1.65,3.61)], psychopathology of parents [[OR 95% CI = 1.43(1.12,1.83)], acculturative stress [[OR 95% CI = 2.02(1.08,3.77)], and childhood asthma (Feldman et al., 2010) (N = 2491, Puerto Rican children). Youth with asthma were found to be two times more likely to have a diagnosis of a depressive or anxiety disorder than youth who did not have asthma (N = 598; Caucasian = 81.6%, African American = 4.8%, Asian/Pacific Islander = 6.5%, Native American = 4.3%, Other = 2.8%) (Katon et al., 2007). Youth with asthma (N = 1285; Island Hispanic = 24.2%, Mainland Hispanic = 4.0%, African American = 14.6%, Non-Hispanic White = 51.7%, Mainland Other = 5.6% were similarly reported to be more likely to have an anxiety disorder than youth who did not have asthma (Ortega et al., 2002).

Depressive symptomatology was another internalizing disorder reported to have higher prevalence, increased likelihood, and an association with asthma activity in youth (Bush et al., 2007; Morrison et al., 2002; Waxmonsky et al., 2006). Inner city youth (N = 46; African American = 41%, White = 26%, Hispanic = 26%, Other = 7%) with asthma were found to score higher on depression scores than expected normal population scores (Morrison et al., 2002). Additionally, depressive symptoms of youth with asthma (N = 129; African American = 65%, White = 13%, Hispanic = 18%, Other = 4%) were found to have a significant positive correlation with asthma disease activity (Waxmonsky et al., 2006).

Youth who had asthma (N = 769; Caucasian parent = 80.2%) and smoked were more than two times as likely to have major depression or one or more anxiety disorders than youth with asthma who did not smoke. Youth who were smokers also demonstrated decreased use of controller medications and increased likelihood of using rescue medications (Bush et al., 2007).

Associations between asthma in children and non-specified internalizing disorders were reported using varying statistical methods (Klinnert et al., 2001; Meuret et al, 2006; Ortega, McQuaid et al., 2004). A birth cohort study of children at risk for developing asthma found that children at age 6 had greater psychological risk than children who did not have asthma (N = 150; Caucasian mothers = 93%) (Klinnert et al., 2001). Higher prevalence rates of mood and anxiety disorders were similarly reported for children who had asthma, when compared to controls (Meuret et al., 2006).

Higher prevalence rates of any anxiety, any depressive disorder, major depressive disorder, and separation anxiety disorder were reported in youth if they had experienced an asthma

attack when compared to youth who had never experienced an asthma attack (Ortega, McQuaid et al., 2004). Puerto Rican children with asthma were additionally reported to have higher odds of having an affective disorder [(OR 95% CI = 2.6(1.2–5.6)] than children who did not have asthma (Ortega et al., 2003).

Associations of asthma and internalizing disorders that had negative consequences for children were listed in 11 of 27 studies (41%). Consequences included missed school days, panic attacks, asthma attacks, increased reporting of asthma symptoms, behavioral problems, and negative family dynamics (Bender & Zhang, 2008; Berz et al., 2005; Blackman & Gurka, 2007; Feldman et al., 2006; Goodwin et al., 2003, 2005; McCauley et al., 2007; Richardson et al., 2006; Wood et al., 2006, 2007, 2008).

Missed school days by children with asthma (*N* = 104; ages 8–18; White = 37.5%, African American = 25.9%, Hispanic = 21%, Other = 15.3%) were predicted by child anxiety [OR 95% CI = 1.068(1.994, 1.136)] and depression scores [OR 95% CI = 1.065(1.006, 1.127)]. Additionally, an increase in children's scores of asthma and depression increased the likelihood of missed school days for children (Bender & Zhang, 2008). This aligns with studies demonstrating higher reports of physiological symptoms (White = 74.6%, African American = 12.3%, Asian and Pacific Islanders = 2.5%, Native American = 7.4%, Other = 3.3%) (Richardson, Lozano, Russo, McCauley, Bush, & Katon, 2006) and increased use of inpatient and outpatient medical services by youth who have asthma and comorbid internalizing disorders (Goodwin et al., 2005).

Panic and asthma attacks were two negative consequences associated with children having asthma. A child having asthma (*N* = 1285; ethnicity not addressed) was associated with an increased likelihood of panic attacks [OR = 1.5(1.01, 2.2)]. A child having more severe asthma was associated with greater likelihood of panic attacks [OR = 2.2(1.3, 4.0)] (Goodwin et al., 2003). Internalizing disorders were found at baseline and one year follow-up in children who had asthma attacks when compared to controls (Feldman et al., 2006). A related study noted that children with a history of asthma attacks were more likely to have difficulty concentrating than those who did not have a history asthma attacks (Ortega, McQuaid et al., 2004).

Ability to maintain attention or concentrate was demonstrated to have more of a potential influence on a child's ability to monitor asthmatic symptoms than did IQ or psychological symptoms. Inability to maintain attention was found to be a potential inhibitor to self-monitoring or self-recognition of asthmatic symptoms (White, Non-Hispanic = 65%) (Koinis-Mitchell et al., 2009). Interestingly, children with asthma also were reported to have higher odds of having a disruptive disorder and/or Attention Deficit Hyperactivity Disorder (ADHD) than children who did not have asthma (Ortega et al., 2003).

Studies in this review also reported greater frequency of behavioral and social related problems for children who had asthma when compared to controls (Blackman & Gurka, 2007; McCauley et al., 2007). This aligns with a report (Non-Hispanic Black = 75%, Hispanic = 23%) that demonstrated significant association between children's anxiety and depression and both interpersonal relationships and peer network extensiveness (Berz, 2005). Another study found that parental recognition of anxiety and depression was more frequent if children who had asthma exhibited behavioral problems (Rockhill et al., 2007).

One report discussed the problems of recognizing internalizing disorders in youth with asthma by the health care system. Recognition of anxiety and depression in youth with asthma by the health care system was overall low (White parent = 72.9–75.9%), but higher recognition rates were associated with greater functional impairment of youth [(OR 95%CI = 3.32 (1.25–8.79)], severity of parental anxiety and depression [(OR 95%CI = 2.49 (1.04–

6.00)], and higher number of visits to primary care [(OR 95%CI = 1.26 (1.10–1.44)] (Katon et al., 2006).

Relationships between depressive symptoms of youth with asthma and family dynamics were reported in several studies (Wood et al., 2006, 2007, 2008; African American = 59.6–64.9%). Findings related to family dynamics and childhood asthma included positive correlations between child depressive symptoms and negative family emotional climate (Wood et al., 2006, 2007, 2008) ([r = 0.32, $p < .01$]; [r = 0.18, $p < .01$]; [r = 0.19, $p < .01$]). Higher numbers of lifetime asthma hospitalizations for children with asthma were significantly associated with personal strain being perceived by parents (r = .36, $p < .01$) and increased family conflict (r = .47, $p < .001$) (Chen, Bloomberg, Fischer, & Strunk, 2003).

Factors Related to Caregivers and Emotional Responses

Among the 39 studies analyzed, 12 (31% of total) studies addressed caregiver emotional symptoms and beliefs (Bartlett et al., 2001, 2004; Brown et al., 2006, 2008; Celano et al., 2008; Chen et al., 2003; Goldberg, 2011; Ortega, Goodwin et al., 2004; Shalowitz, Berry, Quinn, & Wolf, 2001; Silver, Warman, & Stein, 2005; Spear, 2007; Waxmonsky et al., 2006). Eight of these 12 (21% of total, 66.6% of caregiver) studies discussed depressive symptoms of caregivers of children who have asthma (Bartlett et al., 2001, 2004; Brown et al., 2006, 2008; Celano et al., 2008; Shalowitz et al., 2001; Spear, 2007; Waxmonsky et al., 2007). Other findings discussed general caregiver mental health (Ortega, Goodwin et al., 2004), caregiver anxiety (Silver, Warman, & Stein, 2005), family dynamics and caregiver beliefs (Chen et al., 2003), and effects of depression and anxiety on caregivers (Brown et al., 2006).

Depressive symptoms of caregivers were found to be significantly and positively correlated with children's (self-reported) depression scores ($N = 129$; African American = 65%, White = 13%, Hispanic = 18%, Other = 4%) (Waxmonsky et al., 2006). Caretakers of children with higher asthma severity reported higher anxiety when compared to caretakers of children with less severe asthma (N=193; Hispanic=64%, African American = 34%) (Silver et al., 2005). Caregivers with mental health problems were more likely to report histories of asthma attacks in their children than caregivers that did not have mental health problems (Ortega, Goodwin et al., 2004).

Increased asthma related hospitalizations and emergency department visits were associated with depressive and anxiety symptoms in caregivers as well as greater family strain and family conflict (Bartlett et al., 2001; Brown et al., 2006; Chen et al., 2003). Depressive symptoms of caregivers (African American = 85%) also were found to be significantly related to their children having less ability to use their asthma inhalers properly [OR 95% CI = 5.0(1.3–18.9)] problems in their children taking doses of asthma medications as scheduled, [OR 95% CI = 4.2(1.4–12.4)], and less caregiver understanding regarding the use of their children's asthma medications[OR 95% CI = 7.7(1.7–35.9)] (Bartlett et al., 2004).

Depressive symptoms of caregivers (93% African American) were found to be possibly associated with lower caregiver warmth/involvement and greater hostility (Celano, 2008). Depressive symptoms in caregivers (African American = 64%) were also found to be related to high asthma morbidity when combined with negative life stressors and especially if the child with asthma was female (Shalowitz, Berry, Quinn, & Wolf, 2001).

Researchers attempting to examine the causal pathways of caregiver depression and child asthma morbidity conducted a quasi-experimental pilot study of eight caregivers (Caucasian = 2, African American = 5, Hispanic = 1) of children with asthma who had a known diagnosis of depression. The method was the administration of antidepressant therapy to the

caregivers and evaluation of the asthma outcomes of these caregivers. Reduction in depressive symptoms, improvement in child asthma symptoms, and a trend toward decreased unscheduled visits for asthma symptoms was reported ($p = 0.07$) (Brown et al., 2008). Limitations of this study include small numbers of participants ($N = 8$), an isolated area of the country (Dallas, Texas), and limited completers of the study (two caregivers completed the study for the entire 24 weeks).

CONCLUSION

The findings of this literature review include the consistent reports of internalizing disorders for many children and caregivers of children who have asthma. They demonstrate negative consequences associated with these disorders for children. Negative consequences included panic and asthma attacks, missed school days, behavior problems, and negative family dynamics.

Studies presented in this paper regarding caregivers of children who have asthma demonstrate disturbingly increased rates of depression and anxiety in these caregivers when compared to caregivers of children who do not have asthma. Reports of substandard asthma management and low warmth and involvement by caregivers with internalizing disorders are other factors of grave concern. Study findings include relationships between negative caregiver emotional factors and higher asthma morbidity.

Minorities were represented and being studied, but not to the degree that they carry the burden of asthma. Studies specific to children ages 6–12 were rare and were generally intertwined with studies of older children. Conducting studies in this manner ignores the unique developmental stages of children and combines data that should be separated and tailored to specific age groups. Descriptive studies were the most prevalent in this literature review. Only two quasi-experimental studies, lacking in randomization, were found in this study. Socioeconomic status was found difficult to decipher and presented difficulty in equitably comparing samples across studies.

Implications for Clinical Practice

Health care providers intervening with children in asthmatic crisis should address more than just the physiological symptoms of asthma. They should also be aware of the contribution of emotional factors, such as internalizing disorders, and their potential ramifications for children and caregivers. Limiting health care intervention to the recommendation of appropriate asthma medication schedules and teaching physiological symptom recognition/management principles may not always be adequate.

This may be especially true if the recipients of this information are unable to process and use the information due to emotional difficulties. Asthma health care providers should plan for these potential confounders when intervening and be actively aware that emotional factors can potentially inhibit a patient's ability to cognitively receive information. These cognitive limitations may apply to children who have asthma as well as to their caregivers.

Nestled within the issues of internalizing disorders and children are the problems of low levels of recognition of comorbid emotional disorders in children who have asthma. Children with less behavioral problems were less likely to have their internalizing disorders recognized by their parents or their health care providers. Screening for emotional factors, as well as offering community resources for internalizing disorders, should be routinely included in asthma crisis assessments.

Recommendations for Future Nursing Research

Future nursing research should support conducting more studies with minorities and children with low SES status. These populations should be a focus of asthma research due to their disproportionate representation. There appears to be some evidence showing an increase in the study of minorities, but there are still many studies that do not fulfill the minimal requirement of specifying ethnicity. The largest proportions of participants are Caucasian in many important studies of children and asthma.

Secondly, studies focusing on children between the ages of 6–12, with data specific to this age group, should be another future nursing research focus. Generalizability specific to school-age children or adolescents is questionable when data is lumped in age ranges of 6–18 year olds and reported with no regard to individual stages of development. The specific needs and ages of these two populations should be addressed separately in future nursing research to meet the unique needs of these age groups.

Finally, the association of depression and anxiety with asthma has been significantly statistically supported, but the question of direction of potential causation has not been established. Does a mother of a child with asthma develop symptoms of anxiety or depression as a result of the burden of asthma, or does lack of adequate asthma management by caregivers originate with emotional problems that may or not be related to the burden of asthma? This is an important question that should be addressed in future experimental nursing inquiry and research. Answering this question will be a crucial element and foothold in determining strategies to confront the issues related to the emotional responses of children and caregivers of children who have asthma.

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TABLE 1

Summary of 39 Studies: Emotional Responses of School-Age Children with Asthma

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
Bartlett et al. (2001)	Maternal depressive symptoms	To examine if maternal depressive symptoms and emergency department use are associated	Prospective Survey, 2-point collection (baseline and 6 months)	Baseline (n = 177) 6 months (n = 158)	Number asthma emergency department visits reported by mother at baseline and at 6 months.	Inner-city mothers with high levels of symptoms of depression were 30% more likely to take their children to the emergency department for asthma symptoms
					Index of asthma morbidity	
					CES-D: Center for Epidemiologic Studies Depression Scale	
					Pediatric Asthma Caregiver's Quality of Life Questionnaire	
Bartlett et al. (2004)	Maternal depression, Self-efficacy	To determine how symptoms of depression in maternal caregivers influenced medication adherence by the child with asthma, impact of asthma on the mother, and the attitudes and beliefs of the mother	Evaluation of survey data collected at 2 collection points (baseline and 6 months)	Caregivers (maternal) of children with asthma in grades K-5	Child's asthma symptoms and medication adherence (caregiver informant	No difference in asthma morbidity was observed between mothers with low or high depressive symptoms.
				Baseline(n = 177) 6 months (n = 158)	CES-D: Center for Epidemiologic Studies Depression Scale	Maternal depressive symptoms were associated with greater emotional distress, less ability to control symptoms, less self-efficacy to cope with asthma attacks
				Participants were from Baltimore, MD, and Washington.	Pediatric Asthma Caregiver's Quality of Life Questionnaire	Maternal depressive symptoms were significantly related to more problems with their children using inhalers properly ([OR]: 5.0; 95% [CI] 1.3–18.9, forgetting doses, (OR: 4.2; 95% CI: 1.4–12.4), and less caregiver understanding regarding child's medication and

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
						use (OR: 7.7; 95% CI: 1.7–35.9).
					4-point Likert scale: Questions about mother's beliefs regarding asthma management practices, child's asthma treatment, health care providers	
Bender & Zhang (2008)	Negative affect (including depression, anxiety	To evaluate if negative affect and non-adherence to medications each predict decreased symptom control	Prospective survey with baseline and then 4 additional monthly visits	(*n* = 104) ages 8–18 years with asthma recruited through advertising and referrals in the Denver area.	CES-D: Center for Epidemiologic Studies Depression Scale	Higher negative affect scores (depression, anxiety) were associated with reports of more frequent asthma symptoms.
		To evaluate if the relationship between disease control and negative affect is explained by children's medication adherence		One parent was required to participate with each child	RCMAS: Revised Children's Manifest Anxiety Scale	Missed school days were significantly predicted by child's negative affect.
					CDI: Children's Depression Inventory	
Berz et al. (2005)	Social adjustment	To explore links among asthma status, internalizing disorders, and social functioning in urban school-age children	Data drawn from year 1 and year 2 Children's Health Project longitudinal study	(*n* = 48 mother child dyads at year 2) ages 8–12 27 children had asthma	BASC-SRP: Behavior Assessment System for Children (Self-Report)	The associations among internalizing problems and social functioning did not appear to differ when comparing children who had asthma to controls
				27 children had asthma 21 children had no chronic illness	BASC-PRS Behavior Assessment System for Children (Parent Rating Scale)	Generally, children with higher levels of internalizing problems were more likely to have problems with interpersonal relationships.
				Data used from Children's Health Project and year 2	The Friendship Questionnaire	
Blackman & Gurka (2007)	Behavioral, emotional, and developmental problems	To explore the prevalence of behavioral and developmental co-morbidities of asthma considering the influence of SES	Use of the National Survey of Child's Health data (2003–2004) to examine associations	(n = 102,353) ages 0–17 years	Data used from the National Survey of Child's Health (2003): addresses the physical, emotional, and behavioral health of children	When controlling for SES, having asthma significantly increased the odds of having behavioral, emotional, and developmental problems.
Brown et al. (2006)	Caregiver psychiatric disorders	To examine the prevalence of	Prospective survey conducted with	(*n* = 175) Caregivers of children with	MINI: The Mini International Neuropsychiatric Interview	Psychiatric disorders, especially depressive

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
		caregiver psychiatric disorders and symptoms and their relationship to asthma-related service utilization for their children	caregivers who had been hospitalized between March 2004 and February 2006.	asthma (mean age 34.2 ± 7.3 years), Dallas Medical Center		disorders, were common in caregivers and were associated with more asthma related hospitalizations for the child.
					BSI: Self-report of current psychiatric symptomatology	
Brown et al. (2008)	Caregiver depression	To examine the effect of antidepressant therapy on caregivers of children who had asthma and on the asthma outcomes of children of these caregivers with asthma	Quasi-experimental, time series, pilot study	Caregivers: (n = 8; mean age 35.8)	*Caregiver* MINI: International Neuropsychiatric Interview	Significant reduction in caregiver depressive symptoms and improvement in child's asthma symptoms was reported.
				Child ages 5–16.	Hamilton Rating Scale (Depression)	A trend toward decrease in unscheduled visits was noted. (p = 0.07)
				Recruited from Children's Medical Center of Dallas, TX (Only 2 caregivers completed the entire study)	The Quick Inventory of Depressive Symptomatology-Self-report	
					Pediatric Asthma Caregiver's Quality of Life Questionnaire	
					Child Pediatric Asthma Symptom Scale	
					The Pediatric Asthma Quality of Life Questionnaire	
					Child's Depression Inventory	
Bush et al. (2007)	Anxiety, Depressive disorders, Smoking	To evaluate in youth with asthma the association between mental health indicators, (anxiety or depressive disorders) and susceptibility to smoking or being a smoker	Data from an epidemiological study of mental health disorders of teens with asthma was used	(n = 769 parents) (n = 781 youth with asthma)	C-DISC: Diagnostic Interview Schedule for children NIMH DISC-4.0	Adolescents who had asthma and smoked were more than 2 times as likely to have major depression and one or more anxiety disorders than youth with asthma that did not smoke.
		To evaluate how smoking impacts	Survey administered to participants who met inclusion criteria	Identified from Group Health	CBCL: Child Behavior Checklist	Youth who had asthma and had also had anxiety and depressive disorders

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
		asthma symptoms and self-management		Cooperative in Washington state		or had higher externalization behaviors were more likely to also be smokers.
					Smoking validated with 3 standard and validated questions commonly used in surveys of youth	
				Ages 11–17 years	CHSA-T: Three scales of the Children's Health Status-Asthma Teen version	
					HEDIS: Health Employer Data and Information Set	
					PCDS: Pediatric Chronic Disease	
Celano et al. (2008)	Caregiver depressive symptoms	To examine the relationship between caregiver depressive symptoms and observed parenting behaviors	Data used from a longitudinal study called Project STAR	(*n* = 100 Caregivers) (mean age 36.8) of children with asthma ages 6–11	Beck Depression Inventory II	Increased depressive symptoms were significantly associated with lower warmth/ involvement and synchrony scores as well as greater hostility scores when engaging in loss and conflict tasks.
	Warmth/Involvement		Two data collection points, 2 weeks apart; videotaped observation at visit 2	Recruited from a hospital in the Atlanta, GA area	Warmth/Involvement Scale to assess parent behavior	
	Hostility				Hostility Scale	
					Consistent Discipline Scale (developed by researchers)	
					IFIRS: Measures relationship quality	
Chen et al. (2003)	Personal strain	To examine the relationship between psychosocial factors and patterns of being re-hospitalized for asthma in children who had been hospitalized more than one time	Cross sectional survey	(*n* = 115) Ages 4–18	IFS: Impact on Family Scale	Higher numbers of lifetime hospitalizations were significantly associated with personal strain perceived by parents, greater social or family impact, greater family conflict and financial impact.
	Social or family impact			Hospitalized for asthma at St. Louis Children's Hospital between June and December 1999	FES: Family Environment Scale	Higher numbers of lifetime hospitalizations were significantly associated with parents having lower beliefs that they could prevent their

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Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
						children's asthma from worsening, or could stop the asthma when it had started.
	Self-efficacy				Pediatric Asthma Caregiver's Quality of Life Questionnaire	No significant associations were found with the number of hospitalizations and SES or QOL.
					Beliefs: Asthma related beliefs questionnaire	
Feldman et al. (2010)	Anxiety disorders	To examine associations among Puerto Rican health problems (physical) and children's internalizing disorders, parental psychopathology and acculturative stress as well as family factors	Cross sectional survey	(*n* = 2491) Ages 5–13	DISC-IV: Parent report of child; assessment of DSM-IV disorders during past year	The findings imply that a previous identified link among children's internalizing disorders, parental psychopathology, and asthma is non-specific, but may generalize to headaches and abdominal pain
	Parental psychopathology			Puerto Rican children and caregivers from the South Bronx and Commonwealth of Puerto Rico	Children's Physical Health questions to parents	
	Acculturative stress				Parental psychopathology assessed with Family History Screen	
					The Parental Monitoring Scale	
					The Parental Discipline Scale	
					Maternal Acceptance and Warmth Scale	
					Parental Acculturation stress measured from Hispanic Stress Inventory	
					Family functioning was measured by APGAR	
					Parent Child Involvement Scale (child self-report)	
					The Parental Disciplines Practice Scale (lifetime self-neglect, child report)	
Feldman et al. (2006)	Internalizing disorders—Anxiety, Depressive disorders	To examine if the association between lifetime history of	Survey method Wave 1 (July 1999 to December 2000) with follow-up or	(*n* = 1789) children with caregivers ages	DISC-IV: The Diagnostic Interview Schedule for Children for children 11 years and older; younger children	Puerto Rican children with lifetime history of asthma attacks appeared

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Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
		asthma attacks and internalizing disorders would be replicated when examined at one year follow-up	wave 2 (July 2000–December 2001) survey 1 year later	5–18 years Puerto Rico	were not interviewed with the DISC-IV due to reliability issues	to be at greater odds for an internalizing disorder at base line as well as at a one year follow-up when compared to children who did not have asthma attacks.
		To examine if lifetime history of asthma attacks later predicted an internalizing disorder	Longitudinal			
Friedman (2007)	Anxiety, Parental styles	To examine the association between parenting style and anxiety in children with asthma	Cross sectional survey	(n = 60) children with asthma (n = 60) children without asthma Ages 9–12 years	CDI: Child's Depression Inventory	Children in this study with asthma appeared to have more anxiety than controls.
				Children recruited from Department of Pediatrics in the Physician's Office Center at West Virginia University Ruby Memorial Hospital	PBI: Parental Bonding Instrument	No significant differences were found between parenting styles or control or asthma groups.
					FSI: Functional Severity Index	
					SPAI: Social Phobia and Anxiety Inventory	
					BDI-II: Beck Depression Inventory-II	
					PCRI: Parent-Child Relationship Inventory	
Goldberg (2011)	Childhood depression	To assess the relationships among caregiver cultural stress, childhood depression, and child asthma control	Cross sectional survey method, 2 collection points separated by 5 weeks	(n = 120) children and their caregivers Ages 7–15	AAF: Parental Asthma Assessment report	Higher levels of parental cultural stress were associated with higher levels of child cultural stress.
				Recruited from Jacobi Medical Center North Central Bronx and Montefiore Medical Center's Comprehensive Family Care Center	CDI-SF: Children's Depression Inventory-short form	

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
					C-CSQ: Child Cultural Stress Questionnaire	
					CSQ: Cultural Stress Questionnaire	
					EDM: Ethnicity, Demographics and Migration	
					P-LPPQ and L-PPQ: Parent Language Preference and Proficiency Questionnaire	
Goodwin et al. (2005)	Depression, Anxiety	To determine the prevalence of probable anxiety and depression in a children's asthma clinic	Cross sectional survey (pilot)	(*n* = 74) Ages 5–11 with moderate to severe asthma recruited in a clinic in New York.	DISC Predictive Scales 12-item self-report asthma severity scale	Probable diagnoses of depression and anxiety disorders appeared common in inner-city asthma clinic.
		To determine the association between probable depression and anxiety and the use of health care services in an inner-city clinic by children with asthma				Approximately ¼ or 25.7% of the children who had asthma in an inner-city clinic also had a probable diagnosis of anxiety or depression.
						Pediatric asthma patients who had more than one diagnosis of anxiety or depression appeared to use inpatient and outpatient medical services more when compared to pediatric asthma patients who screened negative for these disorders.
Goodwin et al. (2003)	Panic attacks	To test for association between panic and asthma attacks in community youths	Data drawn from a cross-sectional epidemiologic study (MECA)	(*n* = 1285) Ages: 9–17	Data were drawn from:	Asthma was associated with an increased likelihood of panic attacks OR = 1.5 (1.01, 2.2) and severe asthma was associated with an even higher likelihood of panic attacks OR = 2.2 (1.3, 4.0).
				Community based sample of youth Site locations: Emory University, Columbia University, the University of Puerto	MECA study: Methods for the Epidemiology of Child and Adolescent Mental Disorders	

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
				Rico, and Yale University		
Katon et al. (2006)	Depression, Anxiety, Recognition	To examine the predictors and rates of recognition of anxiety disorders as well as depressive disorders among youth who had asthma in primary care setting	Data drawn from automated utilization and pharmacy data from an HMO (STAR) study.	(n = 781) (769 only have corresponding parent interviews) ages 11–17	CBCL: Child Behavioral Checklist	Recognition rates in primary care settings of comorbid depression and anxiety in youths who have asthma were low.
		To examine the quality of mental health care provided to those who have both anxiety and depression over a 1-year period		Recruited from GHC (Group Health Cooperative, in Washington State and 75 contracted clinics) who had asthma	DISC-4.0: Diagnostic Interview Schedule for Children	Few youth who had asthma and comorbid anxiety and depression received guideline-level treatment for mental health issues.
					ASI: Childhood Anxiety Sensitivity Index	
					The Mood and Feelings Questionnaire	
					The Columbia Impairment Scale (functional impairment scale)	
					The Child Health Survey—Asthma	
Katon et al. (2007)	Anxiety, Depressive disorders	To determine the prevalence of depressive and anxiety disorders in youth who had asthma when compared with a control group	Cross sectional survey	Youth with asthma (n = 781) Control group (n = 598) Ages 11–17	CBCL: Child Behavior Checklist	Youth with asthma were almost twice as likely to have depressive and anxiety diagnoses when compared with the control group
		To determine socio-demographics as well as clinical characteristics associated with having one or more depressive/anxiety disorders in youth who had asthma		Identified and recruited from Group Health Cooperative (administrative data) Washington State	DISC-4.0: Diagnostic Interview Schedule for Children	Factors found to increase the risk of having mental disorders included being female, living with a single parent, a more recent diagnosis of asthma, behavioral problems rated as higher by parents, and greater physical health impairment due to asthma.
					The Childhood Anxiety Sensitivity Index	

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Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
					The Mood and Feelings Questionnaire	
					Child Health Survey—Asthma	
					Smoking assessment: “Have you smoked at least 100 cigarettes in your lifetime, that is, about 5 packs of cigarettes?”	
					PCDS: The Pediatric Chronic Disease Scale	
					HEDIS: The Health Plan Employer Data And Information Set	
Kean et al. (2006)	Posttraumatic stress disorder	To assess PTS (Post Traumatic Stress) symptoms in adolescents with asthma and adolescents without asthma as well as their parents	Cross sectional survey	3 groups Those who had experienced a life threatening episode of asthma (n = 49), asthma controls (n = 71), and health controls (n = 80)	UCLA PTSD: Reaction Index	Adolescents with a life threatening asthma episode were more than 2 times more likely to meet PTSD criteria than adolescent controls.
	Depression, Anxiety	To assess the relationship symptoms of posttraumatic stress and asthma morbidity		Ages 12–18 years	RADS-2: The Reynolds Depression Inventory-2	PTS symptoms were linked to asthma morbidity.
	Post traumatic symptoms			Recruited from Brown University, National Jewish Medical and Research Center, and the University of Texas at Tyler	MASC: Multidimensional Anxiety Scale for Children	
					IES-R: The Impact of Events Scale-Revised (Parent measure of PTS of child	
					BSI: Brief Symptom Inventory (psychological distress in adults)	
					Rosier Functional Asthma Severity Scale	
Klinnert et al. (2001)	Maternal depression, Child internalizing behaviors	To identify biological and psychosocial risk factors for asthma symptoms in early years (school-age)	Prospective; Children's ages were 3 weeks at onset; 6 years at end of study	(n = 150) at risk for developing asthma (mother had asthma plus 28 fathers also had asthma) Birth cohort from Colorado followed for 8 years Families were	Total Serum IgE was determined at 6 months	Children with asthma had a greater rated psychological risk than children who did not have asthma (at the 6 year interviews)

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Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
				enrolled between July 1985 and June 1987		
					PRS: Parent Risk Scale	Parenting difficulties at 3 weeks were significantly correlated with mother's depression at 6 years.
					Respiratory illness was recorded	Mothers' CBCL scores of their children's behavior indicated higher internalizing scores for children who had asthma when compared to children who did not have asthma
					Mothers report on stressors, coping strategies used, affective functioning, and marital adjustment	
					Questions regarding the temperament and adjustment of the child were created by researchers.	
					CPR: Child's Psychological Risk coded to mother's responses	
					CBCL: Child Behavior Checklist	
Koinis-Mitchell et al. (2009)	Attention deficit	To test the distinctive effects of cognitive and psychological variables on the perception of children regarding asthma symptoms by use of an Asthma Risk Grid	Cross sectional survey	(n = 270) ages 7–17 (with diagnosed asthma) and primary caregivers	WISC-III: IQ	Children's attentional abilities had more effect on their ability to monitor symptoms than did their psychological symptoms and IQ estimates.
				Data for this study was collected as part of a larger project	Cancellation tasks were used to assess children's attention	
					Trail making test	
					The Conner's Continuous Performance Test (CPT): for attention difficulties	
					WISC attention to measure short-term attention	
					National Opinion Research Council coding system for SES	

Authors	Emotional Responses	Purpose	Study Design	Samples/Ages	Instruments and/or Methods	Major Findings
					determination Conner's Behavior Report	
					Multidimensional Anxiety Scale for Children	
					CDI: Children' Depressive Inventory The Asthma Risk Grid (children's symptom perception)	
McCauley et al. (2007)	Depressive disorders, Anxiety	To assess potential associations of depression and anxiety with psychosocial and asthma related functional impairment (getting along with family, getting into trouble, school/work issues) in adolescents with asthma	Cross sectional survey	(*n* = 767) Ages 11–17	The Child Anxiety Sensitivity Scale	125 youth met criteria for one or more depressive or anxiety disorders within a one year period
				Recruited and identified as asthmatic from administrative data in on HMO	The Mood and Feelings Questionnaire	35% of youth with one or more depressive and anxiety disorders and 43% with major depression were recognized by the medical system within a one-year period
					CBCL: Child's Behavior Checklist	At each level of asthma severity, if the youth met criteria for anxiety or depressive disorders, this was associated with increased functional impairment.
					Telephone version of the depression and anxiety modules from the DISC 4.0	
					Columbia Impairment Scale	
					The Child Health Survey-Asthma	
					HEDIS: The Health Plan Employer Data And Information Set	
McNelis et al. (2000)	Self-concept	To investigate the relationship of family, demographics, asthma, and child factors with self-	Prospective; 4 years separating time 1 and time 2	(*n* = 106) children who had asthma with usable data at time 1 and time 2.	Family Stressors Scale	Poorest self-concepts in children who had asthma were related to more negative attitudes toward asthma, less satisfaction in family

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		concept in children who had asthma				relationships, and the use of more negative coping behaviors.
				Mean age at time 1: 10.2 years	FIRM: Family Inventory of Resources for Management	Boys were found to have similar self-concept scores regardless of the severity of their asthma.
				Mean age at time 2: 14.3 years	SDA: Semantic Differential Attitude	Girls who had severe asthma had lower self-concepts than all other groups. (These findings were not found to be statistically significant.)
				Interviews took place in health care facilities before and after appointments.	Family APGAR: Measures mothers' satisfaction with five aspects of family functioning	
				Interviews took place in health care facilities before and after appointments.	Revised Family APGAR: Reworded for children	
					CATIS: Child Attitude Toward Illness Scale	
					CHIC: Coping Health Inventory for Children	
					PH: Piers-Harris Self-Concept Scale	
McQuaid et al. (2000)	Airway reactivity, Stress	To examine airway reactivity to stress in children who have asthma and health controls	Quasi-experimental	(*n* = 114) children who had asthma (*n* = 30) controls	Physiologic changes in skin temperature, skin temperature, skin conductance, and heart rate were measured using J&J physiodata software (PDS) and equipment (I-410 system).	Children who had asthma and controls demonstrated a trend showing increased airway resistance when responding to stress.
				Ages 9–15 Children who had asthma were recruited from an asthma summer camp. Controls were recruited from the community.	Intrinsic airway resistance was measured with Ganshorn Electronic's Resistance Oscillator.	Stress related airway resistance was not found to be related to asthma severity.
Meuret et al. (2006)	Somatization, Anxiety	To determine the prevalence rate of asthma (parent reported) in children who have internalizing disorders	Cross-sectional survey	(*n* = 365) Ages 5–18	Anxiety Disorders Interview Schedule for DSM-IV-Child and Parent Versions	Higher levels of internalizing problems were reported for children who had mood and anxiety disorders and also had asthma when compared to children with similar

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						disorders who did not have asthma.
		To study the level of internalizing and externalizing problems of these children and compare them with children who do not have asthma		From the Center for Anxiety and Related Disorders (CARD) Boston University	CBCL: Child Behavior Checklist	
					Multidimensional Anxiety Scale for Children	
					CDI: Children's Depression Inventory	
					Depression and Anxiety and Stress Scale	
Morrison et al. (2002)	Depression	To examine the relationship between measures of asthma severity (objective) and depressive symptom severity (clinician-rated)	Cross sectional survey	(*n* = 46 children) (with asthma) ages 6–17 years	FEV1 CDRS-R: Children's Depression Rating Scale Revised	Inner-city children who had asthma in this sample had higher depression scores than anticipated in the general population.
				Recruited from Children's Medical Center Asthma Clinic in Dallas, Texas		Higher depressive symptoms were related to hospitalizations in the last year.
Ortega et al. (2004)	Childhood depression	To determine if the associations between parental mental health problems and asthma attacks in children persist after controlling for childhood anxiety, depression, and other factors	Cross-sectional survey	(*n* = 1891) from a community household sample from Puerto Rican adolescents ages 4–17 years old and their primary caregivers	DISC: The Diagnostic Interview Schedule for Children-IV	Caregivers with mental health problems were more likely to report histories of asthma attacks in their children than parents that did not have mental health problems.
	Childhood anxiety				The Family Psychiatric History Screen for Epidemiologic Studies	
	Parental mental health problems					
Ortega et al. (2002)	Anxiety disorders, Psychiatric disorders	To examine the associations between any and specific psychiatric disorders and asthma or other illnesses of a chronic nature	Cross-sectional survey	(*n* = 1285 pairs of youths and caretakers) (92% of caretakers were mothers)	DISC 2.3: National Institute of Mental Health Diagnostic Interview Schedule for Children	Having an asthma history was associated with having an anxiety disorder and with having any psychiatric disorder.

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				Selected from probability samples from New Haven, Atlanta, New York, and Puerto Rico Ages 9–17 years	DISC 2.3: National Institute of Mental Health Diagnostic Interview Schedule for Adults	
					SURF: Service Utilization and Risk Factors Interview	
Ortega et al. (2004)	Anxiety, Depression, Separation anxiety disorder	To investigate the relationship between asthma and depressive and anxiety disorders using a diagnostic instrument based on the DSM-IV	Cross sectional survey	(*n* = 1891) Ages 4–17 years living in U.S. Commonwealth of Puerto Rico	Diagnostic Interview Schedule for Children	Children with a history of asthma attacks had higher prevalence rates of any anxiety disorder and any depressive disorder, and also separation anxiety disorder and major depressive disorder when compared with children who did not have a history of asthma attacks.
				Caregivers also interviewed		
Ortega et al. (2003)	Psychiatric disorders	To examine the relationship among three indicators of childhood asthma and having a psychiatric, comorbid, or specific disorder	Cross sectional survey	(*n* = 1891) Ages 4–17	The Diagnostic Interview Schedule for Children-I	Children diagnosed with asthma had higher odds of having any psychiatric disorder than children who did not have asthma.
	Affective disorders			A community based random sample of Puerto Rican children	History of Family Psychopathology Questionnaire	These children also had higher odds of having any affective disorder, any disruptive disorder, and ADHD than children who did not have asthma.
	Disruptive disorders, ADHD					
Richardson et al. (2006)	Anxiety, Depression	To evaluate the association between asthma symptoms and the presence of depressive or anxiety disorders in a large population-based sample of adolescents with asthma	Cross sectional survey	Children with asthma Ages 11–17 years (*n* = 767) Washington	HEDIS CHSA-T: Child Health Status-Asthma for Teens (asthma functional status)	The overall number of asthma symptoms reported by youth was significantly related to their number of depressive and anxiety symptoms.

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					NIMH DISC: Diagnostic Interview Schedule for Children	
					PCDS: The Pediatric Chronic Disease Scale	
Rockhill et al. (2007)	Anxiety, Depressive disorders	To examine parent-child agreement regarding depressive disorders and anxiety in youth who had asthma	Cross sectional survey	(*n* = 756) Ages 11–17 years recruited from an HMO Washington state	DISC: Diagnostic Interview Schedule for Children	Higher parent child agreement regarding psychiatric diagnoses was found if youth with asthma had higher externalizing behavior on the CBCL and had higher anxiety or depressive scores on the C-DISC.
	Externalizing behavior	To examine key demographic and differences in health associated with parent-child agreement			CBCL Child Health Status-Asthma	Children with less acting out behaviors and less severe anxiety and depression had lower symptom recognition by their parents.
					Pediatric Chronic Disease Scale	
					Lifetime Smoking Question	
					Childhood Anxiety Sensitivity Index	
					Mood & Feeling Questionnaire	
					Columbia Impairment Scale	
Shalowitz et al. (2001)	Life stressors, Symptoms of depression	To examine relationships among demographics, caregiver life stressors, and depressive symptoms of mothers and asthma morbidity in their children	Cross-sectional survey	(*n* = 123) sample of caregivers of children with asthma	CRISYS measure of life stressors	High morbidity in children who had asthma was more likely if their caregiver's had more depressive symptoms, negative life stressors, and if the children were female.
				Interviewed at 1 of 3 clinics served by a single pediatric asthma program	CES-D Center for Epidemiologic Studies Depression Scale	
Silver et al. (2005)	Caretaker anxiety, Caretaker distress	To examine self-reports of psychological distress in inner-city caretakers of children with asthma and examine for	Cross sectional survey	(*n* = 193) English and Spanish speaking caretakers of children with asthma.	PSI: Psychiatric Symptom Index	Caretakers of children with moderate to severe asthma reported higher anxiety than caretakers of children with less severe asthma symptoms

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		association to disease severity				
				New York Children's Ages 2–12	Nine questions regarding asthma severity using National Asthma Education and Prevention Program (NAEPP) Guidelines	Symptom severity was unrelated to depression, anger, overall distress, or cognitive disturbance in caretakers.
Spear (2007)	Parental emotional regulation	To investigate if parental emotional regulation could predict quality of asthma management for young children	Cross sectional survey	(n = 27) mother and child dyads Ages 6–9	CHSA: Children's Health Survey for Asthma	Parental depression, anxiety, and negative affect were inversely related to asthma management in this study.
				Recruited at two sites: Reno, Nevada, and Omaha, Nebraska	BDI-II: The Beck Depression Inventory-II	
					PSWQ: Penn State Worry Questionnaire	
					STAI: State-Trait Anxiety Inventory	
					DERS: Difficulties in Emotional Regulation Scale	
					ASI: Anxiety Sensitivity Index	
					VCOPD: Vulnerable Child/ Overprotecting Parents Scale	
					PANAS: Positive and Negative Affect Scale	
					CBCL: Child Behavior Checklist	
					STAIC: State-Trait Anxiety Inventory for Children	
					CASI: Childhood Anxiety Sensitivity Index	
					CDI: Children's Depression Inventory	
					PANAS-C: Positive and Negative Affect Scale for Children	
					SCARF: System for Coding Affect regulation in the Family	
Waxmonsky et al. (2006)	Depressive symptoms: Children and parents	To assess the prevalence of depressive symptoms in children who had asthma and the	Initial demographics collection and then a 3-visit survey method study, each visit one week apart	(n = 129) Ages 7–17 recruited from a hospital emergency department Buffalo, New York	CDI: Children's Depression Inventory	Depression symptoms of parents of children who had asthma were significantly correlated with the child's

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		association between asthma disease activity and depression				depression on children's depression rating scales.
					CDI-P: Children's Depression Inventory (Includes parent report)	Depression symptoms in children were found to be significantly associated with asthma disease activity.
					CDRS-R: Children's Depression Rating Scale-Revised	
					CBCL BDI: Beck Depression Inventory (measurement for depression in parents)	
Wood et al. (2007)	Anxiety, Depression	To assess emotional triggering of pediatric asthma and determine its contribution to functional status and disease morbidity	Initial demographics collection and then 3-visit survey method study, each visit one week apart	Children with asthma (n = 272) ages 7–17 and their primary caregivers	ATI: Asthma Trigger Inventory	Possible pathways of effect may be family emotional climate and child depressive symptoms influencing asthma severity by potentiating the emotional triggering of asthma.
	Negative emotional climate	To test if negative family emotional climate is associated with anxious or depressive symptoms and the emotional triggering of asthma attacks in children		Recruitment from emergency department between June 2001 and March 2005.	STAIC: State-Trait Anxiety Inventory for Children	
					CDI: Children's Depression Inventory	
					CDI-P: Children's Depression Inventory-Parent	
					CDRS-R: The Children's Depression Rating Scale-Revised	
					CBCL PAQLQ: Pediatric Asthma Quality of Life Questionnaire	
Wood et al. (2008)	Negative family emotional climate	To test the hypothesis that a negative family emotional climate may contribute to disease severity of asthma by the way of	Initial demographics collection and then 3-visit survey method study, each visit one week apart	(n = 199) mildly to severely asthmatic children Ages 7–17	NFEC: Negative Family Emotional Climate; Derived using the Iowa Family Interaction Rating Scales	Observed negative family emotional climate predicted depression in children who had asthma (β = . 19. p < .01) which predicted severity of

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		the child's depressive symptoms				asthma disease (β = .23, $p < .01$).
	Child depressive symptoms	To test if child-parent relational insecurity is a mediator of the effect		Serially recruited from patients entering pediatric emergency department from July 2001–February 2005	Child's Perception of Inter-Parental Conflict Scale	Relational security was an inverse predictor of depressive symptoms (β = −.40, $p < .001$).
	Parent-child relational security				Relatedness Questionnaire (separate reports for mothers and fathers)	
	Family interactions				Child Depression Inventory	
Wood et al. (2006)	Relational security	To test a multilevel bio-behavioral family model that proposes that negative emotions in a family climate may contribute to child depressive symptoms	Initial demographics collection and then 3-visit survey method study, each visit one week apart	(n = 112) mildly to severely asthmatic Ages 7–18	Negative Family Emotional climate (Parent Report)	Child depressive symptoms were found to be positively correlated with negative family emotional climate. (r = 0.32, $p < .01$)
	Anxiety, Depressive symptoms	These depressive symptoms may then possibly contribute to asthma severity in children		Serially recruited from patients at an one emergency department between July 2001–Sept 2002	Parent-Child Relational Security (Child Reports; separate reports for mother and father)	Depression and anxiety were highly correlated (r = 0.74, $p < .01$). Both depression and anxiety were correlated with disease severity (r = 0.35 and r = 0.25, $p < .01$, respectively)
	Family emotional expression				State-Trait Anxiety Inventory for Children	
					The Children's Depression Inventory	

Note. ADHD = Attention Deficit Hyperactivity Disorder; AA = African American; CBCL = Child Behavior Check list; CI = Confidence Interval; FAD = Family Assessment Device; EQ = Family Expressiveness Questionnaire; HEDIS = Health Employer Data and Information Set; HMO = Health Maintenance Organization; HPA = hypothalamus-pituitary-adrenal; OR = Odds ratio; PTS = Post Traumatic Stress; QOL = Quality of Life; SES = Socioeconomic status; STAR = The Stress and Asthma Research (study)