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RESEARCH ARTICLE

The Prevalence of Medication Use in Head Start Preschool Sample

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This descriptive study examined the prevalence of pharmacological and psychopharmacological medication use in a Head Start preschool sample, as well as trends in medication use based on gender, ethnicity, and behavioral characteristics. The participants for this study included 1,544 parents of children ages 2 to 5 years old enrolled in a Head Start program during the 2008-2009 academic year in three diverse Michigan counties. Fifteen percent of children in this sample *(n* =233*)* were taking medication on a regular basis according to parent report. Pharmacological treatments accounted for 98.2% *(n* =306*)* of the medications in the sample. Sixty-nine percent (*n* =214) of medications reported were asthma related, significantly less than was reported in this population of children just two years ago. The importance of educating parents about the lack of a research base and potential side effects of common medications given to preschool children is discussed.

Keywords: psychotropic medication, medication, preschool, Head Start

There is a paucity of research concerning the prevalence rate of pharmacological and psychopharmacological medication in the preschool population. Pharmacological medications are those drugs that are used to relieve the symptoms of physical ailments such as the common cold or a headache, whereas psychopharmacological medications (e.g. sedatives, mood stabilizers, psychostimulants) are drugs that relieve the symptoms of psychiatric disorders (Elder, Evans, & Nizette, 2009). The umbrella term "medication" frequently includes both pharmacologic and psychopharmacological medications. A great need exists for understanding the scope of medication use given the possible deleterious effects of these medicines when used in young children. One recent study found that 6.8% of children in a Head Start sample were taking a prescribed medication according to parent report (Brinkman & Carlson, 2008). Another study found that almost 10% of children take over-the-counter medication at any given time (Vernacchio, Kelley, Kaufman, & Mitchell, 2008). These data indicate that at least one child in every preschool classroom may be taking medications which might affect their classroom functioning.

Currently, asthma is the most prevalent chronic childhood illness in the United States (Medco Health Solutions, 2004). It is estimated that eighty percent of children who have asthma also have allergies, and often children will take multiple medications concurrently to treat these

conditions (American Academy of Pediatrics, 2010). In a study done by Brinkman and Carlson (2008), 88% of children in a Head Start sample taking medication were taking one or more medications to treat asthma. Asthma medication rates vary, and a decrease in medication usage is associated with children less than five years of age, Medicaid insurance, Spanish language, asthma severity, and access to physicians and nurses (Eggleston et al., 1998; Halterman, Aligne, Auinger, McBride, & Szilagyi, 2000). Only 22% to 32% of children considered at-risk who are diagnosed with asthma take medication to control their asthma (Diaz et al., 2000; Halterman et. al., 2000). The side effects of asthma medications in preschoolers are not well known, especially when multiple medications are prescribed. Side effects of Albuterol, a popular quick-relief asthma medication, are known to include tremors, hyperactivity, and vomiting (Schuh et al., 1989). Most of the asthma literature focuses on the efficacy of treatment, as well as patient education, management, and compliance with respect to asthma medication (Amirav, Newhouse, Minocchieri, Castro-Rodriguez, & Schuepp, 2010).

The use of over-the-counter (OTC) medications within pediatric populations has recently received considerable media attention. Currently, the FDA advises parents that cold and cough medications are not approved for preschool children (0-5 years of age) due to a lack of data, though few OTC drugs have data supporting that they are not safe or efficacious in young children (Vernacchio et al., 2008). Approximately 70% of childhood illnesses, such as common colds, are treated with over-the-counter medications. (Kogan, Pappas, Yu, & Kotelchuck, 1994). The impact of cold and cough medications is widespread, as it is estimated that in any given week, 10.1% of American children use a cold and cough medication (Vernacchio et al., 2008).

Side effects of decongestants include headaches, nausea, vomiting, loss of appetite, hypertension, seizures, and sedation (Clemens et al., 1997; Smith, Henman, Schroeder & Fahey, 2008). Antihistamines used to treat allergies are considered to be the safest OTC medications, yet side effects of antihistamines include headache, dry mouth, nose, and throat, drowsiness, dizziness, hallucinations, hyperactivity, and muscle weakness (Clemens et al., 1997; Hoffer, 2003). Dart and colleagues (2009) reviewed 189 fatalities involving children under twelve years old and the presence of medications. Sixty-two percent of fatalities involved a non-prescription drug, and over-dosage was linked to 75% of the non-prescription drug deaths. In the most severe cases, OTC cold and cough medications have been associated with neurologic impairments, unstable heart rates, and toxic exposure resulting in death (Vernacchio et al., 2008).

Although evidence suggests that OTC medication use among the pediatric population has reached a plateau, psychotropic medication use within the preschool population is rising - despite the fact that little is known about the long-term effects (Coyle, 2000). Antipsychotic medications prescribed to preschoolers on Medicare have doubled since 1990 (Fanton & Gleason, 2009) and surpass spending for pediatric asthma medications (Medco Health Solutions, 2004). Meta-analyses of children across the country indicate that stimulant and antidepressant use has increased from 0.3% to 1% among children six to fourteen years old (Olfson, Marcus, Weissman, & Jensen, 2002), but other reports indicate that psychotropic medications are used rarely (less than .03%) within the preschool population (Brinkman & Carlson, 2008).

The prescription rate for psychotropic medications, while infrequent within preschool populations, greatly outpaces the research base to support the practice (American Psychological Association Working Group, 2006). Over the past decade, there has been a notable increase in the prescription rates of psychotropic medication in the preschool population (Luby, Stalets, & Beldon, 2007; Martin & Leslie, 2003; Olfson et al., 2002; Zito, Safer, & dosReis, 2000; Zito et al., 2007). Percentages of psychotropic medications prescribed to preschoolers range from 0.16%

(Oflson, Crystal, Huang, & Gerhard, 2010) to 2.7% (Zito et al., 2007). Analyses of prescription data indicate that primary care physicians are more likely than specialized physicians to prescribe psychotropic medications to young children (Rappley, 2006), and there are significant differences in prescription rates based on insurance coverage (Zito et al., 2007).

Little is known about the general long-term effects of psychotropic medications on neural development, nor do researchers understand the effects of certain drugs, dosages, or duration of exposure (Greenhill, 1998). However, some children require pharmacological interventions to reduce morbidity and mortality. Studies using experimental animals to understand the effect of psychotropic medications indicate that the medications alter cortical synaptic density and dopamine and norephinephrine levels, and cause memory deficits (Coyle, 2000). This is problematic, considering that researchers do know that during the first few years of life, the brain undergoes the most synaptogenesis and pruning of neural networks and is highly sensitive to environmental and chemical factors (Fanton & Gleason, 2009). "Black box" warnings issued by the Food and Drug Administration (FDA) on some antidepressants that may be prescribed for children, such as clomipramine (Anafril) and fluoxetine (Prozac), warn caregivers and physicians of the potential side effects and dangers of the medication (Leslie, Newman, Chesney, & Perrin, 2005) (Table 1).

Table 1
Psychopharmacological Medications Approved by the FDA
and Specific Treatment Indications by Age

Trade Name	Generic Name	Approved Age
Stimulant Medications for ADHD		
Adderall	Amphetamine	3 and older
Adderall XR	Amphetamine (extended release)	6 and older
Concerta	Methylphenidate (long acting)	6 and older
Dexedrine	Dextropmphetamine	3 and older
Dextrostat	Dextropmphetamine	3 and older
Focalin	Dexmethylphenidate	6 and older
Metadate ER	Methylphenidate (extended release)	6 and older
Methylin	Methylphenidate (liquid/chewable available)	6 and older
Ritalin	Methylphenidate	6 and older
Nonstimulant for ADHD		
Strattera	Atomoxetine	6 and older
Antidepressant and antianxiety medications		
Anafril	Clomipramine	10 and older (for OCD)
Prozac	Fluoxetine	8 and older (for depression/OCD)
Luvox (SSRI)	Fluvoxamine	8 and older (for OCD)
Sinequan	Doxepin	12 and older
Tofranil	Imipramine	6 and older (for bedwetting)
Zoloft (SSRI)	Setraline	6 and older (for OCD)
Risperdal	Risperidone	13 and older (for Schizophrenia)
Antipsychotic Medications		
Haldrol	Haloperidol	3 and older
Mellaril	Thioridazine	2 and older
Orap	Pimozide	12 and older (Tourette's Syndrome)
Thorazine	Chloropromazine	1 and older (Severe Behavior Problems)
Mood Stabilizing Medications		
Cibalith-S	Lithium citrate	12 and older
Depakote	Valproic acid	2 and older (for seizures)
Eskalith	Lithium carbonate	12 and older
Lithobid	Lithium carbonate	12 and older
Tegretol	Carbamazeprine	12 and older (for seizures)
Alpha-agonist		
Catapres	Clonidine	Not approved for children (Tourette's Syndrome/ADHD)

Note. Adapted from Carlson, J. (2008). Best practices in assessing the effects of psychotropic medications on student performance. In Thomas, A. & Grimes, J. (Eds.), Best Practices in School Psychology V (p.1381). Bethesda, MD: NASP. Permission was granted from the author to use reproduce this table in this publication.

METHOD

Participants

The sample for this study included 1,544 parents or caregivers of children ages two to five years old enrolled in a Head Start program during the 2008-2009 academic year in three diverse Michigan counties. The ethnicity of the entire Head Start sample was 28.5% (*n* = 440) African American, 40% (*n* = 624) Caucasian, 9.5% Hispanic (*n* = 147), 19% Multiracial (*n* = 293), and 3% (*n* = 40) other. Half of the preschoolers were male (50.8%; *n* = 784) and half were female (49.2%; *n* = 760). Seventy-five percent were from single parent homes and 25% were from two parent homes. Ninety-six percent of students qualified for Head Start based on family income. All children in the sample had either private or county-provided insurance coverage**.** All participants in the data set were used in the study.

Fifteen percent (*n* = 233) were reported by parents to be taking medication on a regular basis (see Table 3). Since data regarding the specific type of medication prevalence data was missing for 3% (*n* = 7) of children, specific medication prevalence data were analyzed based on a sample of 226. The ethnicity of the Head Start children taking medication was 46% (*n* = 108) African American, 36% (*n* = 85) Caucasian, 12% (*n* = 27) Hispanic, 3% (*n* = 8) Multiracial, and 2% (*n* = 5) Other. Fifty-eight percent (*n* = 136) of the children taking medication were males, and 42% (*n* = 97) were females (See Table 2). The mean age of students taking medication was 3.94 years.

Procedure

Non-identifying data for this study were gathered from existing Head Start initial enrollment packet records in an attempt to help the program better understand and meet the needs of those children who were taking medications. The methods of this study were similar to the methods used in a study by Brinkman and Carlson (2008). Brinkman and Carlson (2008) used self-report data from 89 Head Start Enrollment records to determine the prevalence of medication use in a three county Head Start population in a Midwestern state. This study examined an additional question on the Head Start enrollment sheet pertaining to behavioral characteristics to explore the relationship between medication use and social-emotional behavior given prior links discussed within the literature (eg., McNelis et al., 2000; Michael 2002). Approval for review of this existing data set was obtained by the author's Institutional Review Board and the local Head Start Administrative team.

Measurements

Medication use was determined by parental responses to a series of questions about medication use that were part of each child's initial enrollment packet**: "Is your child taking any medication(s) on a regular basis (including over-the-counter, creams, lotions, herbal remedies, and seasonal)? "If yes, list all medication(s) and what it is taken for."** The prompts used by Brinkman and Carlson (2008) were less detailed: "Is your child taking any medications on a regular basis? If yes list the medication and what it is taken for." The researcher

defined asthma and allergy medications based on the type of specific medication reportedly used (Physicians' Desk Reference, 2006; Robertson & Shilkofski, 2005). The short-acting beta-antagonists (Albuterol, Xopenex) comprised the quick-relief medications used by the preschoolers in this study. Long-term control asthma medications included inhaled corticosteroids (Pulmicort, Flovent), leukotriene modifier (Singulair), anti-inflammatory agent (Cromolyn), and combined long-acting beta antagonist and inhaled corticosteroid (Advair). Other medications were classified as gastrointestinal, seizure control, and other. Psychotropic medications were defined as those commonly used to treat childhood psychiatric disorders (Jensen et al., 1999).

Parental responses to the question (also part of the initial enrollment packet), **"Is there anything you want us to know about your child's personality or temperament which will help us to support his or her adjustment to Head Start?"** were coded according to the following categories: internalizing behaviors (eg., "Separation Anxiety," "Shy,"), externalizing behaviors (eg., "Yelling," "Biting," "Bad Temper"), adaptive skills (eg., "Considerate," "Wants to interact with others," "Very mature"), and nonadaptive skills (eg., "Trouble sharing," "Frustrated Easily," "Doesn't Listen"). Six responses were not coded since they reflected parenting behavior instead of child personality (e.g., "Spoiled"). The researcher chose to categorize qualitative personality data based on internalizing behaviors, externalizing behaviors, adaptive, and non-adaptive skills based on the composite indexes of the Behavior Assessment System for Children, Second Edition (*BASC-2*) parent rating scales. The *BASC-2* composites have high internal consistency and test-retest reliability, and are considered to be a reliable assessment of personality, behavioral, and emotional dimensions of children 2 to 21 years of age (Reynolds & Kamphaus, 2004). In addition to the researcher, two undergraduate students with experience in coding and data processing coded the responses. The internal-consistency reliability value for data coding was .9. Alpha levels greater than .7 are considered "acceptable," greater than .8 are considered "good," and greater than .9 are considered "excellent" (George & Mallery, 2003).

Data analysis

The Statistical Package for the Social Sciences (SPSS) was used to conduct the analyses. The first research question was: What are the prevalence rates and types of medications reported to be taken by preschool children enrolled in Head Start? In order to address this question, descriptive statistics were calculated to determine the types of medication children were reported to be taking, and the prevalence of each medication in the sample.

The second research question was: How do types of medications vary by ethnicity and gender in a Michigan Head Start preschool population? To address this question, Chi-Square analyses were conducted to examine the proportion of children taking medication based on demographic factors such as gender and ethnicity. After medications were divided into categories (long-term-control and quick-relief asthma medications, OTC medications, and psychotropic medications), Fischer's Exact Tests were conducted to test for significant differences between type of medication use, as well as gender and ethnicity.

The third research question was: What are common associated behavioral characteristics of those children who are reported to be taking medication? A Pearson's correlational analysis was conducted to test for relationships between each type of asthma medication and each of the

four personality variables: externalizing behaviors, internalizing behaviors, adaptive skills, and nonadaptive skills. Normality assumptions of the Pearson's correlation coefficient were fulfilled. According to the literature, correlations less than .30 are considered "low," correlations between .30 and .70 are considered "medium," and correlations between .70 and .90 are considered "high" (Spencer, 1995).

RESULTS

Two hundred and thirty three children were reported to be taking medication on a regular basis, representing 15% of the Head Start sample. The average number of medications reported per child was 1.67 (SD = 1.3). Over half of the children (56%) taking medications were taking one type of medication, and 27% of the children taking medications were taking two medications. The most common combination of medication was a quick-relief and a long-term asthma medication. Approximately one-third of students (34%) taking medications were taking a combination of long and short-term asthma medications.

TABLE 2
Demographic Characteristics of Children Taking Medications as a Percentage of the Sample

Characteristic	Overall Sample (n = 1544)		Medication Sample (n = 233)	
Race				
African American	28.5	(440)	46.0**	(108)
Caucasian	40.4	(624)	36.0	(85)
Hispanic	9.5	(147)	12.0	(27)
Multiracial	19.0	(293)	3.0**	(8)
Other	2.6	(40)	2.0	(5)
Gender				
Male	50.8	(784)	58.0*	(136)
Female	49.2	(760)	42.0	(97)

Note. P values are based on Chi Square Tests of Independence.
*$p < .05$, ** $p < .001$*

Chi-square tests of independence were performed to examine the relationship between ethnicity and medication usage, as well as gender and medication usage (Table 2). The relationship between ethnicity and medication usage was significant, χ^2 (4, n =1544) = 68.44, p < 0.01. Examination of the standardized residuals indicated African American children were more likely to be taking medication than any other ethnic group, and Multiracial children were less likely to be taking medication than any other ethnic group. A second chi-square test of independence was performed to examine the relationship between gender and medication usage.

The relationship between these variables was significant, χ^2 (1, n =1544) = 5.95, $p < 0.05$ (Table 2). Males were more likely than females to be taking medication.

As shown in Table 3, psychopharmacological treatments accounted for 1.4% (n = 4) of the medications in the sample, while pharmacological treatments accounted for 98.6% of the medications in the sample. Asthma medications comprised 68.5% of all medications, and allergy medications comprised 20.5% of all medications. Seventy-eight percent of all medications were prescription medications, and 22% were over-the-counter medications. Of the children taking asthma medications, 51.5% (n =114) of asthma medications were quick-relief asthma medications, while 48.5% (n =100) were long-term control asthma medications. Loratadine (Claritin) was the most widely used allergy medication, followed by cetirizine (Zyrtec) and diphenhydramine (Benadryl). Twenty-six of the children who were taking allergy medications were also taking asthma medications, indicating that 16% of children taking asthma medications were also taking an allergy medication.

Results of Fischer's Exact tests indicated gender was a factor in differences in medication use (See Table 4). Males were more likely to be taking any type of medication with a prevalence of 17.3% (136/784), compared to 12.8% (97/760) of females (p = 0.01). However, males were not any more likely to be taking an asthma medication (p = 0.15) or psychotropic medication than females (p = 0.12). There were also significant differences in asthma medication usage based on ethnicity. African American students were more likely to be taking any type of medication with a prevalence of 25% (108/440), compared to 14% (85/624) of Caucasian students (p <0.001). This was predominantly due to the fact that African American students were more likely to take asthma medication with a prevalence of 23.0% (101/440), compared to 10.1% (63/624) of Caucasian students (p <0.001). Hispanic students too were more likely to take asthma medication than Caucasian students with a prevalence of 17.7% (26/147) compared to 10.1% (63/624) of Caucasian students (p = 0.01). African American students were not any more likely to take asthma medications than Hispanic students with a prevalence of 23% (101/440) compared to 17.7% (26/147) of Hispanic students (p = 0.20).

Significant differences based on ethnicity also existed in the types of asthma medication students used. African American students were more likely to take a quick-relief asthma medication with a prevalence of 15.7% (69/440), compared to 5.0% (31/624) of Caucasian students (p <0.001). Caucasian students were more likely to take a long-term-control asthma medication with a prevalence of 5.4% (34/624), compared to 9.0% (40/440) of African American students (p = 0.03).

TABLE 3
Prevalence of Medications Taken by Children in the Sample (*n* =312)

Medication	Percentage	*n*
Asthma	68.5	214
Quick Relief	36.5	114
Albuterol	33.3	104
Pro Air	0.3	1
Xopenex	2.9	9
Long-Term Control	32.1	100
Pulmicort	14.1	44
Singulair	14.7	46
Flovent	3.2	10
Allergy	20.5	64
Prescription	0.9	3
Allegra	0.3	1
Nasonex	0.3	1
Flonase	0.3	1
OTC	19.6	61
Claritin	11.5	36
Zyrtec	4.8	15
Benadryl	2.9	9
Saline Spray	0.3	1
General Prescription	5.8	18
Prevacid	3.8	12
Antibiotics	0.6	2
Tylenol with Codeine	0.6	2
Exjade	0.3	1
Reglan	0.3	1
General OTC Medication	2.2	7
Cold/Cough	0.6	2
Stool Softener	0.6	2
Vitamins/Minerals	0.9	3
Psychotropic	1.3	4
Skin	1.6	5

TABLE 4
P values of Demographic Differences in Medication Usage

	Medication		Asthma Medication		
	Any	Psychotropic	Any	Quick Relief	Long-term
Males/Females	0.013*	0.1250	0.1520	0.3100	0.3790
African American/Caucasian	< 0.0001***	0.5730	<0.0001***	<0.0001***	0.027*
African American/Hispanic	0.1413		0.2040	0.1760	0.3040
Caucasian/Hispanic	0.1526		0.014*	0.0120	0.6930

Note. P values are based on Fischer's Exact Test.
**p < .05, *** p < .001*

Results of Pearson correlational analyses indicated no relationship between asthma medications and behavioral characteristics. Children who took Albuterol, Pulmicort, or Singulair were not any more or less likely to exhibit internalizing, externalizing, adaptive, or maladaptive behaviors than children who were not taking those types of medications. As shown in Table 5, 28% of the students (n = 35) displayed internalizing behaviors, such as keeping to themselves or withdrawing from others. Twenty-seven percent (n = 32) of the students taking allergy and asthma medications displayed externalizing behaviors, such as yelling or biting. The same number of students (n = 32) displayed maladaptive behaviors, such as having difficulty transitioning or becoming easily frustrated. A smaller percentage (19%; n = 24) of students exhibited adaptive behaviors, such as helping others or getting along well with others. Similar patterns were present among children taking allergy medications in addition to other types of medications (n = 13). Students were equally as likely to exhibit externalizing (n = 5) or internalizing behaviors (n = 5). Fewer children were reported to exhibit externalizing characteristics (n = 2) or internalizing characteristics (n = 1).

TABLE 5
Behavioral Characteristics as a Percentage of the Sample

Characteristic	Allergies/Asthma (n=124)		Allergies/Asthma plus other medications (n=233)	
Externalizing	27	(32)	38	(5)
Internalizing	28	(35)	38	(5)
Maladaptive	27	(32)	8	(1)
Adaptive	19	(24)	16	(2)

DISCUSSION

The purpose of this descriptive study was to reexamine the prevalence of medications in a Head Start preschool sample given previous disparities reported in the literature, analyze trends in medication use based on gender and ethnicity, and explore common behavioral concerns in children taking medication. Study results indicate a substantial increase in prevalence of medication use in our Head Start sample. In 2006, 6.8% (n = 95) of children were taking a pharmacological or psychopharmacological medication (Brinkman & Carlson, 2008). Two years later, 11% (n = 170*)* of children representing a similar sample were taking a pharmacological or psychopharmacological medication. When asked about all medications, 15% of parents reported their child was taking a medication. Although the overall medication prevalence rate increased, the average number of medications per child decreased from 2.3 in 2006 (Brinkman & Carlson, 2008) to 1.67 in 2008, indicating less use of polypharmacy practices within this population.

The apparent increase in overall medication use within our sample may partly be attributed to the change in the prompt in the 2008 Head Start enrollment packet. The 2008 prompt gave examples of different types of medications caregivers might list, such as OTC medications or seasonal medications. The 2006 prompt was more limited and did not provide caregivers with examples of medications they could include. As a result, caregivers may not have

indicated any OTC medications their children were taking when this study was initially completed in 2006. This is important to note, since the increase in medication use of the 2008 sample was primarily the result of OTC allergy medications, specifically loratadine (Claritin) and cetirizine (Zyrtec). Cetirizine (Zyrtec) was not available as an OTC medication until 2007 (Bastianelli, 2008).

The majority of prescription medications in this study were used to treat asthma. This is consistent with research that indicates preschoolers have the highest asthma rate in the United States (Akinbami, Moorman, Garbe, & Sondik, 2009). Results of this study indicated that 18.6% (n = 82) of African American children and 7.9% (n = 49) of Caucasian children were taking medications to treat asthma. The discrepancy in this sample is larger than what is usually reported in the literature. In the United States, approximately 8.5% of all children have asthma, with prevalence varying according to race; approximately 12.5% of African American children have asthma, whereas only 7.7% of Caucasian children have asthma (Peters & Fritz, 2010).

The percentage of psychotropic medications in this sample was surprisingly low, as less than one percent of children (n = 4) were reported to be taking psychotropic medications. This is only slightly less than the 0.3% reported by Brinkman & Carlson (2008), but much less than other studies have reported. For example, Zito and colleagues (2007) reported that 2.3% of American preschool children were taking a psychotropic medication. A large body of evidence indicates that males are more likely to take psychotropic medications than females (Olfson et al., 2010; Zito et al., 2007). This study further supports those findings, since all four psychotropic medications (i.e. Methylphenidate (Ritalin), Risperidone (Risperidol)) were prescribed to males.

In addition, the findings of this study underscore the importance of teaching and caring for preschool children - particularly males - with warmth to promote prosocial behaviors. Lack of maternal warmth has been associated with increased rates of hyperactivity in boys (Keown, 2011). In a recent study, maternal warmth and responsiveness toward boys during the preschool years was positively associated with social skill development (Morgan, Shaw, & Forbes, 2014). Given the greater vulnerability of boys to hyperactivity and externalizing behaviors that may result in medication treatment, the importance of warmth and nurturing toward male students in the preschool classroom is essential knowledge for Head Start teachers and staff members.

Reported behavioral characteristics indicate that of the children taking allergies and asthma medications, approximately the same number of children exhibit externalizing characteristics (27%; n = 32) as internalizing characteristics (28%; n = 35) and maladaptive characteristics (27%; n = 32). However, this may be due to the belief that externalizing behaviors are easier for caregivers to track and recall, when compared to internalizing behaviors (Rockhill et al., 2007). The association between mental health issues and childhood asthma is particularly important for caregivers and education professionals to understand, since current research indicates that the mental health of caregivers of children with asthma may be more important than the mental health of children with asthma (Feldman et al., 2011). Caregivers of children with asthma may not be aware of the link between their mental health status and the child's response to his asthma.

IMPLICATIONS

Prevalence rates of medication use in preschoolers have implications of the education and training of early childhood personnel. Providing educational and health services to at-risk

children and families are core values of Head Start programs (U.S. Department of Health and Human Services, 2010). Knowledge of the effects and side effects of medications for common preschool illnesses is important not only for parents of children, but also for those who care for them outside of the home setting. In this sample, 43% of the students reported to be taking medications were taking a combination of medications with unknown interaction effects. The high number of male children and African American children taking medication in this study compared to their peers is consistent with the current literature indicating the higher rate of asthma in both groups (Diaz et al., 2000; Halterman et al., 2000; Peters & Fritz, 2010).

Head Start staff members and families need to be equipped with knowledge about medication trends based on gender and ethnicity, research behind over-the-counter medications and prescription medications used to treat asthma and other common preschool illnesses, and the role of children's and caregivers' mental health in relation to chronic illness. For example, children with asthma have been reported to have frequent sleep interruptions and experience fatigue. Behavior problems and poor academic performance sometimes associated with medication use need to be considered in light of sleep difficulties, mental health challenges, and physical challenges.

Although it is common for some physicians to instruct parents to administer OTC medication to their children to manage medical conditions, it is important for physicians to explain the contraindications of OTC drugs to parents in order for parents to make more empowered decisions pertaining to their children's health. Some physicians rarely inquire about the use of OTC medications, and many caregivers do not perceive OTC medications as medications (Gunn et al., 2001). Young children are often given improper dosages of over-the-counter medications by caregivers who have inadequate numeracy skills to determine the correct dosage, or are incorrectly swayed by labels and graphics (Lokker et al., 2009). For example, an OTC medication featuring an image of an infant on the front cover may not be appropriate for an infant, but a child over two years of age. Although combinations of medications are often necessary to treat asthma-related conditions, many of the medications used to treat this sample of preschoolers have limited safety and efficacy data when used in preschool populations. It is important for all caregivers and staff members to know that current data do not indicate cough and cold medications are effective in reducing the symptoms of the common cold and cough in children (Carr, 2006; Vernacchio et al., 2008). However, this does not diminish the importance of treating children's medical ailments to reduce pain and suffering.

Programs and materials about asthma medication and asthma management are usually designed for older students and require a high level of resources to access, even though preschoolers have the highest asthma rate in the United States (Michael, 2002). More data are needed on both pharmacologic and non-pharmacologic interventions for preschool-age children. Educating Head Start professionals and caregivers of preschool children about the risk factors and protective factors of asthma may encourage caregivers to seek treatment for their children at an earlier age. High levels of asthma care, attention, and asthma management strategies are protective factors for children with asthma (Berz, Murdock, & Mitchell, 2005). From a pragmatic standpoint, families with children attending Head Start need access to educational programming concerning children's health issues that is affordable, efficient, and amenable to transportation difficulties that many families in this population face.

It is important to encourage caregivers to seek consistent medical care for their children to manage their children's asthma symptoms. In addition, it is important to provide Head Start families with information about how to access appropriate health care resources. Children who

are living in poverty and who are African American or Latino account for the highest proportion of hospitalizations and emergency room use (Lin et al., 1999), and are less likely to receive high quality preventative asthma care prior to receiving treatment in a hospital (Finkelstein et al., 1995). Furthermore, in addition to a lack of preventative medical care, students from low SES backgrounds are much more likely to supervise their own medication than their more affluent counterparts (Eggleston et al., 1998). Collaboration between health care providers, students, and families is important not only to educate staff and families about managing medical conditions, but also to empower staff and families with non-pharmacological interventions that could be used to enhance treatment options. Although the prevention and reduction of asthma-related symptoms is important, some children will always be dependent upon medication. Supporting families in dealing with chronic childhood illness and increasing collaboration across health care staff, educational staff, and families is an essential component of progressive interventions. Asthma care plans, in conjunction with parent education and support services, are helpful in optimizing treatment compliance.

School psychologists and other professionals in early childhood care settings are well trained to monitor the effects of medical interventions and school-based care plans on preschool students' social/emotional well-being and academic performance. They also ensure that families are aware of resources to help them manage their child's condition. Tailoring programs and education materials to specific populations may increase the effectiveness of the programming and create better long-term outcomes for the children they serve.

Limitations

A limitation of this study was the use of parent reported data. In order to maintain privacy or avoid social stigma, caregivers may have chosen not to list certain medications – particularly psychotropic medications. In addition, based on the wording of the survey prompt, it is difficult to determine if caregivers listed medications that their children take on a daily basis, as well as medications their children take on a more infrequent basis. The differences between the 2006 and 2008 survey prompts make it difficult to compare the medication prevalence of the 2006 Head Start sample to the 2008 Head Start Sample. In the 2008 prompt, caregivers were specifically asked to list OTC medications in addition to other types of medications, which they were not asked to list in the 2006 prompt.

In addition, the small sample sizes used to describe behavioral problems and medication use limits the validity of the data, and there was no comparison to children who were not on medication. The purpose of this descriptive study was not to imply causation related to asthma medication and behavioral challenges, but rather explore if an association exists. However, this is difficult to do in light of the other variables that may be affecting this association. Finally, the data collection method of this study prohibited the possibility of linking medications to specific medical diagnoses, and the results of this study are limited in their generalizability to other preschool populations.

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