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The relationship between caregivers' subjective social status and asthma symptoms and management for urban children

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Abstract

Objective: Subjective social status (SSS) is a person's perception of his/her social standing among others. We explored the relationship between caregivers' SSS and asthma symptoms, visits, and medication use among children with persistent asthma.

Methods: We analyzed baseline data of children (3–10 years) from the SB-TEAM trial in Rochester, NY. Using a modified MacArthur Scale of SSS, caregivers rated themselves "a lot worse off" to "a lot better off" compared to 4 groups (e.g., neighbors). "Low SSS" was defined by a response of "a lot worse off" or "somewhat worse off" for any of the referent groups. Caregivers reported their child's asthma symptoms, healthcare visits for asthma, and medication use. Bivariate and multivariate statistics were used.

Results: We found that, of the 230 children enrolled (participation rate: 78%, 62% Black, 72% Medicaid), 29% of caregivers had low SSS. Caregivers with low SSS had more depressive symptoms (46% vs. 28%) and lower social support (69.1 vs. 77.7). In multivariable analyses, children of caregivers with low SSS had fewer symptom-free days/2 weeks (5.8 vs. 7.9, $p = .01$). While they were more likely to have a routine asthma visit in the past year (35% vs. 23%, adjusted $p = .03$), there was no difference in their use of preventive medication.

Conclusions: Many caregivers of children with persistent asthma report low SSS. While children of these caregivers had fewer symptom-free days, they were not more likely to use preventive medications. Efforts are needed to support these caregivers to ensure optimal preventive care and reduce morbidity.

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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 this article.

Keywords

Asthma; prevention; subjective social status; underserved

Background

Childhood asthma disproportionately affects minority and low-income children. Poor and minority children face more severe asthma symptoms, more frequent emergency visits and hospitalizations, more activity limitation, and more missed days of school (1–5). The largest contributors to these disparities seem to be social factors, such as poverty, and environmental triggers, such as cigarette smoke exposure, that disproportionately affect this population (6–8). Unfortunately, poor and minority children are also at greatest risk for suboptimal preventive asthma care (5,9).

National and international asthma guidelines outline recommended actions for all children with persistent asthma to optimize preventive treatment and assure good asthma control (10–12). These actions require active engagement of a caregiver to recognize pertinent symptoms, access healthcare and communicate with a primary care provider, obtain an asthma action plan, administer effective therapies, and help the child avoid triggers. However, for many families, achieving optimal asthma selfmanagement is difficult, and for those living in poverty, the challenges are compounded. For example, poor families may have limited access to health care and challenges affording medications and other treatments (13,14). Low socioeconomic status (SES) may create poor housing quality and instability, which can lead to exposure to allergens and other triggers that worsen asthma symptoms (15). Multiple studies have demonstrated barriers to optimal guideline-based care for poor, inner-city children with asthma (9,16).

Additional research has begun to consider an individual's own perspective of their social status, sometimes termed subjective social status (SSS), as an indicator of risk for poor health outcomes (17). SSS is defined as how one perceives themselves in terms of rank among others in their community. To measure this perception, the participant is asked to rank oneself compared to different referent groups such as one's neighbors or American society (18). Considering this subjective rank can be especially pertinent for low-income populations, because SSS captures distinct dimensions of support such as emotional, logistic, and material resources (19). SSS allows the participant to project their socioeconomic trajectory beyond income itself, and account for potential fluctuations in assets or support (19). Further, it is a construct that may be related, but is separate from other variables such as depression (20–23) and social support (24).

Prior studies have demonstrated that high SSS is associated with better health outcomes such as lower heart rate (18), lower rates of angina, diabetes, and depression (21), and better overall self-rated health (25). Although the pathways between SSS and health outcomes are currently unknown, it is posited that feelings of stress and inequality, which are related to low social status, can influence health (26). Chronic stress in caregivers has also been shown to be associated with higher levels of pro-inflammatory markers, such as TNF- α and IL-5, in their children (27). When acute stress is coupled with chronic family stress, children with

asthma have more severe asthma symptoms (28). If chronic stress mediates the relationship between SSS and health, this may also relate to a caregiver's ability to care for others.

To our knowledge, there have been no studies that considered how a caregiver's SSS may affect the health outcomes of their child. However in a sample of long-term care staff, those with high SSS had higher levels of positive caregiving experiences and lower rates of burnout, which can affect outcomes for patients (29). Thus SSS may be important in considering a caregiver's ability to help his or her child manage their chronic illness.

The objective of this study was to explore the relationship between caregivers' SSS and their child's asthma morbidity, healthcare visits for asthma, and medication use among a group of urban children with persistent asthma. We hypothesized that children whose caregivers endorse low SSS will have more severe asthma symptoms, and will receive fewer preventive asthma care measures (e.g., preventive visits and medication use) compared to caregivers of higher SSS.

Methods

We used baseline data from the first 2 years of enrollment for the School-based Telemedicine Enhanced Asthma Management (SB-TEAM) program in Rochester, New York (2012–2014). The study included a cohort of 230 participants (participation rate 78%). The SB-TEAM program is a community-based randomized trial in the Rochester city schools, designed to test a novel intervention using enhanced communication and screening tools, telemedicine, and directly observed therapy of preventive asthma medications to improve asthma care and outcomes among inner-city children with persistent symptoms.

We identified children (aged 3–10 years) with physician-diagnosed asthma through school-based screening throughout the Rochester City School District elementary schools and preschools. Families were contacted by telephone to determine eligibility, which required persistent asthma symptoms or poor asthma control based on the national guidelines (30). Families were excluded if 1) they were unable to speak and understand English, 2) did not have access to a phone for follow-up surveys, 3) the family planned to leave the district within <6 months, 4) the child had other significant medical conditions such as congenital heart disease, cystic fibrosis, or other chronic lung disease, 5) the child was in foster care or other situations in which consent could not be obtained from a guardian, and 6) the child or a sibling living in the same home was previously enrolled. Data from this analysis are from an in-home baseline assessment conducted at the start of the school year, prior to any intervention. All caregivers provided informed consent and assent was obtained from children 7 years of age. The University of Rochester's Institutional Review Board approved this study.

Assessment of SSS

To determine a caregiver's SSS, we used a modified MacArthur Scale of SSS previously used in other studies (31,32). Caregivers reported their SSS by rating themselves as "a lot worse off" to "a lot better off" compared to other groups. We asked parents, "Please think about success in life. Some people are better off and have a high standing in their

community. Other people are worse off and have a lower standing in their community. Please indicate whether you feel you are a lot worse off, somewhat worse off, about the same, somewhat better off, or a lot better off than the following: 1) others in American society, 2) others of your same race or ethnicity, 3) your neighbors, 4) your parents when they were your age.” We defined “low SSS” as a response of “a lot worse off” or “somewhat worse off” for any of the referent groups. We dichotomized responses as having low SSS in any referent group vs. not reporting any low SSS response to ensure adequate power of our analyses. We also considered each referent group separately (25,32).

Assessment of asthma morbidity

We used structured surveys, with questions based on asthma guidelines (30), to measure asthma symptoms within the past 2 weeks (14 days) including 1) symptom-free days (defined as a “24-hour period with no signs or symptoms of asthma during the daytime or nighttime”), 2) daytime symptoms, 3) nighttime symptoms, 4) days that the child had to slow down or stop normal activity because of asthma, and 5) days the child had to take any quick relief (short acting beta agonist) medicine to help relieve symptoms. We also asked parents to report the number of days their child missed school due to asthma during the prior school year.

We also used the previously validated Childhood Asthma Control Test (C-ACT), which evaluates if a child has well-controlled asthma (33). Children and caregivers are asked separate questions related to the child’s asthma. The scores from the children and caregivers were added to construct a total C-ACT score (0-27). A score ≤ 19 indicates that the child does not have well-controlled asthma.

We asked parents to report the number of visits to the emergency department (ED) due to asthma in the prior year. Children were then separated into two groups; those who had any ED visits and those who had no ED visits in the past year.

Assessment of routine asthma visits and preventive asthma medications

Caregivers were asked “Over the past 12 months, did this child visit a doctor or a health care provider?” and were asked whether or not their visit was related to asthma. We defined a routine asthma visit as any visit in which the caregiver stated their child visited their primary care provider for a routine asthma follow-up visit (not including visits for asthma exacerbations or health supervision visits). We dichotomized responses as having a specific asthma-related visit in the prior year or not having any asthma-related visits with their provider.

We asked caregivers to report all medications their child was “currently using” at the time of the baseline assessment. We specifically considered preventive asthma medication use as a key measure of preventive asthma care (30). Caregivers reported whether the child was using one or more preventive medication such as fluticasone and budesonide. Among those who reported their child uses preventive medication, we used the previously validated Horne Adherence Scale to determine adherence with preventive medication (34). The Horne Adherence Scale contains four questions on a 5-point Likert scale (i.e., “I sometimes forget to give my child his/her medicines”; range 4–20). Higher scores indicate worse adherence.

Assessment of covariates

We included several other variables that may influence asthma outcomes (21,31). We assessed children's demographic variables including age, race (white, black, or other), and ethnicity (Hispanic, non-Hispanic.) We also included caregiver age and smoking status. To assess if the caregiver smoked, we asked "Do you currently smoke tobacco, cigarettes, cigars, or pipes?" We analyzed smoking status as a dichotomous variable for those who do smoke and those who do not.

Caregivers were asked to provide the best estimate of their total family income in the past 12 months. For data analyses, the income ranges were combined into three different categories: 1) less than \$16,000, 2) \$16,000 through \$35,000, and 3) more than \$35,000. Education was measured by the highest degree that the caregiver earned. We considered two categories—caregivers who earned less than a high school degree (including GED) and those who earned higher than a high school degree. The child's health insurance was also included. Health insurance was analyzed as a dichotomous variable—children with Medicaid/Public insurance and children with other types of health insurance. Children without health insurance ($n = 7$) were included with "other" types of health insurance.

We used the previously validated Center for Epidemiologic Studies Depression (CES-D) Scale to assess caregiver depressive symptoms (35). The scale includes 20 questions with a 4-point Likert scale (0–60). A score ≥ 16 indicated that the caregiver was experiencing depressive symptoms. Caregiver depression was analyzed as a dichotomous variable—those who have depressive symptoms (scoring ≥ 16 on CES-D scale) or those who do not have depressive symptoms (scoring < 16).

We assessed caregiver's social support using the validated Medical Outcomes Study (MOS) Social Support survey (36). The survey contained 19 questions with a 5-point Likert scale (19–95). Higher values indicated that the caregiver felt that they had higher levels of social support.

Data analyses

We performed data analyses using SPSS software (version 22). We used chi-square and Mann–Whitney tests to compare high and low SSS with demographic variables, asthma outcomes, and preventive asthma care. We controlled for covariates, including caregiver age, race, income, education, health insurance, caregiver depression, and social support, using multiple logistic and linear regression analyses (21,25,31). Logistic regression analyses were used to predict dichotomous outcomes, including ED visits, C-ACT category, preventive medication use, and asthma visits. Multiple linear regression analyses were used to examine the association between SSS and asthma symptoms, rescue medication use, school absenteeism and adherence score. A two-sided $\alpha < .05$ was considered statistically significant.

Results

Among the 230 children enrolled in the SB-TEAM trial, 216 (94%) were included in this study. We excluded male caregivers ($n = 14$), since their SSS may differ from females and

there were too few males to conduct subanalyses (21). Overall, 63 (29%) caregivers endorsed at least 1 low SSS item. When considering each referent group separately, we found that 20 (9.3%) caregivers had lower SSS when asked to compare themselves to others American society, 20 (9.3%) had low SSS when asked to compare to others of the same race or ethnicity, and 15 (7.1%) had a low SSS score when asked to compare to their neighbors. When asked to compare to their parents at their age, 40 (18.9%) caregivers endorsed a low SSS score.

Table 1 shows the demographic characteristics of our study sample. The average age for children was 7.8 years. Most of the children were identified as having black race (62%) and Medicaid insurance (72%). Many of the caregivers never graduated from high school (40%) and 33% reported having symptoms of depression. More than one-third (36%) of the caregivers were smokers.

Caregivers with low SSS were older than caregivers with higher SSS, with a mean age of 36.9 years vs. 33.6 years ($p = 0.01$). There was significant association between caregiver depression and SSS (21). Almost half (46%) of caregivers with low SSS had depressive symptoms, and more caregivers with low SSS reported depressive symptoms compared to caregivers with higher SSS (46% vs. 28%, $p = 0.01$). Caregivers with low SSS also reported significantly lower scores of social support (69.1 vs. 77.7, $p < 0.01$). There were no significant differences in SSS by race, ethnicity, or income.

Table 2 shows the relationship between a caregiver's SSS and a child's asthma severity including symptoms, acute ED visits, and C-ACT scores. We found that children whose caregivers had low SSS had fewer symptom-free days/2 weeks (5.8 vs. 7.9) compared to children whose caregivers did not have low SSS, even after controlling for caregiver age, income, education, health insurance, race, caregiver depression, and social support ($p = .01$). There were no other differences in asthma symptoms between children of caregivers with low SSS and those who did not have low SSS in the multivariate model. There were also no significant differences in the percentage of children with an emergency department visit in the past year (51% vs. 42%, adjusted $p = 0.18$) or with poorly controlled asthma (65% vs. 64%, adjusted $p = 0.56$). We also looked at comparisons for those with low SSS in each referent group separately and had similar findings across measures, but were limited in statistical power.

Table 3 considers the relationship between SSS and a child's routine asthma visits and preventive medication use. We found that 35% of children whose caregivers had low SSS had routine asthma visits in the past year compared to 23% of children whose caregivers did not report low SSS (adjusted $p = 0.03$). However, there was no difference in the percentage of children using a preventive asthma medication (57% vs. 53%, adjusted $p = 0.56$) and no difference in medication adherence (mean score 8.6 vs. 8.1 adjusted $p = 0.30$) by SSS.

Discussion

We explored the relationship between caregivers' SSS and their child's asthma morbidity, healthcare visits, and preventive medication use among a group of urban children with

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persistent asthma. We found that children of caregivers with low SSS had fewer symptom-free days compared to caregivers with higher SSS. While these children had more routine asthma visits in the past year, there was no difference in use of preventive asthma medication. Prior studies have found that individuals with low SSS not only tend to have low self-rated health, but also had poorer health outcomes such as a higher prevalence of angina, diabetes, insulin resistance, and high BMI (21,25,31,37). However, to our knowledge, there have not been studies that looked into how a caregiver's SSS can affect a child's chronic illness. This study expands upon prior research because it examines childhood asthma severity and management in relation to a caregiver's SSS.

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We found that even when we controlled for income, low SSS was significantly associated with fewer symptom-free days. This suggests that SSS may capture aspects of poverty that objective social status does not (19). SSS is a multifactorial measure that captures the longitudinal nature of poverty. Low SSS may relate to difficulty with coping and high levels of stress that often accompanies poverty. Some studies have demonstrated a significant association between caregiver stress and increase in inflammatory markers such as IL-5 and IL-13, which are associated with airway inflammation and hyperresponsiveness. These relationships imply that caregiver stress may play a role in the biological interactions that trigger asthma (38,39).

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While the overall rates of routine asthma visits were low among this group (26%), we found that in contrast to our hypothesis, children of caregivers with low SSS had more routine visits compared to children of caregivers who did not endorse low SSS. The reason for this is not clear, but may relate to the higher level of symptom severity among this group, creating a greater perception of need for routine asthma checkups. Importantly, in light of having more visits, one might have expected higher rates of preventive treatments among this group, yet there were no differences in the percent of children who had a preventive asthma medication or in medication adherence. Only 54% of the children overall reported using a preventive medication. This raises concern because preventive medications are recommended for all children with persistent asthma to improve symptoms and assure optimal control.

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This study also highlights the substantial burden that many caregivers face. Similar to other studies, we found that almost half of the caregivers with low SSS reported depressive symptoms (40). Further, this group endorsed having lower social support, which is concerning since social support has been found to buffer the effects of depression (24). This suggests that our particular cohort of caregivers may suffer even greater burden in addition to having low SSS. All caregivers also have very high rates of smoking, putting both themselves and their children at risk for poor outcomes. Our study population was primarily low-income, and these findings suggest that this group of caregivers with low SSS experience many challenges to optimal health.

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There are some limitations to this study. Because asthma outcomes were self-reported from the caregivers, there is the potential of recall bias. However, self-report is considered standard in the assessment of asthma symptoms, and our recall period was short (14 days) to assist in symptom recollection. We focused our analyses on female caregivers and can only

generalize our findings to female caregivers from similar urban communities. While this study only explored female caregivers' SSS, the SSS scale could be used to engage multiple caregivers for a more holistic picture of the family's status (19). We focused on only a few aspects of asthma management; specifically routine visits and medication use. Future studies are needed with a larger sample of caregivers to further explore the interplay between SSS and the different variables, the longitudinal effects of SSS on children's asthma morbidity and management, the impact of SSS on other chronic illnesses such as cystic fibrosis or epilepsy, and the immunological and epigenetic pathways that mediate the relationship between SSS and health outcomes (41).

This study carries implications for asthma care in a low-income pediatric urban population. We found that caregivers who have low SSS face tremendous burden and their children have significant asthma symptoms. Primary care providers could potentially better support parents by screening for low SSS to offer resources for support and help alleviate the burden on caregivers. New models of care integration with social services provided on-site might further optimize asthma treatment and support for families, and be particularly helpful to this group.

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References

1. Kopel LS, Phipatanakul W, Gaffin JM. Social disadvantage and asthma control in children. *Paediatr Respir Rev* 2014;15(3):256–262; quiz 262–253. PMID: . [PubMed: 24928775]
2. Lewis P, Fagnano M, Koehler A, Halterman JS. Racial disparities at the point of care for urban children with persistent asthma. *J Community Health*. 2014;39(4):706–711. doi:10.1007/s10900-013-9815-5. PMID: . [PubMed: 24435717]
3. Oraka E, Iqbal S, Flanders WD, Brinker K, Garbe P. Racial and ethnic disparities in current asthma and emergency department visits: findings from the national health interview survey, 2001–2010. *J Asthma*. 2013;50(5):488–496. doi:10.3109/02770903.2013.790417. PMID: . [PubMed: 23544662]
4. Akinbami LJ, Moorman JE, Simon AE, Schoendorf KC. Trends in racial disparities for asthma outcomes among children 0 to 17 years, 2001–2010. *J Allergy Clin Immunol* 2014;134(3):547–553. doi:10.1016/j.jaci.2014.05.037. PMID: . [PubMed: 25091437]
5. Crocker D, Brown C, Moolenaar R, Moorman J, Bailey C, Mannino D, Holguin F. Racial and ethnic disparities in asthma medication usage and health-care utilization: data from the National Asthma Survey. *Chest*. 2009;136(4):1063–1071. doi:10.1378/chest.09-0013. PMID: [PubMed: 19567492]
6. Smith LA, Hatcher-Ross JL, Wertheimer R, Kahn RS. Rethinking race/ethnicity, income, and childhood asthma: racial/ethnic disparities concentrated among the very poor. *Public Health Rep* 2005;120(2):109–116. doi:10.1177/003335490512000203.
7. McDaniel M, Paxson C, Waldfogel J. Racial disparities in childhood asthma in the United States: evidence from the National Health Interview Survey, 1997 to 2003. *Pediatrics*. 2006;117(5):e868–877. doi:10.1542/peds.2005-1721. PMID: [PubMed: 16651291]
8. Beck AF, Huang B, Simmons JM, Moncrief T, Sauers HS, Chen C, Ryan PH, Newman NC, Kahn RS. Role of financial and social hardships in asthma racial disparities. *Pediatrics*. 2014;133(3):431–439. doi:10.1542/peds.2013-2437. PMID: . [PubMed: 24488745]

9. Halterman JS, Auinger P, Conn KM, Lynch K, Yoos HL, Szilagyi PG. Inadequate therapy and poor symptom control among children with asthma: findings from a multistate sample. *Ambul Pediatr* 2007;7(2):153–159. doi:10.1016/j.ambp.2006.11.007. PMID: [PubMed: 17368410]
10. Reddel HK, Bateman ED, Becker A, Boulet LP, Cruz AA, Drazen JM, Haahtela T, Hurd SS, Inoue H, de Jong-ste JC, et al. A summary of the new GINA strategy: a roadmap to asthma control. *Eur Respir J* 2015;46(3):622–639. doi:10.1183/13993003.00853-2015. PMID: [PubMed: 26206872]
11. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention. 2017; [accessed 2018 Jan 3]. <http://www.ginasthma.com>.
12. National Heart, Lung, and Blood Institute, Program NAEAP. Guidelines for the diagnosis and management of asthma. 2007; [accessed 2018 Jan 3]. <http://www.nhlbi.nih.gov/files/docs/guidelines/asthgdln.pdf>.
13. National Asthma Education and Prevention Program. Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma-Summary Report 2008. *J Allergy Clin Immunol* 2008;120(5 Suppl):S94–138. PMID: [PubMed: 17983880]
14. Patel MR, Brown RW, Clark NM. Perceived parent financial burden and asthma outcomes in low-income, urban children. *J Urban Health*. 2013;90(2):329–342. doi:10.1007/s11524-012-9774-7. PMID: . [PubMed: 23179603]
15. Schreier HM, Chen E. Socioeconomic status and the health of youth: a multilevel, multidomain approach to conceptualizing pathways. *Psychol Bull*. 2013;139(3):606–654. doi:10.1037/a0029416. PMID: . [PubMed: 22845752]
16. Halterman JS, Montes G, Shone LP, Szilagyi PG. The impact of health insurance gaps on access to care among children with asthma in the United States. *Ambul Pediatr* 2008;8(1):43–49. doi:10.1016/j.ambp.2007.10.005. PMID: . [PubMed: 18191781]
17. Adler NaS J, The MacArthur scale of subjective social status. *Res: Psychosoc Notebook*. 2007; [accessed 2018 Jan 3]. <http://www.macses.ucsf.edu/research/psychosocial/subjective.php>.
18. Adler NE, Epel ES, Castellazzo G, Ickovics JR. Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy, white women. *Health Psych* 2000;19(6):586–592. doi:10.1037/0278-6133.19.6.586.
19. Gage-Bouchard EA, Devine KA. Examining parents' assessments of objective and subjective social status in families of children with cancer. *PloS ONE* 2014;9(3):e89842. doi:10.1371/journal.pone.0089842. PMID: . [PubMed: 24599006]
20. John-Henderson N, Jacobs EG, Mendoza-Denton R, Francis DD. Wealth, health, and the moderating role of implicit social class bias. *Ann Behav Med* 2013;45(2):173–179. doi:10.1007/s12160-012-9443-9. [PubMed: 23229159]
21. Singh-Manoux A, Adler NE, Marmot MG. Subjective social status: its determinants and its association with measures of ill-health in the Whitehall II study. *Soc Sci Med* 2003;56(6):1321–1333. doi:10.1016/S0277-9536(02)00131-4. PMID: . [PubMed: 12600368]
22. Bartlett SJ, Krishnan JA, Riekert KA, Butz AM, Malveaux FJ, Rand CS. Maternal depressive symptoms and adherence to therapy in inner-city children with asthma. *Pediatrics*. 2004;113(2):229–237. doi:10.1542/peds.113.2.229. PMID: . [PubMed: 14754931]
23. Weil CM, Wade SL, Bauman LJ, Lynn H, Mitchell H, Lavigne J. The relationship between psychosocial factors and asthma morbidity in inner-city children with asthma. *Pediatrics* 1999;104(6):1274–1280. doi:10.1542/peds.104.6.1274. PMID: . [PubMed: 10585977]
24. Manuel J, Naughton MJ, Balkrishnan R, Paterson Smith B, Koman LA. Stress and adaptation in mothers of children with cerebral palsy. *J Pediatr Psychol* 2003;28(3):197–201. doi:10.1093/jpepsy/jsg007. PMID: . [PubMed: 12654945]
25. Franzini L, Fernandez-Esquer ME. The association of subjective social status and health in low-income Mexican-origin individuals in Texas. *Soc Sci Med* 2006;63(3):788–804. doi:10.1016/j.socscimed.2006.01.009. PMID: . [PubMed: 16580107]
26. Operario D, Adler NE, Williams DR. Subjective social status: reliability and predictive utility for global health. *Psychol Health*. 2004;19(2):237–246. doi:10.1080/08870440310001638098.
27. Wright RJ, Finn P, Contreras JP, Cohen S, Wright RO, Staudenmayer J, Wand M, Perkins D, Weiss ST, Gold DR. Chronic caregiver stress and IgE expression, allergen-induced proliferation, and

- cytokine profiles in a birth cohort predisposed to atopy. *J Allergy Clin Immunol* 2004;113(6): 1051–1057. doi:10.1016/j.jaci.2004.03.032. PMID: . [PubMed: 15208584]
28. Marin TJ, Chen E, Munch JA, Miller GE. Double-exposure to acute stress and chronic family stress is associated with immune changes in children with asthma. *Psychosom Med* 2009;71(4): 378–384. doi:10.1097/PSY.0b013e318199dbc3. PMID: . [PubMed: 19196805]
 29. Ayalon L. Subjective socioeconomic status as a predictor of long-term care staff burnout and positive caregiving experiences. *Int Psychogeriatr* 2008;20(3):521–537. doi:10.1017/S1041610207006175. PMID: . [PubMed: 17868496]
 30. National Heart Lung, and Blood Institute. Asthma care quick reference: guidelines from the National Asthma Education and Prevention Program Expert Panel Report 3. 2002 6; [accessed 2018 Jan 3]. https://www.nhlbi.nih.gov/files/docs/guidelines/asthma_qrg.pdf.
 31. Wolff LS, Subramanian SV, Acevedo-Garcia D, Weber D, Kawachi I. Compared to whom? Subjective social status, self-rated health, and referent group sensitivity in a diverse US sample. *Soc Sci Med* 2010;70(12):2019–2028. doi:10.1016/j.socscimed.2010.02.033. PMID: . [PubMed: 20381225]
 32. Dunn JR, Veenstra G, Ross N. Psychosocial and neo-material dimensions of SES and health revisited: predictors of self-rated health in a Canadian national survey. *Soc Sci Med* 2006;62(6): 1465–1473. doi:10.1016/j.socscimed.2005.07.038. PMID: . [PubMed: 16154675]
 33. Liu AH, Zeiger R, Sorkness C, Mahr T, Ostrom N, Burgess S, Rosenzweig JC, Manjunath R. Development and cross-sectional validation of the Childhood Asthma Control Test. *J Allergy Clin Immunol* 2007;119(4):817–825. doi:10.1016/j.jaci.2006.12.662. PMID: . [PubMed: 17353040]
 34. Horne R, Weinman J. Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. *J Psychosom. Res* 1999;47(6):555–567. doi:10.1016/S0022-3999(99)00057-4. PMID: . [PubMed: 10661603]
 35. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* 1977;1(3):385–401. doi:10.1177/014662167700100306.
 36. Sherbourne CD, Stewart AL. The MOS social support survey. *Soc Sci Med* 1991;32(6):705–714. doi:10.1016/0277-9536(91)90150-B. PMID: . [PubMed: 2035047]
 37. Subramanyam MA, Diez-Roux AV, Hickson DA, Sarpong DF, Sims M, Taylor HA, Williams DR, Wyatt SB. Subjective social status and psychosocial and metabolic risk factors for cardiovascular disease among African Americans in the Jackson Heart Study. *Soc Sci Med* 2012;74(8):1146–1154. doi:10.1016/j.socscimed.2011.12.042. PMID: . [PubMed: 22381684]
 38. Wright RJ, Cohen S, Carey V, Weiss ST, Gold DR. Parental stress as a predictor of wheezing in infancy: a prospective birth-cohort study. *Am J Respir Crit Care Med* 2002;165(3):358–365. doi: 10.1164/ajrccm.165.3.2102016. PMID: . [PubMed: 11818321]
 39. Chen E, Hanson MD, Paterson LQ, Griffin MJ, Walker HA, Miller GE. Socioeconomic status and inflammatory processes in childhood asthma: the role of psychological stress. *J Allergy Clin Immunol* 2006;117(5):1014–1020. doi:10.1016/j.jaci.2006.01.036 PMID: . [PubMed: 16675327]
 40. Dennis EF, Webb DA, Lorch SA, Mathew L, Bloch JR, Culhane JF. Subjective social status and maternal health in a low income urban population. *Matern Child Health J* 2012;16(4):834–843. doi:10.1007/s10995-011-0791-z. PMID: . [PubMed: 21487843]
 41. Wright RJ. Epidemiology of stress and asthma: from constricting communities and fragile families to epigenetics. *Immunol Allergy Clin North Am* 2011;31(1):19–39. doi:10.1016/j.iac.2010.09.011. PMID: . [PubMed: 21094921]

Table 1.

Population demographics.

Characteristics N(%)	Overall (N = 216)	1 low SSS scores (N = 63)	No low SSS scores (N = 153)	P-value
Caregiver age ^a	34.6 (0.6)	36.9 (9.5)	33.6 (7.5)	0.01
Income (\$)				
<16,000	86 (43%)	22 (36%)	64 (45%)	0.13
16,000 – 35,000	75 (37%)	29 (48%)	46 (33%)	
>35,000	41 (20%)	10 (16%)	31 (22%)	
Caregiver education < High School	87 (40%)	24 (38%)	63 (41%)	0.68
Caregiver smokes	78 (36%)	27 (43%)	51 (33%)	0.19
Caregiver depression (CES-D 16)	71 (33%)	29 (46%)	34 (28%)	0.01
Social support survey ^a	75.2 (1.2)	69.1 (18.1)	77.7 (16.3)	<0.01
Child age ^a	7.8 (0.1)	7.9 (1.7)	7.7 (1.9)	0.61
Child's race				
White	19 (9%)	8 (13%)	11 (7%)	0.43
Black	134 (62%)	37 (59%)	97 (63%)	
Other	63 (29%)	18 (29%)	45 (29%)	
Child is Hispanic/Latino	61 (28%)	18 (29%)	43 (28%)	0.95
Child has Medicaid	155 (72%)	49 (78%)	106 (68%)	0.21

^aNote. Mean (standard deviation)

Table 2.

Asthma health outcomes by subjective social status.

Health outcomes <i>Mean (SD)</i>	Overall (<i>N</i> = 216)	Low SSS (<i>N</i> = 63)	Not low SSS (<i>N</i> = 153)	<i>P</i> -value	Adjusted <i>P</i> -value [*]
Symptom-free days/14 days	7.3 (5.0)	5.8 (0.6)	7.9 (0.4)	<0.01	0.01
Daytime symptoms/14 days	4.7 (4.4)	6.1 (0.6)	4.3 (0.4)	<0.01	0.06
Nighttime symptoms/14 days	3.0 (3.9)	3.1 (0.5)	3.0 (0.3)	0.38	0.91
Used quick relief medicine to relieve symptoms/14 days	4.5 (4.7)	5.3 (0.6)	4.2 (0.4)	0.04	0.28
Missed school days due to asthma in prior year	9.1 (17.2)	13.2 (3.3)	7.6 (1.0)	0.08	0.08
Had ED visit in prior year ^a	96 (44%)	32 (51%)	64 (42%)	0.23	0.18
C-ACT score <19 (Poorly controlled asthma) ^a	134 (64%)	39 (65%)	95 (64%)	0.91	0.56

^a Note. N,(%)^{*} Adjusted for caregiver age, income, education, health insurance, caregiver depression, social support, and race.

Table 3.

Preventive asthma care measures stratified by subjective social status.

Preventive asthma care <i>N</i> (%)	Overall (<i>N</i> = 216)	1 low SSS scores (<i>N</i> = 63)	No low SSS scores (<i>N</i> = 153)	<i>P</i> -value	Adjusted <i>P</i> -value [*]
Prescribed preventive medication	116 (54%)	36 (57%)	80 (53%)	0.55	0.56
Had 1 asthma visits in past year	56 (26%)	22 (35%)	34 (23%)	0.05	0.03
Horne adherence scale ^a	8.2 (3.2)	8.6 (0.5)	8.1 (0.3)	0.30	0.30

^aNote. Mean (standard deviation)^{*}Adjusted for caregiver age, income, education, health insurance, caregiver depression, social support, asthma severity, and race.