

Perceptions about Interpersonal Relationships and School Environment

Among Middle School Students with Asthma

Hyekyun Rhee, PhD, PNP*, Brenda McQuillan, PhD¹, Ding-Geng Chen, PhD²,
Shannska Atis, BSN, RN³

¹LMSW Roberts Wesleyan College

²University of North Carolina at Chapel Hill, NC USA

³School of Nursing, University of Rochester

Corresponding Author School of Nursing, University of Rochester 601 Elmwood
Avenue, Box SON Rochester, New York 14642 585-276-3775 (phone) 585-273-1270

(fax) Email: Hyekyun_rhee@urmc.rochester.edu

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Abstract

Objectives: To examine interpersonal relationships involving peers and teachers and perceptions about school environment among middle school students with asthma in comparison to their healthy counterparts. The study also assesses asthma prevalence in a large sample of middle school students representing different geographic locations.

Methods: Cross-sectional data were collected from 1059 middle school students in grades 6-8 enrolled in schools in a northeastern region of the U.S. Students reported their chronic health conditions including asthma and completed questionnaires measuring perceptions about their relationships with peers and teachers as well as

school environment. ANCOVAs were used to compare students with asthma and their healthy counterparts in the study variables.

Results: Asthma was reported by 16.5% of the sample ($n = 169$). The rate was higher among minority students (23%) than their white counterparts (15%). Greater proportion of urban students (28%) reported asthma than rural (18%) and suburban (14%) students. Students with asthma reported significantly poorer relationships with peers ($B = -1.74$, $p < .001$) and teachers ($B = -1.41$, $p = .009$), and their perceptions about overall school environment ($B = -1.30$, $p = .009$) were also lower than their healthy counterparts. Race showed no significant effects on school factors.

Conclusion: Overall asthma prevalence was substantially higher than the national average of adolescent asthma, particularly those residing in the urban area. Poor perceptions of interpersonal relationships with peers and teachers among students with asthma may indicate compromised quality of life. Suboptimal interpersonal relationships and school environment need to be identified and adequately addressed given their implications for asthma management at the school setting among middle school students.

Keywords

school-based study, asthma prevalence, peer relationship, relationship with teachers

Approximately 6.3 million children in the United States (U.S.) had a current diagnosis of asthma in 2014 [1]. Asthma is responsible for nearly 14 million missed school days [1], causing disruption in the learning process [2, 3]. In general, school absenteeism in children with a chronic health condition is associated with low performance scores on standardized tests and decreased participation in extracurricular activities [4, 5]. Likewise, poor academic achievement in adolescents with asthma is often attributed to frequent school absenteeism [3, 6-10], which can cause them to develop negative feelings about school and feel unmotivated to attend [6].

Moreover, adolescents with asthma may experience difficulty in forming or maintaining healthy social interactions at school due to a daily medical regimen at school, either scheduled or unscheduled, and somewhat limited ability to participate in certain school/sports activities [5, 11]. Particularly, physical limitations imposed by asthma make adolescents with asthma feel different or isolated from their peers [12] and more vulnerable to peer bullying in the form of ostracism, exclusion, or teasing [12-15]. Given the circumstances, it is no surprise that adolescents with higher levels of asthma morbidity are less adaptive at school, presenting behavioral or emotional issues [2], which can deteriorate their relationships with peers and teachers.

School environments have been identified as a factor affecting asthma management in students. School environments constitute not only physical conditions of school buildings and campus but also the characteristics of relationships between members within the school and specific school policies and rules [16]. Qualitative studies of young children and their teachers identified some of school environments

(e.g., inefficient medication access policy and a lack of understanding and ineffective communications among school staff) as barriers to physical activity participation and symptom management during school in children with asthma [17, 18]. Despite the identified concerns about potentially compromised interpersonal relationships at school among children and adolescents with asthma and inadequate school environments, most studies pertaining to school context have primarily focused on academic performance while little is known about the extent to which asthma affects students' social functioning at school and their perceptions about overall school environment. Particularly, previous findings indicating ineffective school environments regarding asthma management have been based on students in elementary schools [17-20]. Therefore, there is a need for a study capturing the perspectives of adolescents about the relationships between asthma and school environments.

The purpose of the study was to examine the quality of interpersonal relationships at school and overall school environment among middle school students with asthma in comparison to their healthy counterparts. We hypothesized that middle school students with asthma would report poorer relationships with peers and teachers, and more negative perceptions about school environment than their healthy peers. Additionally, the study assessed the prevalence of asthma in a large sample of middle school students representing each of urban, suburban and rural locations.

Methods

Study Setting and Sample

Three public middle schools, one from each of rural, urban, and suburban districts, in Western New York, U.S. participated in the study. These schools were selected because of the school administrators' prior acquaintance with one of the investigators (xx) and their willingness to participate. All students in grades 6-8 in each school were invited to complete the study survey. Students were excluded from the survey due to the following reasons: (1) parental refusal; (2) receiving special education services due to a reading level below 6th grade according to school administrators; and (3) being absent on the day of survey administration.

Measurements

Asthma and health status. Students reported their current diagnosis of asthma and other types of chronic health conditions including diabetes, obesity, cancer, ADHD, bipolar, and depression (yes vs. no). To adequately capture the presence of other uncommon chronic conditions, the "others" line was provided for students to indicate other chronic conditions. Students' perception of overall health was measured on a 5-point Likert type scale from 1 (I am always healthy/I am never sick) to 5 (I am never healthy/I am sick every day)

For the following psychometric measures, Cronbach alphas were computed to assess internal consistency or reliability of the instruments. In general, Cronbach alphas $\geq .70$ are considered acceptable [21].

Peer relationships. Students' perception of their relationships with peers was assessed using the Generalized Perception of Peers Scale [22]. Eleven items addressed whether they believe peers care about what happens to them, will help in time of need, can be trusted, and are sensitive to their feelings. Response options were provided on a 4-point Likert type scale (1 = no/not at all to 4 = yes/completely). Total scores ranged from 11 to 44 with higher scores indicating positive peer relationships. Cronbach alpha in this sample was .89.

Relationships with teachers. Students' perspectives of their relationships with teachers were measured using the teacher subscale of the Child and Adolescent Social Support Scale [23]. Ten items included in the subscale assessed the level and type of support that students received from their teachers, such as whether their teacher "tries to answer questions" and "gives good advice." Items were rated on a 4-point Likert type scale from 1 (never) to 4 (always). Total scores ranged from 10 to 40. Cronbach alpha was .91 in this study.

School environment measured in this study pertained to two subdomains (1) characteristics of relationships between members and (2) organizational structure and physical characteristics of the school. Five items measuring the *characteristics of relationships between members* assessed the relationships among students, and between students and teachers [16]. For example, students rate whether teachers treat students with respect and students treat teachers with respect. *Organizational structure of the school system* pertained to the policies and procedures being in place within the school system (e.g., school rules are fair or consistent: 4 items), and the physical

condition of their buildings and campus (2 items). Each item was measured on a 4-point scale, ranging from 1 (never) to 4 (always), yielding total scores ranging from 11 to 44 with high scores indicating positive school environment. In this sample, Cronbach alphas were .76 and .80 for organizational structure and school relationships, respectively. We used the items together from the two subdomains as one indicator of school environment. Cronbach alpha for the whole scale was .86.

Sociodemographic Factors: Students reported their sex, age, grades and race/ethnicity in the survey form.

Procedure

Parents were notified of the study through direct mailings and were given the opportunity to opt out of the study by returning a letter or calling the researcher or school administrator within ten school days. If no notification was received from the parent, it was assumed that permission was given for their child to participate. The parents of fourteen students (<1% of parents informed of the study) opted out of the study. Parents who opted out were equally distributed across suburban (<1%, n = 10), rural (<1%, n = 3) and urban (<1%, n = 1) locations. Written student assent was obtained prior to survey administration. Study information was presented orally, prior to beginning the survey. After reading the assent information, students were given the choice to opt out of participation or continuing on with the survey. Eleven students (7 from suburban, 3 from rural and 1 from urban location) chose not to participate in the survey. The survey data were anonymous, and time and location of survey administration was determined by each participating school. All data were collected in

2013. This study was approved by the Institutional Review Board of the University affiliated with the investigators.

Data Analysis

Pearson χ^2 were used for the comparisons of categorical variables such as asthma status and health status by grade, gender, race and location. T-test was used for the comparisons of continuous variables including relationships with peers, relationships with teachers and school environment between students with asthma (n = 168) and their healthy counterparts (n = 638) who did not report any types of chronic physical or mental health conditions. Analysis of covariance (ANCOVA) was used to analyze the effects of asthma status and race on three school variables (i.e. relationships with peers, relationships with teachers and school environment) of continuous measure. Main and interaction effects of asthma and race controlling for age were computed. Model diagnostics are performed for all these models for their residual normality and homogeneity. All analysis was done using R 3.2.3 [24].

Results

Demographic Characteristics

A total of 1059 students completed the survey. Table 1 summarizes the demographic characteristics of the sample. Each gender and grade was evenly represented. Average age of participants was 12.64 years (SD = 1.01: range 10-16). Minority students represented about 20% (n = 214) of the sample. The majority of participants was from a suburban location (58.9%, n = 624), followed by rural (30.3%, n = 321) and urban (10.8%, n = 114) locations.

Asthma Prevalence

Asthma was reported by 16.5% of the sample ($n = 169$). No significant differences in asthma prevalence were found in grade ($p = .95$) or gender ($p = .43$). We noted significant group differences in asthma prevalence by race ($\chi^2 = 7.5$, $p = .06$) with 23% of minority students reporting asthma compared to 15% in white counterparts. Greater number of urban students (28%) reported asthma than rural (18%) and suburban (14%) teens ($\chi^2 = 13.8$, $p = .001$). Strong association between race and geographic location ($\chi^2 = 283.17$, $p < .001$) indicates conceptual redundancy between two factors. So, the subsequent analyses were conducted using only race. Students with asthma reported poorer overall health perception compared to healthy students who do not report any health issues ($t = 3.03$, $p = .003$).

Relationships Between Asthma and School Factors

Table 2 summarizes the overall descriptive statistics of the study variables including peer relationships, relationships with teachers and school environment. Students generally responded positively on these three variables. Students with asthma ($n = 168$) were compared with their healthy counterparts ($n = 638$) in relationships with peers and teachers, and perceptions on school environment (Table 3). Students with asthma reported significantly poorer relationships with peers and teachers, and their perceptions about overall school environment were also significantly lower than those of healthy students.

ANCOVA examined the extent to which each of these three school factors was affected by interactions between asthma status and race and age. Here we used age

instead of grade levels to keep the variable at a continuous level. We found no significant interaction effects on school factors, and race was found to be a significant covariate to these school factors. The final ANCOVA model included the three school factors as the outcomes and the asthma status (yes vs. no) and race (minority vs. whites) as covariates controlling for age. Table 4 reports the results of this ANCOVA model. All three ANCOVA models were significant based on the F-test. Students' age was negatively associated with two school factors, indicating that older teens were more likely to report negative relationships with teachers, and poor perceptions about school environment. Race showed no significant effects on school factors in all three models. Lastly, asthma status was found to have a significant impact on three school factors. Students with asthma reported poorer relationships with peers and teachers, and poorer perceptions about overall school environment regardless of age and race.

Discussion

To our knowledge, this is the first study to document the relationships between asthma and school adaptation beyond academic performance among middle school students. In our study, students with asthma reported poorer relationships with their peers at school than their healthy counterparts, thus providing support for the study hypothesis. Peers have the greatest influence over behaviors and psychosocial well-being in adolescence [25]. Positive peer relationships are of great importance in teens with a chronic condition such as asthma given its implications for disease management. According to Cohen et al. [11], over 30% of teens with asthma were reluctant to take their medication in the presence of their peers out of embarrassment. In fact, fear of

being teased or bullied is a major reason for limited use of asthma-related medications at school in students with asthma [20]. As such, peers can affect adherence to disease self-management [26-28]. Teens with asthma highly value support from peers [29, 30], and positive peer interactions can have positive impact on their asthma management [11, 31], physical activity [32], and overall psychosocial well-being [28, 33, 34]. Given the critical roles that peers play not only in healthy adolescent development but also in the management of asthma, their poor perceptions about peer relationships raise a concern and call for adequate interventions.

As hypothesized, students with asthma had poorer relationship with teachers than their healthy counterparts. To date no literature has reported the impact of asthma on students' perceptions about their relationships with teachers. It is speculated that frequent missed school days in students with asthma might limit the opportunities to form positive relationships with their teachers. Moreover, their academic difficulties due to absenteeism might further challenge their relationship with teachers. In general, teachers' knowledge of asthma and its management has been found to be limited [18, 19, 35], which may contribute to misunderstanding about and inefficiency in addressing students' needs around asthma, imposing challenges to building positive relationships between them. Underlying reasons for students with asthma to perceive poor relationship with their teachers warrant further investigation.

This study also revealed that students with asthma tended to perceive their school environment less desirable than their healthy counterparts, supporting the hypothesis. In this study, school environment encompasses the school's physical

condition, rules and policies and overall relationship characteristics among the members within the school. Certain physical conditions in the school such as sanitation, ventilation, temperature, or humidity have been found to not only affect students' learning but also trigger asthma symptoms in students [10]. Therefore, low ratings of the school's environment are particularly concerning given that students spend most of their daytime at school, meaning longer exposure to environmental triggers of asthma. Poor perceptions of school environment in this study could also reflect ineffective and inconsistent school policy, and disrespect and distrust among school members. Absent or inconsistent school policy concerning asthma (e.g., medication accessibility during school, school nurses training or environmental trigger control) could present students challenges to adequate asthma management. Particularly, distrust or disrespect within the school community would make it unlikely for students with asthma to disclose their condition or seek help from peers or school officials for fear of ridicule, rejection or ostracism. Given the serious implications of poor school environment for adequate asthma management and control, our findings call for particular attention from school administrators into improving the school's physical and organizational environments to promote the health of students with or without asthma.

Asthma prevalence in our sample (17%) is strikingly higher than that of national sample of adolescents ages 12-17 years (9.7%) in 2014 [1]. The rates of asthma in our urban (28%) and non-urban schools (16%) are much higher than what have been reported in a recent population based study of children aged 6-17, in which urban prevalence was 13% and nonurban rate was 10.6% [36]. The remarkable differences

might have been due to differences in geographic locations (northeastern vs. southern U.S.) or participant age (younger adolescents only vs. broader age range from 6 to 17). The large proportion of our urban school demographics was represented by racial minority, primarily African American, while the suburban school was overrepresented by white students. Therefore, the disparities in asthma rates by urbanicity might have been the reflection of the differences in asthma prevalence between minority and white students. Further study is needed to explore underlying factors explaining the disproportional burden of asthma in urban youth beyond race.

This study is subject to at least four limitations that warrant caution. First, this study relies on self-report data. Therefore, the accuracy of asthma diagnosis and other self-reported data remains unknown or subject to reporting bias. Given the high sensitivity and specificity of self-reports for asthma prevalence (91% and 97% respectively) [37], however, it is unlikely that a self-reported asthma diagnosis raises a serious concern for inaccuracy. Second, we were unable to examine varying degrees of students' perceptions depending on different levels of asthma severity or control. Future research is needed to understand if greater asthma severity would make students more or less susceptible to poor perceptions of interpersonal relationships and school environment. Third, because this study uses the convenient, albeit large, sample of middle school students in a northeastern region in the U.S., the results might not be representative of student populations in other parts of the country or of a broader age range. Particularly, the urban subsample constitutes less than 11% of our entire sample, which can limit the generalizability of findings to a larger urban student population.

Additionally, some students with asthma may have happened to be absent from school on the day of data collection, thus not represented in the study. Finally, this study is based on cross-sectional survey data. Therefore, making a causal inference between asthma and students' adjustment to school is beyond the scope of the study.

Conclusions

This study provides important insight into psychosocial functioning of middle school students with asthma. Students with asthma appear to experience less satisfactory relationships with their classmates and teachers than their healthy peers. Students with poor interpersonal relationships at the school may tend to hold a negative view about their school, leading to poor perceptions about school environment. Poor interpersonal relationships particularly with peers and teachers and negative school environment can not only take a toll on the quality of life in students with asthma but also present serious barriers to their adequate management of asthma at school. Given the important implications, it is vital for clinicians to assess young patients' school adjustment targeting their relationships with peers and teachers and overall school environment. Any identified areas of concern need to be evaluated in the context of asthma management. Whenever warranted, clinicians may need to communicate or partner with school administrators to improve school environment not only to ameliorate asthma morbidity but also to promote the health of students with and without asthma.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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Table 1. Demographic Characteristics (N = 1059)

Characteristic	n (%)
Gender	
Male	519 (49.0)
Female	538 (50.8)
Missing	2 (0.2)
Grade	
6 th	374 (35.3)
7 th	345 (32.6)
8 th	340 (32.1)
Race	
White	829 (78.3)
Black/African American	121 (11.4)
Asian/Pacific Islander	30 (2.8)
Other	63 (5.9)
Missing	16 (1.5)

Table 2. Descriptive statistics of study variables

	# of items		Minimu	Maximu		Std.
		N	m	m	Mean	Deviation
Peer relationship	11	1054	11	44	30.33	5.88
Relationship with teachers	10	1059	10	40	31.53	6.34
School environment	11	1052	11	44	33.53	5.94

Table 3. Comparisons in school related factors between students with and their healthy peers

	Asthma (n = 168) (Mean, Std Deviation)	Healthy (n = 638) (Mean, Std Deviation)	T	P
Relationships with peers	29.34 (6.59)	31.08 (5.50)	- 3.13	.002
Relationships with teachers	30.65 (6.64)	32.01 (6.04)	- 2.46	.016
Perception of school environment	32.68 (6.83)	34.04 (5.54)	- 2.37	.019

Table 4. Analysis of covariance models analyzing the impact of asthma on school factors. (n = 806)

	Relationship with Peers			Relationship with Teachers			School Environment		
	B (SE)	95%CI	P	B (SE)	95%CI	P	B (SE)	95%CI	P
Age	-0.34 (0.20)	(-0.73, 0.06)	0.099	-0.76 (0.22)	(-1.18, -0.33)	<0.001	-0.76 (0.20)	(-1.15, -0.36)	<0.001
Race (Minority vs. White)	-0.03 (0.51)	(-1.04, 0.98)	0.949	-0.27 (0.55)	(-1.35, 0.80)	0.618	-0.86 (0.51)	(-1.86, 0.15)	0.095
Asthma (Yes vs. No)	-1.74 (0.51)	(-0.75, -2.73)	0.000	-1.41 (0.54)	(-0.35, -2.47)	0.009	-1.30 (0.50)	(-0.32, -2.29)	0.009
F	4.97 (DF = 3, 787) (p = 0.002)			6.67 (DF = 3, 787) (p <0.001)			8.49 (DF = 3, 787) (p <0.001)		

B unstandardized regression coefficient; SE standard error; 95%CI 95% confidence interval; DF degree of freedom. Asthma negatively affects three school-related variables after controlling for age and race.