

CONTROL, ADHERENCE AND OUTCOMES

What About Your Friends? Exploring Asthma-Related Peer Interactions

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Purpose. School-based asthma interventions have been shown to be effective, but many may not be sensitive to the influence of peer interactions in shaping asthma-related emotional experiences. This exploratory study describes associations between peer interactions and asthma-related emotional experiences, asthma control, and outcomes among elementary-aged children with asthma. **Methods.** Data come from the baseline assessment of a randomized trial evaluating the effect of a school-based asthma intervention. Univariate and multivariate statistics were completed to examine associations between peer interactions and asthma-related variables of interest. **Results.** Eight hundred and thirty-five caregiver and child interviews were used in the analysis. Both males and females were enrolled in this study, 31% had not well controlled or poorly controlled asthma and 44% reported taking asthma medications. Overall, 26% of children talked to friends about asthma. Females were significantly more likely to talk to friends about asthma ($p < .05$) and more likely to report that they were worried, concerned, or troubled about asthma ($p < .01$). Significant differences in emotional quality of life between males and females were also found. Children who reported talking to friends about asthma were more likely to report teasing about asthma (OR = 2.47; 95% CI 1.57, 3.89) and to report that friends help with their asthma (OR = 1.79; 95% CI 1.07, 3.01). **Conclusions.** School-based asthma interventions should be sensitive to emotional-related outcomes associated with asthma and the influence of asthma-related peer interactions. Providing children with communication strategies for disclosure of asthma status to peers that result in more supportive interactions may be needed.

Keywords asthma, children, disease management, peer relationships, school-based

INTRODUCTION

Asthma is the most common chronic illness of childhood in the United States, affecting over 7 million children (1, 2). Asthma accounts for the majority of childhood hospitalizations in children younger than 15 years of age and is estimated to have treatment costs of \$6.39 billion per year (3).

The relationships between childhood asthma and depression, familial factors, and social dysfunction have been the focus of research related to psychosocial factors that affect asthma management (4–6). Existing research related to peer interactions among children with asthma has focused primarily on the children's social competence, acceptance, and/or popularity (7–9). The role of peer interactions in shaping chronic disease management and psychosocial outcomes have been explored with findings demonstrating the importance of peer interactions as a source of social support for children with chronic conditions (e.g., diabetes) (10–12). However, peer influences may also negatively affect disease management, as children do not want to appear different from those around them, and may consequently become nonadherent to management regimens that are overt or require use of medical devices, such as metered-dose inhalers (13). A study by Dinakar and colleagues found that one-quarter

of 8- to 18-year-olds with asthma reported feeling uncomfortable using their inhaler in front of their friends (14). Roder et al. found that children with asthma between the ages of 8 and 12 had higher rates of internalizing behavior and occurrences of rejection by peers, compared with non-asthmatic children (15).

Developmental research in children indicates that middle childhood, ages 8–12, is a particularly important period of development characterized by an increase in group identity and an increase in the amount of time spent with peers (16, 17). Peer interactions are integral to the development of self-esteem and communication skills (18). In a recent study, Slavic and colleagues found that neural sensitivity to social rejection may be associated with inflammatory responses to social stress and therefore increase susceptibility for those with inflammatory diseases (19). For children with a chronic inflammatory illness such as asthma, the social and peer-related experiences are further complicated, as they are adjusting not only to age-related developmental and milestone tasks, but also to the management of an illness that may impose social and/or medical burdens (e.g., use of metered-dose inhalers).

Research has shown that school-based asthma interventions have been implemented to varying degrees of success (20–25); but few studies have explored or utilized programmatic design elements or strategies that are specifically sensitive to the influence of peer interactions on management or psychosocial-related outcomes. Educational interventions generally fail to address the various elements of children's social environment—namely the influence of peer interactions.

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As children spend the majority of their time in a school setting, peer interactions are believed to strongly influence health behaviors and decision making (16). Most recently, we have seen the increase in report of the detrimental impact of negative peer interactions and suicides in mass media. To date, there has been little work that explicitly explores the influence of peer interactions and asthma-related psychosocial outcomes among children with asthma. Exploring these relationships may provide new insights into identification of the most appropriate communication and intervention strategies for addressing peer influences within school-based asthma intervention curriculums. The purpose of this exploratory study is to examine the association between peer interactions and emotional quality of life measures among urban, elementary-aged children with asthma. We hypothesize that children who report less supportive peer interactions will be more likely to experience poorer peer and emotional-related experiences.

METHODS

Data used in this analysis come from the baseline assessment of a randomized trial evaluating the effect of an urban school-based asthma program on asthma outcomes in elementary school-aged children. The educational intervention evaluated in the trial is detailed elsewhere (25). The study protocol was approved by the University of Michigan Institutional Review Board (IRB) and the Detroit Public Schools (DPS) system. Adult caregivers provided written informed consent for themselves and their minor child before the collection of any survey data; additionally, child assent was conducted before the completion of the child's interview.

Sample

Participants were elementary school-aged children ($N = 1085$) with symptoms of asthma enrolled in grades 3–5 at 14 elementary schools in Detroit, MI. The 14 schools were located in low-income neighborhoods in Northwest Detroit. At the time of this study, more than 40% of children enrolled in these elementary schools met federal guidelines for poverty. A strict study inclusion criteria based on National Asthma Education Prevention Program (NAEPP) asthma diagnosis and treatment guidelines (26) was used to enroll participants. The inclusion criteria included a physician's diagnosis of asthma and active symptoms; no physician's diagnosis, but reported presence of three or more of seven asthma symptoms in the past year; or the report of two exercise-related asthma symptoms with frequency of three times or more in the past year. A total of 6351 caregivers of all children enrolled in grades 2–5 at the 14 elementary schools were provided a survey form designed to identify asthma cases. A total of 4576 caregivers returned the case identification survey with sufficient data for analysis, of which 1217 children were identified for participation and 1085 completed baseline interviews for the randomized trial (25, 27).

Instruments

The child interview data were collected at the child's school by trained interviewers. The child survey included measures related to peer relationships and quality of life (25, 27, 28). The caregiver interview was used to capture self-reported data related to the child's asthma symptoms, asthma medications, and family and household demographic data including age, head of household, and household income.

Measures

Asthma Control. Asthma control was based on reports of the presence of daytime and nighttime symptoms in the previous 3 months, as provided in the parent interview. The control level was calculated by taking the worst of the day or night symptom control level. The NAEPP guidelines were used to classify the frequency of children's symptoms reported by caregivers in three categories: poorly controlled, not well controlled, or well controlled (26).

Asthma Severity Level. The frequency of daytime and nighttime symptoms experienced during the past 3 months was collected in the caregiver interview. The 3-month assessment was calculated to demonstrate a weekly assessment of symptom experience. The NAEPP guidelines were used to classify the frequency of children's symptoms reported by caregivers into four categories: severe persistent, moderate persistent, mild persistent, and mild intermittent (26).

Peer Interactions. The children's self-report of asthma-related peer interactions were measured by four items using a binary (yes/no) scale: "Do you talk to your friends about asthma?" "Do you think your friends understand how you feel about having asthma?" "Do your friends ever help you take care of your asthma?" and "Do other children ever laugh at you or tease you because of your asthma?"

Emotional Experiences. Items from the Juniper Pediatric Asthma Quality of Life Questionnaire were used to explore asthma-related emotional experiences of children (29). The questionnaire consists of 23 items in three dimensions (activity limitation, symptoms, and emotional function) and is measured by a 7-point Likert scale ranging from 1 (none of the time) to 7 (all of the time). Children were instructed to think about the impact of asthma-related emotional experiences during the past week. Only the emotional function items were used in this study. The items used in this study included the eight emotional function items associated with asthma in the past week. The Cronbach's α for the eight items in this sample was 0.78.

Other Measures. The children's self-report of taking asthma medication to school was captured by one item using a binary scale (yes/no): "Do you take your asthma medicine with you to school?" Emergency department utilization, educational performance, and household income data were self-reported by the child caregiver.

Data Analysis

Data analysis was performed using SPSS statistical software 18.0. Descriptive statistics including frequencies, means, and standard deviations were computed for all measures of interest using the caregiver (age, race/ethnicity, asthma symptoms, educational performance, emergency department use, household income, and medication use) and child self-reported (peer interactions at school) data. Data were analyzed using chi-square tests of independence and ANOVA to assess associations between peer interactions and asthma-related variables of interest. Logistic regression analysis was used to examine the impact of peer interactions on teasing about asthma in the sample, controlling for age, asthma control, educational performance, emergency department use, gender, and household income. A confidence level of 95% was accepted as significant.

RESULTS

Characteristics of Study Sample

A total of 835 children were included in this analysis based on completed baseline questionnaires with caregivers and children (paired interviews). As shown in Table 1, 97% of the children were African American and

53% were male. The children's age ranged between 6 and 12 years (mean age = 8.41, *SD* 1.3). Eighty percent of the children reported symptoms associated with intermittent asthma and 44% were taking a prescribed asthma medication, however, 31% had symptoms associated with "not very controlled" or "poorly controlled" asthma. Although 44% of students reported taking prescribed asthma medications, only 16% of those had controller medicines. Over half of the children (59%) had annual household incomes below \$20,000.

Asthma-Related Interactions with Peers by Females and Males

As shown in Table 2, 26% ($n = 195$) of the children reported talking to friends about asthma, 54% ($n = 400$) felt friends understood their feelings about their asthma, 22% ($n = 166$) had friends who helped take care of their asthma, and 12% ($n = 91$) reported being teased or laughed at about their asthma. Females were significantly more likely than males to talk to friends about asthma ($p < .05$). No differences between females and males were found regarding the report of friends understanding feelings about asthma, receiving help from friends in taking care of their asthma, or teasing because of asthma.

TABLE 1.—Characteristics of study sample.

Variable	Total sample ($N = 835$)	Male (N)	Female (N)	P -value
Race of child (% African American)	812 (97%)	428 (97%)	382 (98%)	ns
Gender				
Male	441 (53%)	—	—	—
Female	392 (47%)	—	—	—
Age in years (mean, <i>SD</i>)	8.41 (1.3)	8.44 (1.3)	8.36 (1.3)	ns
Age				
6–8 years	472 (57%)	247 (56%)	224 (57%)	ns
9–12 years	363 (43%)	194 (44%)	168 (43%)	ns
Asthma severity				
Mild intermittent	665 (80%)	347 (79%)	316 (81%)	ns
Mild persistent	79 (9%)	41 (9%)	38 (10%)	ns
Moderate persistent	58 (7%)	30 (7%)	28 (7%)	ns
Severe persistent	32 (4%)	23 (5%)	9 (2%)	ns
Asthma control				
Well controlled	580 (69%)	297 (67%)	281 (72%)	ns
Not well controlled	131 (16%)	70 (16%)	61 (16%)	ns
Very poorly controlled	124 (15%)	74 (17%)	50 (13%)	ns
Medication				
Takes asthma medication (# and % yes)	369 (44%)	215 (49%)	153 (39%)	ns
Controller (# and % yes)	137 (16%)	79 (18%)	58 (15%)	ns
Reliever (# and % yes)	357 (43%)	208 (47%)	148 (38%)	ns
Take asthma med to school (# and % yes)	135 (18%)	81 (20%)	54 (16%)	ns
Caregiver relationship to child				
Mother	720 (87%)	377 (86%)	341 (89%)	ns
Father	34 (4%)	24 (6%)	10 (3%)	.04
Grandmother	50 (6%)	25 (6%)	25 (6%)	ns
Other	21 (2%)	12 (2%)	9 (2%)	ns
Household income				
<\$20,000	452 (59%)	248 (60%)	204 (57%)	ns
\$20,001–\$40,000	185 (24%)	90 (22%)	95 (26%)	ns
\$40,001–\$60,000	91 (12%)	49 (12%)	42 (12%)	ns
\$60,001 and greater	45 (6%)	28 (7%)	17 (5%)	ns

Note: One-way ANOVA and chi-square tests were performed on demographics and variables of interest to identify differences between the groups.

TABLE 2.—Number and percentage of males and females reporting asthma-related interactions with peers.

Question	Total sample <i>N</i> (%)	Males (<i>N</i> , %)	Females (<i>N</i> , %)	χ^2 (<i>P</i> -value)
Do you talk to your friends about asthma? (yes)	195 (26)	92 (23)	103 (30)	4.54 (< .05)
Do you think your friends understand how you feel about having asthma? (yes)	400 (54)	204 (51)	196 (57)	2.86 (.09)
Do your friends ever help you take care of your asthma? (yes)	166 (22)	83 (21)	83 (24)	1.16 (.28)
Do other children ever laugh at you or tease you because of your asthma? (yes)	91 (12)	45 (11)	46 (13)	0.76 (.38)

Note: Data for those who reported "yes" to experiencing of peer interactions in the total sample (*N* = 835).

Asthma-Related Emotional Experiences by Females and Males

The mean scores for variables assessing asthma-related emotional experiences in females and males indicate a number of children felt frustrated, worried, angry, or irritable due to their asthma a little to some of the time (see Table 3). An examination of emotional feelings of frustration, worry, anger, irritability, fright, and discomfort associated with asthma over a week's time indicate females are significantly ($p < .05$) more likely than males to report feelings of worry, concern, or trouble; feeling different or left out; and frustration because they could

not keep up with others due to their asthma. Males were more likely to report feeling uncomfortable due to their asthma in the past week ($p < .05$). No other emotional-related significant differences between females and males were found.

Examination of Teasing about Asthma and Asthma-Related Peer Interactions

Logistic regression results examining the likelihood of asthma-related teasing associated with peer interactions after adjusting for age, asthma control, educational

TABLE 3.—Examination of mean differences in asthma-related emotional experiences during the past week in males and females.

	Males mean (SD)	Females mean (SD)
How often did your asthma make you feel FRUSTRATED during the past week?	3.84 (2.23)	4.03 (2.15)
How often did you feel WORRIED, CONCERNED, OR TROUBLED because of your asthma during the past week?	3.27 (2.07)	3.71 (2.14)**
How often did your asthma make you feel ANGRY during the past week?	3.23 (2.19)	3.44 (2.19)
How often did your asthma make you feel IRRITABLE during the past week?	3.31 (2.11)	3.56 (2.14)
How often did you feel DIFFERENT OR LEFT OUT because of your asthma during the past week?	3.55 (2.45)	3.50 (2.26)**
How often did you feel FRUSTRATED BECAUSE YOU COULDN'T KEEP UP WITH OTHERS during the past week?	3.55 (2.45)	3.50 (2.26)*
How often did your asthma make you feel UNCOMFORTABLE during the past week?	3.55 (2.45)	3.50 (2.26)*
How often did you feel FRIGHTENED BY AN ASTHMA ATTACK during the past week?	2.95 (2.26)	3.29 (2.29)

Note: The mean score reported is based on a 7-point Likert scale ranging from 1 (none of the time) to 7 (all of the time). Higher scores indicate worse or greater perception of emotionally related dysfunction in past week.

P-values: * $p < .05$, ** $p < .01$.

TABLE 4.—Adjusted odds ratio examining relationship between teasing about asthma and peer interactions controlling for age, asthma control, educational performance, emergency department use, gender, and household income.

	Teasing about asthma	
	OR (95% CI)	<i>P</i> -value
Peer-related interactions		
Talk to friends about asthma	2.47 (1.52, 3.99)	.001
Friends understand their asthma	1.00 (0.63, 1.60)	.99
Friends help with asthma	1.79 (1.07, 3.01)	.03
Take asthma medications to school	1.45 (0.81, 2.60)	.21

Note: All analyses control for age, asthma control, educational performance, emergency department use, gender, and household income.

OR, odds ratio; CI, confidence interval.

performance, emergency department use, gender, and household income are shown in Table 4. Findings indicate that those who talked to friends about asthma were more likely to experience teasing than those who did not talk to their friends about asthma (OR = 2.47; 95% CI 1.57, 3.89, $p = .001$). Children who reported that friends helped with asthma were also found to be more likely to report teasing (OR = 1.75; 95% CI 1.08, 2.83). In this study, neither the children who reported that friends understood their asthma nor those who took their asthma medications to school were found to be more likely to experience teasing about their asthma.

DISCUSSION

This study findings suggest peer interactions play an important role among children managing asthma within a school setting and underscore that some social interactions with peers, whether sought for support or as part of sharing and building of friendships or group membership, may incite negative asthma-related emotional responses and/or peer experiences. Given that a little more than 1 in 10 of the children in this study sample experienced teasing, it is important to determine which children are most at-risk for teasing due to their asthma. Furthermore, it may be of value to distinguish the impact of experiences with teasing due to disclosure of asthma status to friends.

Although some studies indicate that peer influences may not be strongly associated with behavioral decision making (4, 30, 31), the findings from this study suggest that perhaps for this age group (6- to 12-year-olds), setting (school-based), and cognitive developmental phase, peer influences are worthy of further investigation and consideration in the design and recommendations for disease management interventions and patient-provider communication. Given the developmental needs, specifically those of younger elementary-aged children who are managing a chronic illness, it may be beneficial for asthma interventions to explicitly address the potential effect of peer behavioral influences. More importantly, educational interventions may want to directly address peer group membership, interpersonal dynamics, and social support (e.g., instrumental as well as emotional support) within the context of asthma management through use of interactive role modeling of appropriate communication and coping strategies (31).

In this study, we found that about 1 in 4 children (26%) talked to friends about their asthma. There is little question that communicating about asthma status and emotional concerns to others, such as parents, care providers, and educators, is important for children managing asthma, however, some communication may have implications for peer interactions and possibly teasing. Chronic disease (e.g., type 1 diabetes) management research with children suggests peer support is of value in disease management (10–12). Study results suggest that peer support for children managing asthma in a school environment may be

insufficient and that further research is needed to identify strategies for improving not only the understanding of asthma, but asthma-related communication with peers.

Our findings indicating that females reported talking to friends about their asthma more than males are not surprising. It is important to note that differences in emotional quality of life were also found by gender, with females reporting more emotional-related concerns. Research indicates that males report less intimate exchange, less validation and caring, and less help and guidance in their friendships than females (32). Sharing one's asthma status with others might make children, both females and males managing asthma, vulnerable to negative or insensitive peer interactions that may influence adherence with asthma management. There appears to be a need for incorporation of effective health communication strategies that will assist children in identifying ways for not only disclosing asthma status to peers, but for addressing and coping with potentially negative emotional and social responses in interventions. Tailoring messages to the gender-specific peer communication styles may result in the design of more effective asthma management strategies (33). Communication strategies for effective and appropriate peer communication about illness diagnosis and management may also be needed and appropriate for children managing other chronic diseases, such as type 1 diabetes and epilepsy.

LIMITATIONS

There are several limitations to this exploratory study. First, there were children in our sample who were undiagnosed, however a strict case identification criteria based on the NAEPP asthma guidelines was used to confirm undiagnosed cases (25, 26). Although a significant finding of this exploratory study was that children who talk to their friends about asthma reported being teased more about their asthma. The measures used do not clarify nor capture definitions of the terms (i.e., "friends") within a children's sample; therefore we do not know how the peer interaction terms are defined by the sample. Additionally, we cannot clearly define the child's expectations of the peer relationship or the importance or potential influence of the peer relationship referenced by a child in answering the study questions. This is important and necessary to examine in future research. However, careful attention to identify school setting relationships and peer interactions was made in the framing of all survey questions. Also related to this is the need to identify classification and definitions used by children for asthma-related constructs such as anger, sadness, worry, and frustration. Although the measures used in this study have been carefully tested in the development of the Juniper Pediatric Asthma Quality of Life Questionnaire (29), there is a need for completion of cognitive interviews or additional psychometric testing to better identify the meaning and interpretation of emotional concepts and terms within an elementary-aged population. In this study, we used the

8 emotional domain items with a Cronbach's α of 0.78. Due to the small number of children in our sample that reported teasing, we suspect that our findings concerning the associations with peer interactions may in fact be underestimated. Larger samples may give more robust indicators of these associations. Finally, the sample was predominately African American, therefore these findings may not be generalizable to other populations of children with asthma.

It is important to note that a relatively small number of children with asthma in this study sample talked about their asthma with their friends, which could present a missed opportunity for positive peer social and asthma management support. Notwithstanding these limitations, future research is needed to (i) assess the occurrence of teasing due to asthma status, (ii) identify the influence of peer interactions on adherence to asthma management, and (iii) inform the design of more appropriate and effective peer-relationship communication strategies for inclusion in asthma management interventions.

CONCLUSIONS

The findings reported here suggest peer interactions deserve attention and that children with asthma may need assistance in adoption of strategies for communication about their asthma to prevent negative peer interactions, that is, exposure to unsupportive peer feedback such as teasing. Addressing peer interactions among children managing asthma in a school environment may help to reduce negative emotional asthma-related experiences and result in better asthma management and long-term asthma outcomes.

ACKNOWLEDGMENTS

We thank Dr. Noreen M. Clark for her review and for allowing us to conduct this study using the Partnership to Control Asthma in Public Schools data. We thank Dr. Mary Janevic and Ms. Margaret Wilkin for their review and thoughtful feedback. The study presented here was supported by the Lung Division of the National Heart, Lung, and Blood Institute grant HR-56028.

DECLARATION OF INTEREST

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

REFERENCES

1. US Department of Health and Human Services. Centers for Disease Control and Prevention, Atlanta, GA. Summary health statistics for US adults: National Health Interview Survey, 2009, Tables 3, 4. Available at: <http://www.cdc.gov/HealthyYouth/asthma/index.html>. Accessed on 22 October 2010.
2. National Center for Health Statistics. Summary Health Statistics for US Children: National Health Interview Survey, 2008. Table 1. Series 10, No. 244. US Department of Health and Human Services. Centers for Disease Control and Prevention. Hyattsville, MD. DHHS Publication No. (PHS) 2010-1572. Available at: http://www.cdc.gov/nchs/data/series/sr_10/sr10_244.pdf. Accessed on 22 October 2010.
3. Kamble S, Bharmal M. Incremental direct expenditure of treating asthma in the United States. *J Asthma* 2009; 45:73–80.
4. Chen E, Chim LS, Strunk RC. The role of the social environment in children and adolescents with asthma. *Am J Respir Crit Care Med* 2007; 176:644–649.
5. Mangan JM, Wittich AR, Gerald LB. The potential for reducing asthma disparities through improved family and social function and modified health behaviors. *Chest* 2007; 132:789S–801S.
6. Bender BG, Annett RD, Ikke D. Relationship between disease and psychological adaptation in children in the childhood asthma management program and their families. *Arch Pediatr Adolesc Med* 2000; 154:706–713.
7. Zbikowski SM, Cohen R. Parent and peer evaluations of the social competence of children with mild asthma. *J Appl Dev Psychol* 1998; 19:249–265.
8. La Greca AM. Social consequences of pediatric conditions: fertile area for future investigation and intervention. *J Pediatr Psychol* 1990; 15(3):285–307.
9. Graetz B, Shute R. Assessment of peer relationships in children with asthma. *J Pediatr Psychol* 1995; 20:205–216.
10. Varni JW, Babani L, Wallander JL. Social support and self-esteem effects on psychological adjustment in children and adolescents with insulin-dependent diabetes mellitus. *Child Fam Behav Ther* 1989; 11:1–17.
11. La Greca AM. Peer influences in pediatric chronic illness: an update. *J Pediatr Psychol* 1992; 17:775–784.
12. La Greca AM. Peer relations of youth with pediatric conditions and health risks: promoting social support and healthy lifestyles. *Dev Behav Pediatr* 2002; 23:271–280.
13. Clark NM, Dodge JA, Thomas LJ, Andridge RR, Awad D, Paton JY. Asthma in 10- to 13-year-olds: challenges at a time of transition. *Clin Pediatr* 2010; 49(10):931–937.
14. Dinakar C, Brimer AG, Adams CD. Social perceptions and preferences of youth with asthma. *Mo Med* 2006; 103:553–556.
15. Roder I, Kroonenberg PM, Boekaerts M. Psychosocial functioning and stress-processing of children with asthma in the school context: differences and similarities with children without asthma. *J Asthma* 2003; 40:777–787.
16. Neumark-Sztainer D. The social environments of adolescents: associations between socioenvironmental factors and health behaviors during adolescence. *Adolesc Med* 1999; 10:41–55.
17. Parker JG, Gottman JM. Social and emotional development in a relational context. In: Bernt TJ, Ladd GW, eds. *Peer Relationships in Child Development*. Somerset, NJ: John Wiley and Sons, 1989.
18. Damon W, Phelps E. Strategic uses of peer learning in children's education. In: Bernt TJ, Ladd GW, eds. *Peer Relationships in Child Development*. Somerset, NJ: John Wiley and Sons, 1989.
19. Slavich GM, Way BM, Eisenberger NI, Taylor SE. Neural sensitivity to social rejection is associated with inflammatory responses to social stress. *Proc Natl Acad Sci U S A* 2010; 107(33):14817–14822.
20. Levy M, Heffner B, Stewart T. The efficacy of asthma case management in an urban school district in reducing school absences and hospitalizations for asthma. *J School Health* 2006; 76:321–324.
21. Gerald LB, Redden D, Wittich AR. Outcomes for a comprehensive school-based asthma management program. *J School Health* 2006; 76:292–296.
22. Bartholomew LK, Sockrider M, Abramson SL. Partners in school asthma management: evaluation of a self-management program for children with asthma. *J School Health* 2006; 76:283–290.
23. Splett PL, Erickson CD, Belseth SB. Evaluation and sustainability of the healthy learners asthma initiative. *J School Health* 2006; 76:276–282.
24. Evans D, Clark NM, Feldman CH. A school health education program for children with asthma aged 8–11 years. *Health Educ Q* 1987; 14:267–279.

25. Clark NM, Brown R, Joseph CL, Anderson EW, Liu M, Valerio MA. Effects of a comprehensive school-based asthma program on symptoms, parent management, grades, and absenteeism. *Chest* 2004; 125:1674–1679.
26. US Department of Health and Human Services. Guidelines for the diagnosis and management of asthma. Expert Panel Report 3. Hyattsville, MD: National Asthma Education and Prevention Program (NAEPP), 2007.
27. Clark NM, Brown R, Joseph CL, Anderson EW, Liu M, Valerio M, Gong M. Issues in identifying asthma and estimating prevalence in an urban school population. *J Clin Epidemiol* 2002; 55:870–881.
28. Clark NM, Gong M, Kaciroti N. A model of self-regulation for control of chronic disease. *Health Educ Behav* 2001; 28:769–782.
29. Juniper EF, Guyatt GH, Feeny DH. Measuring quality of life in children with asthma. *Qual Life Res* 1996; 5:35–46.
30. Lau R, Quardrel M, Hartman K. Development and change of young adults' preventive health beliefs and behavior: influence from parents and peers. *J Health Soc Behav* 1990; 31:240–259.
31. Ladd GW. Friendship patterns and peer status during early and middle childhood. *J Dev Behav Pediatr* 1988; 9:229–237.
32. Parker JG, Asher SR. Friendship and friendship quality in middle childhood: links with peer group acceptance and feelings of loneliness and social dissatisfaction. *Dev Psychol* 1993; 29:611–621.
33. Siegel M, Doner L. *Marketing Public Health: Strategies to Promote Social Change*. Sundbury, MA: Jones and Bartlett Publishers, 2007.

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