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Food Allergy-Related Bullying and Associated Peer Dynamics Among Black and White Children in FORWARD Study

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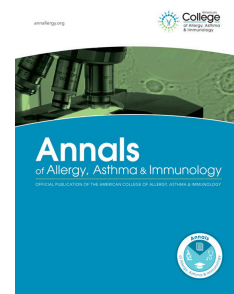
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Conflict of Interest:

Dr. Gupta receives research grant support from The National Institutes of Health (NIH), Food Allergy Research & Education (FARE), Stanford Sean N. Parker Center for Allergy Research, UnitedHealth Group, Thermo Fisher Scientific, Genentech, and the National Confectioners Association (NCA); and has served as a medical consultant/advisor for Aimmune Therapeutics, Genentech, Before Brands, Kaléo, DBV Technologies, ICER, DOTS Technology, and Food Allergy Research and Education (FARE).

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Dr. Pappalardo serves on the Chicago Asthma Consortium Board of Directors and as a consultant for Optum Rx/United Health Group.

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Abbreviations/Acronyms:

FA: Food allergy

US: United States

EAP: Emergency action plan

NIH: National Institutes of Health

EAI: Epinephrine auto-injector

CDC: Centers for Disease Control and Prevention

CPS: Chicago Public Schools

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Background: The experiences of Black children with food allergy (FA) are not well characterized, particularly with respect to bullying victimization and other psychosocial outcomes.

Objective: To examine bullying experiences of Black and White children with FA, as well as associations with peer relationships, anxiety and school policies.

Methods: Surveys were administered to parents of 252 children with physician- diagnosed FA enrolled in the multi-site FORWARD cohort. Surveys assessed demographics, atopic disease, bullying victimization, and school FA management practices and policies. Descriptive statistics of bullying by race were compared via chi-

squared tests. Multiple logistic regression analyses adjusting for race, age, parental education, household income, child gender and multi-FA compared adjusted probabilities of bullying victimization by school policies.

Results: Nearly 20% of school-aged children were bullied for FA with no significant racial differences overall, though for children ages 11 and up, Whites reported higher rates of bullying. However, Black children experienced non FA-related bullying twice as frequently as White children (38.6% vs. 17.7%; $p=.002$). The majority (85.7%) of caregivers who intervened in their child's bullying reported it was helpful. Among parents, 17.3% reported they were teased/bullied due to their child's FA. Over half of respondents (54.8%) reported that some allergens are banned from their child's school, most commonly peanut. In schools banning peanuts, FA-related bullying was less-frequently reported by all food-allergic students.

Conclusion: Bullying due to FA is common and caregivers, medical professionals and school administrators can help reduce bullying by screening for bullying and supporting and educating school policies.

INTRODUCTION

Food allergy (FA) is a growing public health concern and can place substantial psychosocial burden on children and their families.¹ The impact on food-allergic children and their families is extensive and can impair quality of life.² Considering the amount of time children spend engaged in school-related activities, appropriate management of FA is pivotal to their safety and well-being.³ Additionally, emerging literature reveals FA-related bullying victimization is remarkably common and may lead to distress and anxiety.⁴

Recent studies estimate that 8% of children in the United States (US) are food-allergic.⁵ Beyond the physical manifestations of FA, allergen avoidance behaviors essential to FA management may also lead to social isolation, depression, anxiety, and other forms of psychological distress, which bullying may exacerbate.⁶ In a 2013 study, 31.5% of food-allergic children reported bullying related to FA and 24.7% of parents reported their child was victimized by such bullying.⁷ A 2010 cross-sectional survey of 353 FA conference attending teens and young adults (up to age 25) found that 35.2% had been bullied, teased, or harassed as a result of FA.⁸ Of those, 85.9% reported that the bullying happened more than once.⁸ Although the reasons for negative peer experiences varied, the majority of respondents indicated that they were bullied solely due to FA; other reported reasons were having to carry medication or being placed in distinct groups to prevent exposure to the allergen.⁸

Studies indicate that teachers may not be fully aware of the psychosocial challenges of children with FA, and only half of teachers in a recent study knew that food-allergic students were at a greater risk of bullying.^{9,10,11} Although the consequences of FA-related bullying are becoming more understood, research on parental responses to FA-related bullying, the impact of bullying

on child peer relationships and anxiety, as well as relationships between school FA management policies and bullying warrant further investigation. In addition, to the knowledge of the authors, this is the first study to examine and conduct a statistical analysis on the effect of race in regard to FA-related bullying. The present study examines the bullying-related experiences of a socioeconomically and geographically diverse sample of food-allergic Black and White children, in addition to the association between FA-related bullying and school-level FA policies.

METHODS

FORWARD is a prospective multi-center cohort study, initiated to examine racial differences in the natural history of FA among Black and White children. We also sought to study other effects of FA among these children and their families, given the under-representation of Black families in existing FA-related psychosocial research. Children 12 years of age and younger at study enrollment who had allergist-diagnosed IgE-mediated FAs and were identified as of either Non-Hispanic Black or Non-Hispanic White race were recruited from allergy clinics affiliated with Northwestern University, including Ann & Robert H. Lurie Children's Hospital of Chicago, Rush University Medical Center, Cincinnati Children's Hospital Medical Center, and Children's National Hospital in Washington, DC. Upon enrollment, parents/guardians of food-allergic children provided written consent and completed electronic surveys at intake and quarterly for 24 months after enrollment. Bullying was assessed via parent-reported questionnaire (eFigure 1) administered at 9- and 21-month follow-up. For individuals with multiple completed questionnaires, the most recent available responses were utilized. All study activities were approved by each center's Institutional Review Board.

Child peer relationships were assessed via the Parent-Proxy Peer Relationships Scale, published by the National Institutes of Health (NIH) Patient-Reported Outcomes Measurement Information System (PROMIS). Similarly, child anxiety was assessed via the parent-report NIH PROMIS Emotional Distress—Anxiety scale.¹² These questionnaires were administered at 12- and 24-month follow-up. Items for each scale are rated on a 5-point Likert scale (1 = “Never” to 5 = “Always”); higher scores indicate better peer relationships and greater anxiety. For individuals with responses at both waves, mean scores were calculated for all items with multiple measurements; mean composite scores were also calculated for all individuals with multiple completed PROMIS surveys. Both scales demonstrated excellent internal consistency (PROMIS Peer Relationships scale Cronbach’s $\alpha=.95$; PROMIS Emotional Distress-Anxiety scale Cronbach’s $\alpha=.90$). Confirmatory factor analyses of each scale confirmed that unifactorial models provided excellent fit to the data (Comparative Fit Indices $\geq.950$; Standardized Root Mean Squared Residuals $<.05$).

Descriptive counts and proportions were calculated to summarize key study variables. Chi-squared (X^2) tests assessed the magnitude of unadjusted associations between participant characteristics (e.g., race, age), parental education, household income and bullying, peer relationships and anxiety, with 2-sided $p<.05$ indicative of statistically significant relationships. Standardized T-scores were calculated for each PROMIS instrument using the *HealthMeasures* Scoring Service. Multiple logistic regression models estimated covariate adjusted effects of sociodemographic and allergic disease characteristics on bullying victimization. Furthermore, while the presented data focus exclusively on Black and White children due to the design of the FORWARD cohort, as of Fall 2020 this cohort also began enrolling Latinx children with FA. This recent expansion of the sampling frame of the FORWARD study to include Latinx patients

will facilitate further racially/ethnically inclusive data collection and enhance the external validity of the resulting findings.

RESULTS

Demographic Characteristics

Data were collected from 252 parents/guardians of food-allergic children who met inclusion criteria and also completed a bullying questionnaire. Nearly two-thirds (62.3%) of children were male and the majority identified as Non-Hispanic White (73.4%) (See Table 1). More than half (54.4%) of enrolled children were 4-10 years old and 20.4% were 11 years or older at the most recent study assessment period (Winter/Spring 2020). The most common FAs among all children were peanut (68.8%) and tree nut (58.5%). Multiple FAs were reported for 72.2% of children.

Significant differences in parental education and annual household income were reported across the two racial groups within our sample ($p<.001$). More than two-thirds (67.9%) of all White respondents reported having attained either a Bachelor's or Master's degree in comparison to 44.2% of Black respondents. Additionally, almost three-quarters (74.1%) of White respondents indicated an annual household income of $\geq \$100,000$ vs. the majority of Black respondents who reported annual household income of $< \$50,000$ (60.7%).

Bullying

As seen in Table 2, 18.7% of all parents of children 4-15 years old reported that their food-allergic child had been bullied due to their FA and 24.1% reported that the child had been bullied for reasons other than FA. FA-related bullying was most commonly reported among older children, affecting 33.3% of children at least 11 years old versus 13.2% of children 4-10 years

old. No significant racial differences in FA-related bullying prevalence were identified overall (20.0% of White participants vs. 15.6% of Black participants; $X^2(1_{df})=.46$; $p=.50$); however, among children ages 11 and up, rates were significantly higher among White participants (44.8% vs. 18.2% of Black participants; $X^2(1_{df})=4.0$; $p=.046$). In contrast, bullying unrelated to FA was higher among Black children (38.6%), lower in White children (17.7%) and significantly different between the 2 groups for all ages; $X^2(1_{df})=9.5$; $p=.002$.

Overall, 14.4% of respondents reported that the child had disclosed being bullied to their parent/guardian, with similar rates reported for Black (15.4%) and White (12.3%) participants; $X^2(1_{df})=0.3$; $p=.58$. Black parents were more likely than White parents to report taking actions to address their child's bullying via all assessed modalities (see Table 2). The greatest racial differences were found with respect to *speaking with the offender or offender's parent*, $X^2(1_{df})=12.8$; $p<.001$). All parents reported that it was helpful if they did something to stop the bullying, but benefit was more likely to be reported by Black parents (93.3% of Black parents vs. 81.5% of White parents); $X^2(1_{df})=1.1$; $p=.29$.

In addition, questions about whether parents themselves had experienced bullying due to their child's FA were assessed. Overall, 17.3% reported they had been made fun of or teased, including 20.7% of White parents and 6.9% of Black parents, $X^2(1_{df})=7.2$; $p=.004$. Within our sample, the most common sources of parental FA-related bullying were the parent of another child (9.6%) and/or another family member (9.5%).

Child Peer Relationships and Anxiety

For both PROMIS instruments administered in this study, a T-score of 50 corresponds to the mean for the US general pediatric population with a population-level standard deviation of 10.

The mean T-score observed within the entire sample on the peer relationships scale was 50.0 (SD = 9.1); which is “good” according to the PROMIS score cut points (T-score range 40-60). The mean T-score value for this sample at baseline on the anxiety measure was 51.4 (SD = 9.3), which fell within “normal” limits (T-score < 55).

Parental perceptions of child peer relationships and anxiety were analyzed for children ages 4-15 (Table 3). The mean composite peer relationship scores for all children with FA-related bullying and for children who were bullied for other reasons showed no significant differences when compared to children without such bullying ($p_{\text{FA-related bullying}}=.73$, $p_{\text{Non FA-related bullying}}=.19$). White respondents scored significantly higher on the item, “My child was able to count on his/her friends,” than Black respondents ($M_{\text{White}}=4.33$, $SD=.67$, $M_{\text{Black}}=3.98$, $SD=.96$; $p=.03$). There were no significant differences in composite peer relationship scores when comparing White and Black respondents with FA-related bullying and White and Black respondents with non-FA related bullying. Moreover, mean scores for both White and Black respondents indicated an overall perception of “good” child peer relationships.

Significantly higher child anxiety scores were observed from parents who reported that their child experienced both FA-related bullying and bullying for other reasons when compared to those without report of either type of bullying ($M_{\text{Yes, FA-related bullying}}=2.25$, $SD=.88$, $M_{\text{No FA-related bullying}}=1.87$, $SD=.61$; $p=.02$; $M_{\text{Yes, other bullying}}=2.18$, $SD=.88$, $M_{\text{No other bullying}}=1.87$, $SD=.60$; $p=.04$). Black respondents scored significantly higher on the “My child felt nervous” and “My child felt worried” items than White respondents ($p=.02$ for both). There were also no significant differences in composite anxiety scores when comparing White and Black respondents with FA-related bullying and White and Black respondents with non-FA related bullying. When analyzing

the effects of bullying, the observed peer and anxiety relationships remained consistent after adjusting for age, sex, parental education, income, and presence of non-FA-related bullying.

School-Level FA Management

Among those participants with complete data for school management, bullying, and PROMIS surveys (n=82), 30.5% of children were in daycare or preschool, 57.3% were in elementary or middle school, and 1.2% were high school students (Table 4). Of this sample, half of White students (50.0%) and more than three-fourths (76.2%) of Black students attended public school. Moreover, 48.1% of White students and 14.3% of Black students attended private school.

Roughly all respondents reported that they had discussed FA management and had written FA management documents on file at their child's school (97.3% discussed and 98.6 written documents). Ninety-two percent of respondents reported that their child had their own epinephrine auto-injector (EAI) at school, yet only 26.0% reported that stock epinephrine was available in case of an emergency, and 43.8% were unsure. Additionally, more than half (54.8%) of respondents reported that some foods were not allowed in their child's school due to FA. Of those respondents, 97.5% reported that peanuts were not allowed and 75.0% reported that tree nuts were not allowed. When asked if allergen-free lunch areas were available for students with FA, 48.1% of White respondents and 19.1% of Black respondents reported yes, and 40.4% of White respondents and 38.1% of Black respondents reported no. Of those respondents who said yes, peanut-free tables and dairy-free tables were the most commonly reported allergen-free lunch areas available in schools (89.7% and 82.8%, respectively).

Associations

As indicated in Table 5, we examined adjusted associations for any FA-related bullying and any non-FA-related bullying. Children greater than 11 years of age were significantly more likely to report any FA-related bullying (OR: 4.57; CI: 1.86 - 11.27) and report telling their parents that they were bullied (OR: 4.90; CI: 1.90 - 12.61) in comparison to children 4-11 years old. Children with egg allergy were also significantly more likely to experience any FA-related bullying (OR: 3.22; CI: 1.25 - 8.32), any non-FA-related bullying (OR: 2.58; CI: 1.13 - 5.86), and inform their parents that they were bullied (OR: 3.25; CI: 1.17 - 9.06), in comparison to children without egg allergy.

DISCUSSION

Bullying is widely defined as repeated, unwanted, aggressive behavior that involves a real or perceived power imbalance.¹³ The power imbalance may be physical or psychological, and the aggressive behaviors may be verbal, social, physical, and/or psychological. Studies have reported bullying rates of 17% to 35% among school-aged children.¹⁴⁻¹⁷ This study extends previous work by evaluating the differences between races associated with FA-related bullying. Our results indicated that 1 in 5 school-aged children in our sample experienced bullying solely due to their FA. No significant racial differences regarding FA-related bullying were identified overall; though for children ages 11 and up, Whites reported higher rates of bullying. However, significant differences were observed concerning bullying for reasons other than FA, as Black participants experienced bullying at a rate of more than twice that of White participants. Parents who knew their child was being bullied and subsequently did something to stop the bullying reported that it was helpful in the majority cases. Black parents were more likely than White parents to address their child's bullying. When considering peer dynamics among children with

FA, no significant racial differences among mean composite peer relationship scores or mean composite anxiety scores were found.

To effectively manage FA, lifestyle changes often include strict food monitoring and preparation, carrying medical equipment (e.g., EAI), and being placed in special groups and/or excluded from food-related activities, which may predispose children to bullying.^{7,8} Children with FA have experienced a variety of threats in school including verbal threats of allergen exposure, being touched by an allergen, having an allergen thrown or waved at them, and/or intentional cross-contact of their food with an allergen.^{7,8} These events could lead to life-threatening allergic reactions and additional emotional distress.

The lived experiences of school-aged children with FA are becoming better understood and many studies have identified associations between FA and peer dynamics. Among participants who had experienced FA-related bullying, 65.7% expressed sadness or depression and 64.2% indicated feelings of embarrassment or humiliation.⁸ Among the present cohort, parent-proxy report of child peer relationships and anxiety were slightly better among children with no FA-related bullying; however, mean composite scores for child peer relationships and anxiety were generally favorable. It has been previously found that parental knowledge of bullying is linked with less distress and greater quality of life in food allergic children.⁷ This was also true in our cohort; 85.7% of parents with a child aged 4-15, reported it was helpful if they did something to stop their child from being bullied.

Due to the amount of time children spend in school-related activities, there is a critical need for managing both the medical and social aspects of FA in schools.¹⁸ A balance must be reached when considering how to safely manage FA in schools without physically isolating children with

FA.¹⁹ Children with FA who are separated from their peers may have increased anxiety and lessened social skills, making them more susceptible to bullying and its psychological effects.^{17,20} Parents of children with FA also experience vulnerability and anxiety during their child's transition to school. Their concerns include their child's safety and other parents' negative attitudes towards FA.²¹ Currently, there are no well-controlled studies assessing the rates of allergen exposures or reactions between schools with and without school-wide allergen restriction policies, and no policy has been associated with a complete absence of allergic reactions.^{9,22}

The psychosocial impact of daily FA management and FA-related bullying is far-reaching. Schools have the responsibility to ensure that children with FA feel safe, thereby empowering them to focus on learning rather than risk management. Students should also feel included in social activities, a fundamental experience that supports socioemotional development. Multiple studies have indicated that educational interventions to ensure properly trained school personnel are crucial in FA management.^{10,23,24-26} Schools could consider implementing policies to help children feel safe from allergen exposure and confident that allergic reactions will be treated appropriately. For example, school nurses could instruct all teachers on best practices for FA safety rather than just teachers who have children with FA in their classroom. Policies regarding allergen exclusion from classrooms, parties, and other events could be implemented across the entire school rather than isolated to classrooms with children with FA. With robust anti-bullying policies, these allergy-related policies would lessen the risk of children with FA being blamed for such policies, while also promoting safety and social inclusion.

Medical professionals who work with FA patients can also play a role in reducing the psychosocial impact of FA in general, and bullying specifically, by routinely educating families

about school FA policies that promote safety and social inclusion, the benefits of having a school FA management plan on file, and the possibility that FA-related bullying could occur. Furthermore, medical professionals can assess the school and peer experiences of their FA patients during appointments and encourage parents to speak with school officials when needed. Clinicians should use open-ended queries about patient experiences that do not require children to specifically label their experiences as bullying. In addition to clinician intervention, parental mediation can also help decrease FA-related bullying. Among our sample, we found that when parents interfered, it was helpful in over three-fourths of all cases indicating that parents can play a greater proactive role in bullying.

Strengths of the present study include its clinically-recruited sample, which is likely more generalizable to the broader FA population than previous work that has largely relied upon convenience samples. The FORWARD study's prospective cohort design also allows repeated assessment of key outcomes of interest, resulting in reduced measurement error. However, the fact that not all constructs examined in this study were assessed concomitantly is also a limitation, given the relatively high rates of missing data within the cohort for any given survey assessment. It is important to note, however, that missing data is addressed via ongoing participant outreach to encourage survey completion. As the cohort ages, this will permit further examination of change in FA-related bullying and other peer dynamics over time. Perspectives of high school-aged youth with FA are lacking in the present study, due to its inclusion criteria. Other limitations of the study include reliance on parent-proxy report of child bullying, which may not be fully indicative of the child's experiences. Similarly, the description of school-level policies was based upon parent-report and therefore may be inaccurate. Nevertheless, future

work should consider building upon the present work by incorporating multi-modal assessment of bullying and school-level policies for more accurate and reliable perspectives.

Increasing school policy awareness for parents and greater educational FA awareness for students is critical. While we found that most parents reported previously discussing FA management with their child's school, over 40% were unsure if stock epinephrine was available in case of emergency and one in five were unsure if there were allergen-free areas for students with FA to eat lunch. Thus, schools need to make sure FA-management discussions are intentional and that parents understand school FA-related policies. Moreover, schools, parents, and food allergic children should work together to educate the school community about FA. If students (and caregivers) understand the potential severity of FA and its burden on affected students, as well as ways to support students with FA, this may help reduce FA-related bullying. A previous study indicated that using peer-developed educational videos improved FA knowledge among elementary to high school-aged children.²⁷ After watching the videos, the majority of students reported that they learned something new about FA, could identify common food allergens, and increased their knowledge regarding FA symptoms.²⁷ Awareness of FA leads to accommodation and acceptance, which may reduce the social exclusion that would otherwise be magnified in youth during this psychologically and sociologically formative time in their lives.^{28,29}

In sum, this study found that both White and Black children experience FA-related bullying at comparable rates, with older children experiencing more FA-related bullying than younger children. Also for older children, Whites reported higher rates of bullying. Additionally, Black parents were more likely than White parents to address their child's bullying. Bullying experiences were relatively unrelated to parent reports of child anxiety or peer experiences,

266 although these were poorer among children who experienced FA-related bullying. Further
267 research is needed that directly assesses children's perspectives about their experiences of school
268 FA policies and bullying. School policies have the potential to positively impact the experiences
269 of their students with FA if they enact school wide policies that are socially inclusive.

References:

1. Warren CM, Jiang J, Gupta RS. Epidemiology and Burden of Food Allergy. *Curr Allergy Asthma Rep.* 2020;20(2):6.
2. Warren CM, Otto AK, Walkner MM, Gupta RS. Quality of Life Among Food Allergic Patients and Their Caregivers. *Current Allergy and Asthma Reports.* 2016;16(5):38.
3. Gupta RS, Rivkina V, DeSantiago-Cardenas L, Smith B, Harvey-Gintoft B, Whyte SA. Asthma and Food Allergy Management in Chicago Public Schools. *Pediatrics.* 2014;134(4):729-736.
4. Egan M, Sicherer S. Doctor, my child is bullied: food allergy management in schools. *Current Opinion in Allergy and Clinical Immunology.* 2016;16(3):291-296.
5. Gupta RS, Springston EE, Warrier MR, et al. The prevalence, severity, and distribution of childhood food allergy in the United States. *Pediatrics.* 2011;128(1):e9-17.
6. Cummings AJ, Knibb RC, King RM, Lucas JS. The psychosocial impact of food allergy and food hypersensitivity in children, adolescents and their families: a review. *Allergy.* 2010;65(8):933-945.
7. Shemesh E, Annunziato RA, Ambrose MA, et al. Child and parental reports of bullying in a consecutive sample of children with food allergy. *Pediatrics.* 2013;131(1):e10-17.
8. Lieberman JA, Weiss C, Furlong TJ, Sicherer M, Sicherer SH. Bullying among pediatric patients with food allergy. *Ann Allergy Asthma Immunol.* 2010;105(4):282-286.
9. Wang J, Bingemann T, Russell AF, Young MC, Sicherer SH. The Allergist's Role in Anaphylaxis and Food Allergy Management in the School and Childcare Setting. *J Allergy Clin Immunol Pract.* 2018;6(2):427-435.
10. Polloni L, Lazzarotto F, Toniolo A, Ducolin G, Muraro A. What do school personnel know, think and feel about food allergies? *Clinical and Translational Allergy.* 2013;3(1):39.
11. Polloni L, Gini G, Fiore G, et al. Bullying risk in students with food allergy: schoolteachers' awareness. *Pediatric allergy and immunology.* 2015;27(2):225-226.
12. Irwin DE, Gross HE, Stucky BD, et al. Development of six PROMIS pediatrics proxy-report item banks. *Health Qual Life Outcomes.* 2012;10:22.
13. stopbullying.gov. What Is Bullying. <https://www.stopbullying.gov/bullying/what-is-bullying>. Accessed July 24, 2020.
14. Winsper C, Lereya T, Zanarini M, Wolke D. Involvement in bullying and suicide-related behavior at 11 years: a prospective birth cohort study. *J Am Acad Child Adolesc Psychiatry.* 2012;51(3):271-282.e273.
15. Solberg ME, Olweus D. Prevalence estimation of school bullying with the Olweus Bully/Victim Questionnaire. *Aggressive Behavior.* 2003;29(3):239-268.
16. Kyriakides L, Kaloyirou C, Lindsay G. An analysis of the Revised Olweus Bully/Victim Questionnaire using the Rasch measurement model. *Br J Educ Psychol.* 2006;76(Pt 4):781-801.
17. Nansel TR, Overpeck M, Pilla RS, Ruan WJ, Simons-Morton B, Scheidt P. Bullying behaviors among US youth: prevalence and association with psychosocial adjustment. *JAMA.* 2001;285(16):2094-2100.
18. Erb N, McHugh S, Wolk H. School-Based Policy for Students with Chronic Conditions: Analysis and Recommendations for Advocacy Targets in Illinois. *University of Michigan.* 2013.

19. Sicherer SH, Mahr T. Management of food allergy in the school setting. *Pediatrics*. 2010;126(6):1232-1239.
20. Ravid NL, Annunziato RA, Ambrose MA, et al. Mental health and quality-of-life concerns related to the burden of food allergy. *Immunol Allergy Clin North Am*. 2012;32(1):83-95.
21. Sanagavarapu P, Said M, Katelaris C, Wainstein B. Transition to School Anxiety for Mothers of Children with Food Allergy: Implications for Educators. *Australasian Journal of Early Childhood*. 2016;41(4):115-122.
22. Bartnikas LM, Huffaker MF, Sheehan WJ, et al. Impact of school peanut-free policies on epinephrine administration. *J Allergy Clin Immunol*. 2017;140(2):465-473.
23. Gregory NL. The case for stock epinephrine in schools. *NASN Sch Nurse*. 2012;27(4):222-225.
24. Sasaki K, Sugiura S, Matsui T, et al. A workshop with practical training for anaphylaxis management improves the self-efficacy of school personnel. *Allergology International*. 2015;64(2):156-160.
25. Stukus DR. Peanut-free schools: What does it really mean, and are they necessary? *J Allergy Clin Immunol*. 2017;140(2):391-392.
26. Kao LM, Wang J, Kagan O, et al. School nurse perspectives on school policies for food allergy and anaphylaxis. *Ann Allergy Asthma Immunol*. 2018;120(3):304-309.
27. Jiang J, Gallagher JL, Szkodon JW, et al. The development and evaluation of peer food allergy education videos for school-age youth. *Annals of Allergy, Asthma & Immunology*. 2019;123(1):107-108.
28. Dean J, Fenton NE, Shannon S, Elliott SJ, Clarke A. Disclosing food allergy status in schools: health-related stigma among school children in Ontario. *Health Soc Care Community*. 2016;24(5):e43-52.
29. Papalia DE, Olds SW, Feldman RD. *A child's world: Infancy through adolescence*. McGraw-Hill New York; 1990.

Table I. Demographic Characteristics Among Children Surveyed with Food Allergy (among those with completed bullying questionnaire)

	All Participants		White Participants		Black Participants		
Characteristic	N	%	N	%	N	%	X²; P VALUE
Age							
<4	63	25.2	53	29	10	14.9	X ² (2df)=10.9; p=.004
4-11	136	54.4	101	55.2	35	52.2	
>11	51	20.4	29	15.9	22	32.8	
Gender							
Male	157	62.3	114	61.6	43	64.2	X ² (1df)=.14; p=.71
Female	95	37.7	71	38.4	24	35.8	
Race							
White or Caucasian	185	73.4	185	100	0	0	
Black or African-American	67	26.6	0	0	67	100	
Type of Food Allergy							
Peanut	174	68.8	127	68.7	47	70.2	X ² (1df)=.05; p=.82
Milk	67	26.5	54	29.2	13	19.4	X ² (1df)=2.4; p=.12
Egg	112	44.3	82	44.3	30	44.8	X ² (1df)=.004; p=.95
Fin Fish	34	13.4	13	7	21	31.3	X ² (1df)=24.9; p<.001
Shellfish	42	16.6	11	6	31	46.3	X ² (1df)=57.6; p<.001
Wheat	19	7.5	7	3.8	12	17.9	X ² (1df)=14.1; p<.001
Tree Nut	148	58.5	102	55.1	46	68.7	X ² (1df)=3.7; p=.05
Sesame	48	19	40	21.6	8	11.9	X ² (1df)=3.0; p=.08
Soy	18	7.1	10	5.4	8	11.9	X ² (1df)=3.2; p=.08
Other	39	15.4	30	16.2	9	13.4	X ² (1df)=.29; p=.59
Highest attained parental education							
Some high school, no diploma	5	2.1	3	1.7	2	3.3	X ² (7df)=46.5; p<.001
High school graduate, diploma or equivalent	13	5.5	5	2.9	7	11.5	
Some college, no degree	30	12.7	11	6.3	19	31.2	
Associate's degree	10	4.2	5	2.9	5	8.2	
Bachelor's degree	69	29.2	53	30.5	16	26.2	
Master's degree	76	32.2	65	37.4	11	18	

	Professional degree	14	5.9	14	8.1	0	0	
	Doctoral degree	19	8	18	10.3	1	1.6	
Annual Household Income								
	<\$50,000	54	22.9	16	9.2	37	60.7	X ² (6df)= 75.4; p<.001
	\$50,000-99,999	22	9.3	15	8.6	7	11.5	
	\$100,000-149,999	40	17	35	20.1	5	8.2	
	\$150,000-199,000	23	9.8	20	11.5	3	4.9	
	\$200,000-299,000	34	14.4	31	17.8	3	4.9	
	\$300,000 or more	45	19.1	43	24.7	2	3.3	
	Decline to answer	18	7.6	14	8	4	6.6	
Number of Food Allergy								
	Single	70	27.8	56	30.3	14	20.9	X ² (1df)=2.2; p=.14
	Multiple	182	72.2	129	69.7	53	79.1	
Comorbidities*								
	Physician-diagnosed Allergic Rhinitis	117	49.8	77	44.5	40	64.5	X ² (1df)=7.3; p=.007
	Current Asthma	94	39.8	58	33.3	36	58.1	X ² (1df)=13.3; p=.001
	Outgrown Asthma	9	3.8	9	5.2	0	0	
	Physician-diagnosed Lifetime Eczema	195	83	137	79.2	58	93.6	X ² (1df)=6.7; p=0.1
*Comorbidity data only available from subset of N=235 patients								

Table II. Food Allergy Related Bullying

	Yes Overall N(%)	White Participants N(%)	Black Participants N(%)	X2; P VALUE
Ever bullied due to FA	35 (18.7%)	26 (20.0%)	9 (15.6%)	X2 (1df)=.46; p=.50
4-11 years	18 (13.2%)	13 (12.9%)	5 (14.3%)	X2 (1df)=.04; p=.83
>11 years	17 (33.3%)	13 (44.8%)	4 (18.2%)	X2 (1df)=4.0; p=.046
Ever bullied for reasons other than FA	45 (24.1%)	23 (17.7%)	22 (38.6%)	X2 (1df)=9.5; p=.002
4-11 years	29 (21.3%)	15 (14.9%)	14 (40.0%)	X2 (1df)=9.8; p=.002
>11 years	16 (31.4%)	8 (27.6%)	8 (36.4%)	X2 (1df)=.45; p=.50
Child disclosed bullying to parent/guardian	27 (14.4%)	20 (15.4%)	7 (12.3%)	X2 (1df)=.3; p=.58
4-11 years	13 (9.6%)	10 (9.9%)	3 (8.6%)	X2 (1df)=.05; p=.82
>11 years	14 (27.5%)	10 (34.5%)	4 (18.2%)	X2 (1df)=1.7; p=.20
Parent/guardian did something to stop bullying				
Spoke with child	20 (12.6%)	11 (10.4%)	9 (17.0%)	X2 (1df)=1.4; P=.24
Spoke with offender or offender's parent	11 (7.0%)	2 (1.9%)	9 (17.3%)	X2 (1df)=12.8; P<.001
Spoke with a teacher	27 (16.8%)	15 (13.8%)	12 (23.1%)	X2 (1df)=2.2; P=.14
Spoke with a principal or administration	25 (15.5%)	14 (12.8%)	11 (21.2%)	X2 (1df)=1.9; P=.17
Other				
If a parent/guardian did something to stop bullying, was it helpful?	36 (85.7%)	22 (81.5%)	14 (93.3%)	X2 (1df)=1.1; p=.29
Parent-reported that they (the parent) were made fun of or teased in a hurtful way because of their concerns about their child's food allergy	36 (19.3%)	31 (23.9%)	5 (8.8%)	X2 (1df)=5.8; p=.02
4-11 years	27 (19.9%)	24 (23.8%)	3 (8.6%)	X2 (1df)=3.8; p=.052
>11 years	9 (17.7%)	7 (24.1%)	2 (9.1%)	X2 (1df)=1.9; p=.16
Who was the source of this parental bullying?				
Spouse	11 (4.2%)	9 (4.7%)	2 (2.9%)	X2 (1df)=.4; p=.54
Friend	17 (6.7%)	15 (8.0%)	2 (3.0%)	X2 (1df)=1.9; p=.16
Parent of another child	24 (9.6%)	23 (12.4%)	1 (1.5%)	X2 (1df)=6.7; p=.01
Teacher / Principal at the child's school	10 (4.0%)	9 (4.9%)	1 (1.5%)	X2 (1df)=1.5; p=.22
My parents (the child's grandparents)	9 (3.6%)	8 (4.4%)	1 (1.5%)	X2 (1df)=1.2; p=.28
My spouse's parents	15 (6.0%)	15 (8.1%)	0 (0%)	X2 (1df)=5.7; p=.02
Another family member	24 (9.5%)	20 (10.8%)	4 (5.9%)	X2 (1df)=1.4; p=.24

Other	7 (2.8%)	6 (3.3%)	1 (1.5%)	X ² (1df)=.54; p=.46
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TABLE III. PROMIS Peer Relationships and Anxiety Measures

	No Report of FA- related Bullying	Report of FA-related Bullying	T-test P VALUE	No Report of Other Bullying	Report of Other Bullying	T-test P VALUE	Overall White Respondents	Overall Black Respondents	T-test P VALUE
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
<i>Peer Relationships</i>									
My child felt accepted by other kids his/her age	4.45 (.66)	4.26 (.54)	0.21	4.48 (.61)	4.15 (.68)	0.01	4.43 (.60)	4.37 (.76)	0.65
My child was able to count on his/her friends	4.27 (.71)	4.17 (.72)	0.56	4.28 (.71)	4.17 (.72)	0.48	4.33 (.67)	3.98 (.96)	0.03
My child was good at making friends	4.25 (.92)	4.26 (.75)	0.95	4.29 (.91)	4.09 (.83)	0.3	4.29 (.85)	4.07 (1.05)	0.24
My child and his/her friends helped each other out	4.26 (.76)	4.17 (.65)	0.61	4.28 (.77)	4.13 (.64)	0.36	4.31 (.69)	4.04 (.92)	0.08
Other kids wanted to be my child's friend	4.19 (.85)	4.17 (.83)	0.92	4.20 (.88)	4.15 (.72)	0.77	4.21 (.84)	4.12 (.88)	0.61
Other kids wanted to be with my child	4.22 (.83)	4.24 (.77)	0.91	4.27 (.82)	4.06 (.79)	0.23	4.28 (.79)	4.01 (.93)	0.11
Other kids wanted to talk my child	4.27 (.81)	4.26 (.75)	0.95	4.32 (.80)	4.07 (.78)	0.15	4.29 (.78)	4.21 (.91)	0.63
Composite Peer Relationship Score	4.27 (.68)	4.22 (.58)	0.73	4.31 (.67)	4.12 (.62)	0.19	4.30 (.63)	4.11 (.81)	0.17
<i>Anxiety</i>									
My child felt nervous	2.31 (.86)	2.41 (.94)	0.59	2.27 (.80)	2.54 (1.06)	0.15	2.45 (.84)	2.03 (1.04)	0.02
My child felt scared	2.10 (.84)	2.30 (1.02)	0.3	2.11 (.82)	2.22 (1.09)	0.56	2.17 (.84)	2 (1.04)	0.35
My child felt worried	2.22 (.85)	2.5 (1.01)	0.17	2.18 (.80)	2.57 (1.10)	0.04	2.37 (.80)	1.97 (1.07)	0.02
My child felt like something awful might happen	1.62 (.70)	2.09 (1.07)	0.01	1.63 (.69)	1.96 (1.08)	0.05	1.74 (.79)	1.66 (.94)	0.65
My child worried when he/she was at home	1.61 (.68)	1.96 (.82)	0.04	1.61 (.66)	1.89 (.86)	0.08	1.75 (.75)	1.5 (.74)	0.1
My child got scared really easy	1.74 (.80)	2 (1.04)	0.18	1.72 (.79)	2.02 (1.02)	0.11	1.82 (.88)	1.72 (.90)	0.58
My child worried about what could happen to him/her	1.70 (.72)	2.36 (1.04)	<.001	1.75 (.72)	2.06 (1.11)	0.09	1.85 (.80)	1.70 (.98)	0.36
My child worried when he/she went to bed at night	1.68 (.82)	2.04 (1.19)	0.08	1.70 (.81)	1.91 (1.18)	0.29	1.85 (.95)	1.49 (.85)	0.05
Composite Anxiety Score	1.87 (.61)	2.25 (.88)	0.02	1.87 (.60)	2.18 (.88)	0.04	2.00 (.68)	1.77 (.79)	0.12

Table IV. School Management Policies (among those with complete school management, bullying and PROMIS data)

	All Participants	White Participants	Black Participants	X2; P VALUE
	N (%)	N(%)	N(%)	
Daycare/Preschool	25 (30.5%)	19 (31.7%)	6 (27.3%)	X2 (3df)=4.2; p=.24
Elementary/Middle School	47 (57.3%)	33 (55.0%)	14 (63.6%)	
High School	1 (1.2%)	0 (%)	1 (4.6%)	
N/A	9 (11.0%)	8 (13.3%)	1 (4.6%)	
Which type of school does your child attend				
Public	42 (57.5%)	26 (50.0%)	16 (76.2%)	X2 (3df)=9.2; p=.027
Private	28 (38.4%)	25 (48.1%)	3 (14.3%)	
Home School	2 (2.7%)	1 (1.9%)	1 (4.8%)	
Other	1 (1.4%)	0 (0%)	1 (4.8%)	
Did you discuss food allergy management with your child's school?				
Yes	71 (97.3%)	51 (98.1%)	20 (95.2%)	X2 (1df)=0.45; p=.50
Yes, spoke with principal	31 (43.7%)	24 (47.1%)	7 (35.0%)	X2 (1df)=0.85; p=.36
Yes, spoke with teacher	60 (84.5%)	44 (86.3%)	16 (80.0%)	X2 (1df)=0.43; p=.51
Yes, spoke with school nurse	46 (64.8%)	29 (56.9%)	17 (85.0%)	X2 (1df)=5.0; p=.026
Yes, spoke with caseworker	14 (19.7%)	7 (13.7%)	7 (35.0%)	X2 (1df)=4.1; p=.04
Do you have a written food allergy management documents on file at your child's school?				
Yes	70 (98.6%)	50 (98.0%)	20 (100%)	X2 (2df)=0.40; p=.53
No	0	0	0	
Unsure	1 (1.4%)	1 (2.0%)	0 (0%)	
(If yes to above), which of the following do you have on file at your child's school?				
Food Allergy Action Plan/Anaphylaxis Emergency Care Plan	68 (97.1%)	49 (98.0%)	19 (95.0%)	X2 (1df)=0.46 ; p=.50
Individualized Education Program (IEP)	12 (17.1%)	5 (10.0%)	7 (35.0%)	X2 (1df)=6.3 ; p=.012
504 Plan	15 (21.4%)	7 (14.0%)	8 (40.0%)	X2 (1df)=5.7; p=.02
Other Plan	3 (4.3%)	3 (6.0%)	0 (0%)	X2 (1df) 1.3; p=.26
Is Stock epinephrine available at your school in case of emergency?				
Yes	19 (26.0%)	11 (21.2%)	8 (38.1%)	X2 (2df)=2.3; p=.32
No	22 (30.1%)	17 (32.7%)	5 (23.8%)	
Unsure	32 (43.8%)	24 (46.2%)	8 (38.1%)	
Does your child have their own epinephrine at school?				
Yes	67 (91.8%)	49 (94.2%)	18 (85.7%)	X2 (2df)=2.9; p=.23

No	5 (6.9%)	2 (3.9%)	3 (14.3%)	
Unsure	1 (1.4%)	1 (1.9%)	0 (0%)	
(if yes to above) Where is your child's epinephrine kept?				
My child self-carries	11 (16.4%)	7 (14.3%)	4 (22.2%)	X2 (4df)=5.8; p=.22
Teacher's desk	14 (20.9%)	12 (24.5%)	2 (11.1%)	
Nurse's office	30 (44.8%)	19 (38.8%)	11 (61.1%)	
Principal's office	5 (7.5%)	4 (8.2%)	1 (5.6%)	
Other	7 (10.5%)	7 (14.3%)	0 (0%)	
Are some foods not allowed in your child's school due to food allergies?				
Yes	40 (54.8%)	27 (51.9%)	13 (61.9%)	X2 (2df)=13.9; p=.001
No	25 (34.3%)	23 (44.2%)	2 (9.5%)	
Unsure	8 (11.0%)	2 (3.9%)	6 (28.6%)	
(if yes to above) Which foods are not allowed in your child's school due to food allergies?				
Peanuts	39 (97.5%)	27 (100%)	12 (92.3%)	X2 (1df)=2.1; p=.14
Tree Nuts	30 (75.0%)	20 (74.1%)	10 (76.9%)	X2 (1df)=0.04; p=.85
Other	2 (5.0%)	1 (3.7%)	1 (7.7%)	X2 (1df)=0.29; p=.59
Is there a classroom policy regarding food in the classroom for snacks, parties, etc...?				
Yes	101 (80.2%)	68 (79.1%)	33 (82.5%)	X2 (2df)=1.3; p=.52
No	15 (11.9%)	12 (13.9%)	3 (7.5%)	
Unsure	10 (7.9%)	6 (7.0%)	4 (10.0%)	
(If yes to above) Which of these applies to your child's classroom?				
Only allergen-free food is allowed	49 (48.5%)	30 (44.1%)	19 (57.6%)	X2 (1df)=1.6; p=.20
Only food with a clear ingredient label is allowed	35 (34.7%)	26 (38.2%)	24 (72.7%)	X2 (1df)=1.2; p=.28
No food is allowed	21 (20.8%)	16 (23.5%)	5 (15.2%)	X2 (1df)=0.9; p=.33
I'm not sure	7 (6.9%)	3 (4.4%)	4 (12.1%)	X2 (1df)=2.0; p=.15
Other	10 (9.9%)	9 (13.2%)	1 (3.0%)	X2 (1df)=2.6; p=.11
Are there allergen-free areas for students with food allergy to eat lunch?				
Yes	29 (39.7%)	25 (48.1%)	4 (19.1%)	X2 (2df)=10.3; p=.006
No	29 (39.7%)	21 (40.4%)	8 (38.1%)	
Unsure	15 (20.6%)	6 (11.5%)	9 (42.9%)	
(if yes to above) What allergen-free lunch areas are available at your child's school?				
Peanut-free table	26 (89.7%)	22 (88.0%)	4 (100.0%)	X2 (1df)=0.54; p=.46
Tree nut-free table	12 (41.4%)	11 (44.0%)	1 (25.0%)	X2 (1df)=0.51; p=.47

Dairy-free table	24 (82.8%)	20 (80.0%)	4 (100.0%)	X2 (1df)=0.97; p=.33
Other allergen-free areas	4 (13.8%)	3 (12.0%)	1 (25.0%)	X2 (1df)=0.49; p=.48

Table V. Multiple Logistic Regression Analyses Examining Demographic and Clinical Predictors of Bullying Victimization			
Patient Characteristics Associated with: Any FA-related Bullying	Odds Ratio	95% CI	
Black (vs White)	0.49	0.15	1.58
>11 years (vs 4-11 years)	4.57	1.86	11.27
Parental Education	0.73	0.54	1.01
Annual Household Income	1.13	0.88	1.44
Female (vs Male)	1.81	0.77	4.26
Multiple FA (vs Single FA)	0.58	0.15	2.19
Peanut Allergy	1.48	0.51	4.33
Tree Nut Allergy	0.57	0.2	1.64
Egg Allergy	3.22	1.25	8.32
_cons	0.35	0.06	2.01
Patient Characteristics Associated with: Any Non-FA-related Bullying	Odds Ratio	95% CI	
Black (vs White)	1.88	0.73	4.81
>11 years (vs 4-11 years)	1.74	0.76	3.95
Parental Education	0.74	0.56	0.98
Annual Household Income	0.99	0.79	1.23
Female (vs Male)	1.66	0.77	3.56
Multiple FA (vs Single FA)	0.65	0.19	2.2
Peanut Allergy	1.25	0.47	3.34
Tree Nut Allergy	1.29	0.5	3.35
Egg Allergy	2.58	1.13	5.86
_cons	0.53	0.11	2.55

Figure 1: Child Peer Relationships and Anxiety PROMIS Outcomes by FA-Related Bullying and non FA-Related Bullying Victimization

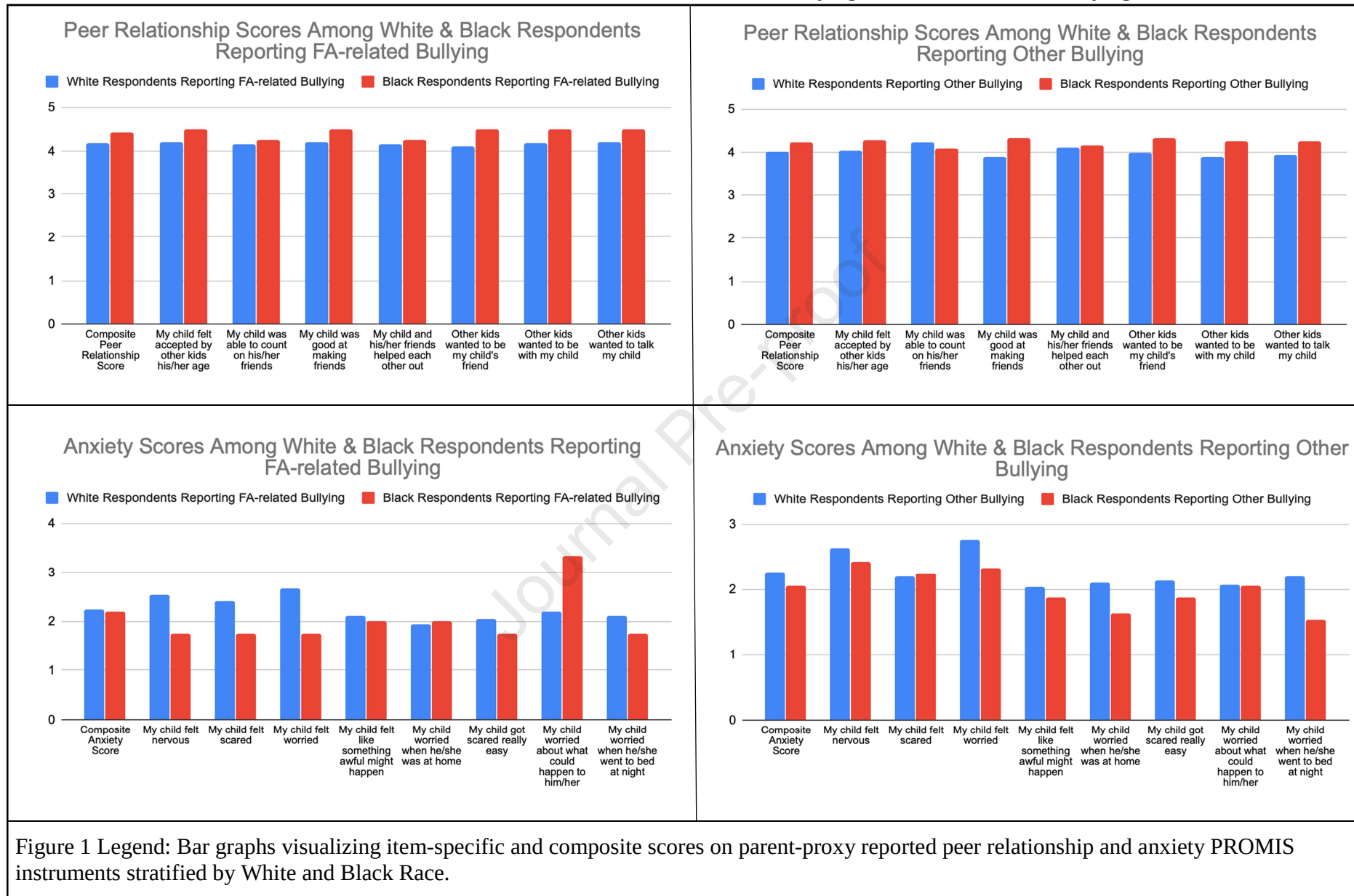


Figure 2: Covariate-adjusted Predictors of FA-Related Bullying and non FA-Related Bullying Victimization

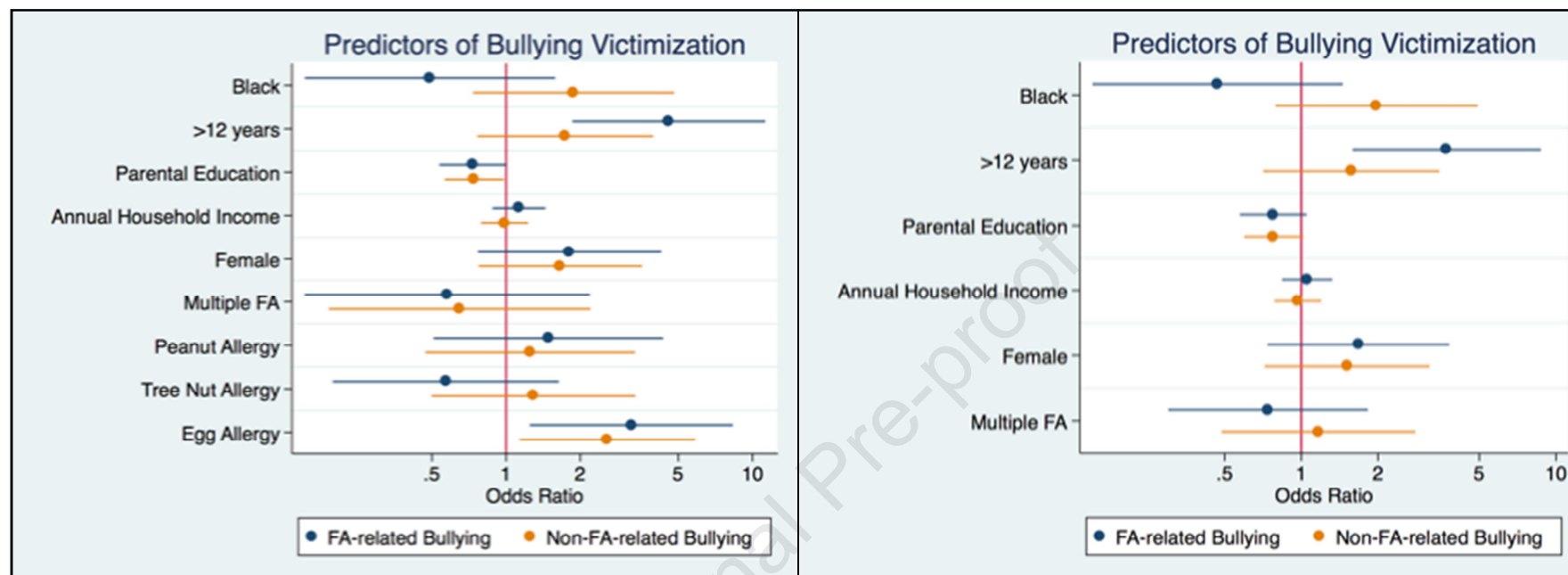


Figure 2 Legend: Plots of exponentiated logistic regression coefficients (e.g. odds ratios) corresponding to covariate-adjusted predictors of bullying victimization with corresponding 95% confidence intervals.

Food Allergy Related Bullying

Please complete the survey below.

	Yes	No	Not Sure
Was your child ever bullied because of the food allergy?	☐	☐	☐
Was your child ever bullied for reasons that are NOT related to food allergy?	☐	☐	☐
Did your child ever tell you that he or she was bullied because of the food allergy?	☐	☐	☐
Did you ever need to do anything to stop your child from being bullied?	☐	☐	☐
When you did something, was it helpful in stopping the bullying?	☐	☐	☐

What did you do (check all that apply):

- ☐ I spoke with the child.
- ☐ I spoke with the offender or the offender's parent (if the offender was another child)
- ☐ I spoke with a teacher
- ☐ I spoke with a principal or an administrative person at school.
- ☐ Other:

Were YOU ever made fun of or teased in a hurtful way because of your concerns about your child's food allergy?

- ☐ Yes
- ☐ No

Who was behaving in a hurtful way to YOU (check all that apply):

- ☐ Spouse
- ☐ Friend
- ☐ Parent of another child
- ☐ Teacher / principal at the child's school
- ☐ My parents (the child's grandparents)
- ☐ My spouse's parents
- ☐ Another family member
- ☐ Other:

Please specify other:
