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Examining health literacy among urban African-American adolescents with asthma

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Abstract

Objective—This exploratory study assessed health literacy among urban African-American high school students to improve understanding of the association between adolescent health literacy and asthma.

Methods—We conducted a secondary data analysis of the control group (n = 181) of the Puff City randomized controlled trial (2006–2010), a web-based intervention to promote asthma management among students, grades 9 through 12. A validated self-report 3-item health literacy screening instrument was completed at final online follow-up survey. Logistic regression was used to explore the association between health literacy, demographic characteristics, quality of life, asthma management, and health care utilization.

Results—Multivariate analysis revealed that an overall inadequate health literacy score was associated with students who were more likely to be younger (OR 0.61; 95% CI 0.44–0.84), not on Medicaid (OR 0.36; 95% CI 0.17–0.76), have at least one hospitalization (OR 1.29; 95% CI 1.07–1.56); and a lower overall quality of life (OR 0.75; 95% CI 0.59–0.95). Those lacking confidence in filling out medical forms, needing help reading hospital materials, and having difficulty understanding written information were more likely to not have a rescue inhaler (OR 0.49; 95% CI 0.25–0.94), have one or more emergency visits (OR 1.21–95% CI 1.02–1.43), and one or more hospitalizations (OR 1.19; 95% CI 1.01–1.41), respectively.

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Declaration of Interest

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

Conclusions—The findings indicate a significant association between inadequate health literacy and suboptimal asthma management. It is important to advance understanding of adolescent health literacy, especially those at-risk, as they assume asthma self-management tasks and move toward independent adult self-care.

Introduction

Health literacy is defined as the degree to which individuals have the capacity to obtain, process, and understand basic information and services needed to make appropriate decisions regarding their health [1]. Functional health literacy refers to the ability, attributes, and skills necessary to engage in the complex and multidimensional health care environment [2,3]. Skills critical for achieving health literacy include a capacity to engage in two-way communication, having confidence and motivation to request and receive health information, and having freedom from impediments and/or communicative assistance from others [2–4]. Patients with inadequate health literacy have difficulties in understanding and following the complex daily regimen necessary in the control of their asthma [5–8]. Additionally, health literacy research indicates that vulnerable populations have a high prevalence of low literacy [2,3] and suffer disproportionately from chronic diseases, including asthma [9–12].

To date, a majority of the studies examining health literacy among asthma patients have focused on the health literacy of adults, whether it be the adult patient or the caregiver of a child suffering from asthma. This body of research is replete with studies demonstrating the negative impact of inadequate health literacy. For example, among adult patients, the literature consistently demonstrates that asthma management, quality of life, and satisfaction with health care delivery are negatively impacted by inadequate health literacy [5–8]. Research has likewise demonstrated that children are likely to have poor asthma outcome if their caregivers have inadequate health literacy [13–17]. While the literature of adult health literacy is abundant and rich, less is known about adolescent health literacy and its impact on their health [18].

Early studies of adolescent health literacy focused on the relationship between low health literacy and socially-related outcomes, such as problem behaviors, tobacco use and alcohol misuse [18–20]. Other studies have examined the association between adolescent health literacy medication adherence [21,22] and chronic illness outcomes [21,23,24]. More recently, the role of the Internet on adolescent health-information seeking and health literacy has received increased attention in the literature [25–29], as has the role of cultural factors and socialization on adolescent health literacy [26,30–32].

Given the transition of asthma self-management tasks at adolescence [33], it is essential to examine the association between adolescent health literacy and asthma. Prevention of asthma episodes is dependent on the full understanding of individual risk factors (i.e., triggers and symptoms) and the application of this understanding for the prevention of episodes. We posit that limited health literacy in adolescents may be associated with poor asthma management, and thereby contribute to ongoing asthma disparities. In this exploratory study, to assess health literacy among adolescents that may have limited skills for obtaining and processing medical information, we used a 3-item validated screening tool

to examine the association between health literacy, demographic factors, asthma management and quality of life among urban African-American adolescents participating in a web-based intervention in their high school setting.

Methods

Data is drawn from the control group (n = 181) of a randomized controlled trial (RCT) of the Puff City intervention conducted in six Detroit high schools [34,35]. Puff City is a web-based intervention program designed to promote asthma control among high school students. Students accessed the program using computers at participating schools in two separate randomized trials. This study uses data from the second trial (2006–2010). Because the tailored intervention may have impacted aspects of health literacy skills (e.g. ability to use health information) or influenced the way students answered the three health literacy screening questions, this analysis only includes control group (n = 218) data. Development of the program and detailed results are reported in previous publications [34,35]. All aspects of the randomized trial were approved by the Institutional Review Boards of Henry Ford Health System (HFHS), the University of Michigan (UM), and the Detroit Public School Office of Research, Evaluation, and Assessment.

Participants

Control group students from the six participating schools were in grades 9 through 12 and ranged in age from 15–19. Participants were identified using a Lung Health Survey and were deemed eligible for the randomized trial if they met study criteria for current asthma, defined as report of ever having a physician diagnosis of asthma, accompanied by one or more of the following: daytime and/or nighttime symptoms in the past 30 days; use of medication for asthma symptoms in the past 30 days; medical care use for asthma in the past year; and > 2 refill(s) of β -agonists in the past year [36]. Students were also eligible if they did not report a physician diagnosis, but answered positively to items selected from the International Study of Asthma and Allergies in Childhood [37] and reported symptom frequencies outlined in the National Asthma Education and Prevention Program's (NAEPP) *Guidelines for the Diagnosis and Management of Asthma: Expert Panel Report 2 (EPRII)* [36]. Eligible students were invited to enroll in the randomized trial, which required written parental consent and student assent [34]. Upon completion of an online baseline questionnaire students were randomized and asked to complete 4 online educational sessions. Students randomized to the control group were directed to websites of organizations featuring asthma education for youth. Students in the treatment group received a tailored asthma education program. All students were asked to complete follow-up questionnaires throughout the trial, regardless of the number of sessions completed. Detailed information regarding survey collection has been previously reported [34,35]. A final questionnaire included the self-reported 3-item health literacy screening instrument used in this analysis. Depending on when the student was enrolled during the rolling enrollment period, the final questionnaire was completed online at 24–36 months post-baseline. Demographic data was collected at baseline and data for all other variables were collected at the final questionnaire. All student surveys were conducted using software designed for the randomized trial.

Measures

Demographic Data—Demographic measures including age, gender, grade, health insurance coverage, and mother’s education (which served as a proxy for caregiver health literacy) were obtained. Weight, height for body mass index (BMI) and medical status information was also obtained.

Clinical/Management Variables—Current asthma was defined as report of ever having a physician diagnosis of asthma. Details of the screening process have been previously reported [34, 35]. Asthma control was based on the EPRII Guidelines (EPRII) [36] and assessed by self-report of one or more of the following: daytime and/or nighttime symptoms in the past 30 days; use of medication for asthma symptoms in the past 30 days; medical care use for asthma in the past year; and > 2 refill(s) of β -agonists in the past year. Asthma severity was categorized according to EPRII Guidelines (EPRII) [36]. Asthma medication use was measured as having a controller or rescue medication. Health care utilization was defined as emergency department visits and/or hospitalizations within the last three months.

Quality of Life—The Mini Paediatric Asthma Quality of Life Questionnaire (MiniPAQLQ) is a validated instrument for use among children and adolescents [38]. The survey consists of 13 questions designed to capture the burden of illness during the previous week across three domains; symptoms (6 items), activity limitation (3 items), and emotional function (four items) [38,39]. Students were asked to respond to each item on a 7-point scale ranging from no impairment (7) to severe impairment (1). Mean scores for each domain and for overall quality of life were computed.

Health Literacy—We used the 3-item health literacy screening instrument developed and validated by Chew and colleagues [40,41] to assess inadequate health literacy in the population. The questions are: “How confident are you filling out forms by yourself?;” “How often do you have someone (like a family member, friend, hospital/clinic worker or caregiver) help you read hospital materials?;” and “How often do you have problems learning about your medical condition because of difficulty understanding written information?” Likert scale response choices, scored from 0 to 4, for the first question ranged from *extremely* to *not at all*. Response choices for the second and third questions ranged from *none of the time* to *all of the time*. Higher scores reflect worse self-reported health literacy. In this analysis, for the overall health literacy score we report the average summed score of the three questions. The cut point for inadequate health literacy was less than or equal to a summed score of 9, as validated in previous studies [41,42]. We assessed the association of asthma-related management behaviors to the summed overall health literacy score as well as each individual item. The latter was chosen to provide more detail regarding the potential relationship between health literacy and our predictors. Scores for individual questions were collapsed (= 1 vs. >1) into two groups: high confidence vs. lower confidence; not often vs. more often; and never or rarely vs. some of the time or frequently.

Statistical Analysis

Data analysis was performed using SAS statistical software. Descriptive statistics including frequencies, means, and standard deviations were computed for all measures of interest.

Logistic regression was used to calculate odds ratios (ORs) and corresponding 95% confidence intervals to describe the association between health literacy and clinical characteristics of asthma. Hospitalizations and emergency department visits for asthma were entered into the model as continuous variables. To find the best multiple variate model, a backwards stepwise logistic regression model was used. Inadequate health literacy was recoded as $\beta = 1$ and $\beta = 0$ in all models. A p-value less than 0.05 was accepted as significant.

Results

Among the control group sample used for the analysis 92% of students were African American, 62% were female and 80% were enrolled in grades 10–12 (Table 1). A little over half of the students (52%) had Medicaid health coverage. Maternal education among participants was reported as 34% were high school graduates and 50% had a greater than high school education. Approximately 44% of the students had BMI in the 85th percentile or greater.

Clinical/Management Characteristics

A majority of students (83%) reported a physician diagnosis of asthma (Table 1). Using NAEPP guidelines [36] to categorize asthma severity, 24% of students were categorized as having moderate persistent to severe asthma. Overall, 57% of students reported a rescue medication and 38% reported a controller medication. Of those with a physician diagnosis, 67% had a rescue medication. The mean number of emergency department visits in the study population was 1.17 ± 3.50 (range = 0–35) and the mean number of hospitalizations was 0.84 ± 3.19 (range = 0–30). The overall mean quality of life score for the population was 4.58 ± 1.50 ; indicating an overall lower quality of life in the study sample. Distribution of quality of life scores by domain was as follows: 4.03 ± 1.45 (activities), 4.50 ± 1.60 (symptoms), and 5.01 ± 1.70 (emotions).

Health Literacy

The mean summed score for overall health literacy was 11.70 ± 2.98 (range = 3–15) (Table 1). With a cut point of $\beta = 9$, 23% of the population had inadequate health literacy. Inadequate health literacy was observed across each of the three health literacy questions (Table 2). Almost a third (31%, $n = 56$) of the population reported a lack of confidence in filling out medical forms; 41% ($n = 74$) of the students had someone help them read hospital materials “some of the time” or “all of the time;” and 32% ($n = 32$) reported problems learning about their medical condition because of difficulty understanding written information.

Multivariate Models

Significant associations between health literacy and demographic and clinical characteristics were observed. The overall inadequate health literacy score was associated with students who were more likely to be younger, in 9th grade, not on Medicaid, have one or more hospitalizations, lower overall quality of life and lower quality of life across all three domains (Table 3). In addition, as shown in Table 3, those students with lower confidence in filling out medical forms were younger, in grade 9, had mothers with less than a high school

education, were less likely to have Medicaid health care coverage, have a BMI >85th percentile, and be without a rescue medication. Students who reported needing help to read hospital materials were in grade 9, less likely to have Medicaid health care coverage, and reported more ED visits. Those who reported having problems learning about their medical condition due to difficulty understanding written information were more likely to be in grade 9 or younger students, have more ED visits, more hospitalizations, and lower overall quality of life, specifically in the domains of activities and symptoms.

A backwards stepwise logistic model found that inadequate health literacy score was associated with students who were more likely to be in 9th grade, not on Medicaid, have a BMI >85th percentile and have at least one or more hospitalizations. Students less confident in completing forms were significantly more likely to be younger, have a mother with less than high school education, have BMI >85th percentile, and not have a diagnosis of asthma (Table 4). Those needing help reading hospital materials were more likely to be in the 9th grade and had a higher number of ED visits. Students with problems understanding written information were more likely to be in the 9th grade, have worse quality of life in the symptoms domain, and greater number of ED visits.

Discussion

To our knowledge, this is the first study to explore the use of a validated self-reported health literacy screening instrument to examine the association between adolescent health literacy and self-reported asthma severity, management, health care utilization, and quality of life among urban African-American teens. We found that the inadequate health literacy in this study population was associated with younger age (and lower grade in school), not on Medicaid, lower scores for quality of life, and clinical problems (e.g. higher BMI and higher health care utilization, less likely to have an asthma diagnosis). Students not confident in filling out forms were also more likely to be younger, not use a rescue medication, and have mothers with little formal education. Our findings are consistent with previous studies demonstrating that younger adolescents are more likely to have lower health literacy than their older counterparts [26,32]. Some authors suggest that this may be due to the fact that older adolescents, particularly those with chronic illness, have more experience with the health care system [30,43] or have been socialized about health, via media and interpersonal experiences, longer than their younger counterparts [30,26]. This finding is also consistent with prior research demonstrating an association between limited caregiver health literacy and poor asthma management [13–17]. Our use of Mother's education as a proxy for caregiver health literacy is supported by previous research findings that mother's education is a significant predictor of low health literacy [44–46].

While our study was exploratory, assessing health literacy among an at-risk adolescent population provides further insight into factors impacting asthma management and ongoing health disparities. For example, our results indicate that students with inadequate health literacy are more likely to be overweight and have hospitalizations. Given that adolescent obesity is associated with lower health literacy [23] and poor asthma management [47], African-American adolescents may be at increased risk for poor asthma outcome because they are more likely to be obese compared to their white and Hispanic counterparts. In fact,

according to the 2013 CDC Health Disparities and Inequalities Report [48], among adolescent females, African-American have the highest prevalence of obesity. African-American adolescent males have a higher prevalence than whites and only a slightly lower obesity prevalence than Hispanics.

Having a chronic condition such as asthma creates unique challenges for the adolescents transitioning to self-care. These challenges may be even greater for African-American adolescents because they have less access to specialty health care [49] which puts them at risk for poor understanding of asthma and asthma management [50]. Nearly one third of the students in our study lacked confidence in completing medical forms and had difficulty understanding medical information. Even more students reported needing help to read medical materials. Having inadequate health literacy puts these adolescents with asthma at a disadvantage for having a sound grasp of their disease process and management. Moreover, less than half of the participants in this study were Medicaid enrollees, placing them squarely at risk for health disparities [51]. Assessing adolescent health literacy, especially among at-risk populations, has implications for improvement of long-term adolescent outcomes and reduction of unnecessary health care utilization [33,52,53], as well as addressing and minimizing asthma-related health inequalities in populations with a disproportionate burden of need.

Several limitations to this study should be noted. First, this is a cross-sectional analysis using secondary data of a control group from a randomized trial. As an exploratory study, our findings do not reflect causality. Rather, the analysis reported allows for the exploration of associations between a 3-item assessment of health literacy and self-reported clinical characteristics of asthma in an at-risk adolescent population to improve understanding of the health literacy needs of adolescents. Second, the 3-item health literacy assessment was designed for use in adults and have not been previously used for examination of adolescent health literacy. However, it has been found to be valid and reliable assessment of health literacy among adults of varied age who were at-risk for limited literacy [40,41]. Although the Rapid Estimate of Adult Literacy in Medicine for Teens (REALM-Teen), was developed and validated [54] to assess health literacy among adolescents in healthcare settings, it is a more time consuming 66-item measure. Moreover, while the REALM-Teen has merit in that it focuses on word recognition and readability, it does not allow for an assessment of how information is utilized [55]. The students are in high school and represent a population that is transitioning to adulthood, therefore, we expect them to have an understanding and a degree of exposure to the navigation related tasks in the three items. Furthermore, given the distribution of the adult health literacy scores for the three items [40,41] and the similar distribution in adolescent scores for the 66-item REALM-Teen instrument [55], we submit that the 3-item health literacy screening instrument is appropriate for use with an adolescent population. Third, due to the fact that health literacy was not assessed at baseline, we were unable to determine whether obtaining asthma information from websites impacted health literacy. Another limitation is generalizability. We examined health literacy among urban African-American high school students, therefore our findings may not reflect health literacy among adolescents of other geographic locales, racial or ethnic backgrounds.

As a majority of adolescents are proficient at accessing the Internet, Manganello [43] compellingly argues that future research on health literacy and adolescents take into account their affinity for using mass media and technology to obtain information, especially among teens with a chronic illness [43]. Recognizing the influence of the Internet [25–29,43] allows for the design of more appropriate, tailored, web-based interventions to strategically address the use of health information during a critical developmental age in high-risk populations. Utilizing Chew's 3-item health literacy screening instrument to assess item specific and overall health literacy provides insight into the needs of adolescents regarding engagement in decision making and the development of skills necessary to more effectively navigate the health care system through appropriate completion of medical forms, use of hospital materials and improved understanding of written medical and health information. Likewise, a greater understanding of adolescent health literacy may also result in better medical encounter communication and may thereby serve to build confidence in the adolescent patient and improve his/her capacity to navigate an increasingly complex health care system as they transition into adulthood. In view of the intergenerational risk for asthma, addressing asthma-related health literacy at the adolescence life stage benefits the health of future generations of families and contributes to the elimination of health disparities over time. Collective health literacy, which takes into account the health literacy of child, parents, family members, school staff, and others responsible for an individual's health care [54] may also influence asthma self-management given caregiver influence for the adoption of self-management behaviors.

Conclusion

Our findings indicate a significant association between inadequate health literacy and self-reported asthma management related health care utilization in an urban African-American adolescent population. These results have implications for inclusion and assessment of adolescent health literacy in future asthma studies and contribute to our understanding of the need for tailored interventions to address the needs of adolescents with inadequate health literacy. Given the limited availability of health literacy assessments for adolescents, the use a validated short assessment of self-reported health literacy has utility for examining health literacy in adolescents with asthma. Finally, the health literacy-related domains of the three screening questions individually represent commonly requested tasks necessary for engagement of patients within the healthcare setting and are key for transitioning into shared decision making and appropriate navigation of the health care system.

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Table 1

Characteristics of Study Sample

	% (n/N)
Demographics	
Female	62 (112/181)
Grade 10–12 in high school	80 (144/181)
Mom's education	
Less than high school	16 (25/158)
High school graduate	34 (54/158)
> High school	50 (79/158)
Medicaid enrollee	48 (87/181)
BMI >85 th percentile	44 (75/172)
Clinical/Management Variables	
Report physician diagnosis of asthma	83 (150/181)
Asthma severity	
Mild intermittent	57 (103/181)
Mild persistent	19 (35/181)
Moderate	12 (22/181)
Severe	12 (21/181)
Report controller medication	38 (64/169)
Report rescue medication	57 (97/169)
ED Visits, <i>mean (SD)</i>	1.17 (\pm 3.50)
Hospitalizations, <i>mean (SD)</i>	0.84 (\pm 3.19)
Quality of life, <i>mean (SD)</i>	
Overall	4.58 (\pm 1.50)
Domain: Activities	4.03 (\pm 1.45)
Domain: Symptoms	4.50 (\pm 1.60)
Domain: Emotions	5.01 (\pm 1.70)
Health Literacy Assessment	
Overall Health Literacy Score, <i>mean (SD)</i>	11.70 (\pm 2.98)
Range of Scores	3–15
Inadequate Health Literacy	23 (41/181)

Table 2Self-Reported Health Literacy¹ of Urban Teen Sample

	% (n/N)
How confident are you in filling out medical forms?	
High confidence (extremely and quite a bit)	69 (125/181)
Low confidence (somewhat, a little bit or not at all)	31 (56/181)
How often do you have someone help you read hospital materials?	
Not often (None of the time and a little of the time)	59 (107/181)
More often (Some of the time, most of the time and all of the time)	41 (74/181)
How often you have problems learning about your medical condition because of difficulty understanding written information?	
High confidence (extremely and quite a bit)	68 (123/181)
Low confidence (somewhat, a little bit or not at all)	32 (58/181)

¹[Chew, 2008]

Table 3

Multivariate analysis of self-reported health literacy and demographic and clinical characteristics¹

	Inadequate Health Literacy ²			Not Confident			Need Help			Have Problems		
	OR	(95% CI)	p	OR ³	(95% CI) ⁴	p	OR	(95% CI)	p	OR	(95% CI)	p
Demographics												
Age	0.61	(0.44, 0.84)	0.002	0.54	(0.40, 0.74)	0.001	0.84	(0.65, 1.07)	0.155	0.81	(0.62, 1.06)	0.121
Female	0.73	(0.36, 1.48)	0.387	0.61	(0.32, 1.15)	0.125	0.69	(0.38, 1.28)	0.239	0.82	(0.43, 1.55)	0.536
Grade (10)	0.28	(0.13, 0.60)	0.001	0.25	(0.12, 0.52)	0.001	0.33	(0.16, 0.71)	0.004	0.41	(0.19, 0.85)	0.017
Mom education (< high school vs other)	2.37	(0.91, 6.18)	0.077	2.91	(1.21, 7.02)	0.017	1.44	(0.61, 3.42)	0.411	0.90	(0.35, 2.33)	0.835
Medicaid	0.36	(0.17, 0.76)	0.007	0.38	(0.20, 0.75)	0.005	0.50	(0.27, 0.91)	0.023	0.67	(0.36, 1.26)	0.217
BMI> 85th percentile	1.95	(0.95, 4.02)	0.069	2.27	(1.17, 4.41)	0.015	1.50	(0.81, 2.76)	0.196	1.00	(0.53, 1.91)	0.995
Clinical/Management												
Physician diagnosis of asthma	1.64	(0.59, 4.59)	0.344	0.47	(0.21, 1.04)	0.063	1.87	(0.81, 4.33)	0.145	1.44	(0.60, 3.44)	0.415
Moderate-Severe asthma	1.35	(0.67, 2.71)	0.404	0.64	(0.34, 1.23)	0.181	1.11	(0.61–2.02)	0.735	1.11	(0.59, 2.08)	0.746
Rescue medication	1.12	(0.53, 2.34)	0.774	0.49	(0.25, 0.94)	0.003	1.84	(0.98, 3.48)	0.06	1.44	(0.74, 2.82)	0.289
Controller medication	1.33	(0.64, 2.80)	0.447	0.54	(0.27, 1.09)	0.085	1.73	(0.92, 3.25)	0.091	1.31	(0.67, 2.55)	0.428
Number of ED visits	1.09	(0.99, 1.21)	0.086	1.01	(0.93, 1.10)	0.834	1.21	(1.02, 1.43)	0.029	1.20	(1.03, 1.40)	0.020
Number of Hospitalizations	1.29	(1.07, 1.56)	0.009	1.15	(1.00, 1.32)	0.055	1.19	(1.00, 1.42)	0.055	1.19	(1.01, 1.41)	0.036
Quality of Life												
QOL Overall	0.75	(0.59, 0.95)	0.016	0.91	(0.74, 1.12)	0.383	0.86	(0.70, 1.05)	0.129	0.78	(0.63, 0.97)	0.025
Domain: Activities	0.70	(0.54, 0.92)	0.011	0.85	(0.68, 1.06)	0.154	0.87	(0.71, 1.08)	0.203	0.75	(0.60, 0.95)	0.016
Domain: Symptoms	0.77	(0.61, 0.96)	0.019	0.94	(0.77, 1.14)	0.535	0.86	(0.71, 1.04)	0.109	0.78	(0.64, 0.96)	0.016
Domain: Emotions	0.81	(0.61, 1.00)	0.044	0.94	(0.78, 1.13)	0.483	0.89	(0.75, 1.06)	0.197	0.86	(0.71, 1.03)	0.101

¹ Sample size = 181 with exception of mom education<high school (n=158), BMI> 85th percentile (n=172), rescue medication (n=169), controller medication (n=169), and 1 ED visit (n=180);

² Inadequate health literacy was recoded as 9 = 1 and 9 = 0 for analysis;

³ Odds ratio;

⁴ 95% Confidence Interval.

Final multivariate stepwise model examining health literacy, demographics, and asthma characteristics

Table 4

Dependent variable	OR ²	(95%CI) ³	p-value
Inadequate Health Literacy¹			
Grade (10)	0.28	(0.12, 0.65)	0.003
Medicaid enrollee	0.39	(0.17, 0.91)	0.029
BMI 85th percentile	2.27	(1.01, 5.10)	0.047
1 hospitalization	1.37	(1.11, 1.69)	0.003
Not Confident			
Age	0.53	(0.37, 0.77)	0.001
Mom's education (< high school vs. other)	3.73	(1.30, 10.22)	0.015
BMI 85th percentile	3.99	(1.69, 9.42)	0.002
Asthma diagnosis	0.33	(0.12, 0.94)	0.039
Need help			
Grade (10)	0.32	(0.15, 0.68)	0.003
Number of ED visits	1.21	(1.02, 1.44)	0.029
Have problems			
Grade (10)	0.4	(0.19, 0.86)	0.018
Quality of Life: Symptoms	0.78	(0.63, 0.96)	0.017

¹ Inadequate health literacy was recoded as 9 = 1 and 9 = 0 for analysis;

² Odds ratio;

³ 95% Confidence Interval.