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## Association of Family Stressful Life-Change Events and Health-Related Quality of Life in Fifth-Grade Children

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### Abstract

**Objective**—To examine the association of recent family-related stressful life-change events (SLEs) with health-related quality of life (HRQOL) in fifth graders.

**Design**—Population-based, cross-sectional survey.

**Setting**—Three US metropolitan areas; 2004–2006.

**Participants**—A total of 5147 fifth graders and their parents.

**Main Exposures**—Nine recent family-related SLEs: a parent's death, another family member's death, a family member's injury/illness, a family member's alcohol/drug problems, loss of a pet, recent change of residence, addition of a new baby or child to the household, parental separation, and parental divorce.

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**Author Contributions:** Dr Coker had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. *Study concept and design:* Coker, Elliott, Wallander, Cuccaro, Grunbaum, and Schuster. *Acquisition of data:* Elliott, Wallander, Cuccaro, Saunders, and Schuster. *Analysis and interpretation of data:* Coker, Elliott, Corona, and Schuster. *Drafting of the manuscript:* Coker, Wallander, and Schuster. *Critical revision of the manuscript for important intellectual content:* Coker, Elliott, Wallander, Cuccaro, Grunbaum, Corona, Saunders, and Schuster. *Statistical analysis:* Coker and Elliott. *Obtained funding:* Elliott, Wallander, Cuccaro, Grunbaum, and Schuster. *Administrative, technical, and material support:* Cuccaro, Grunbaum, Corona, and Saunders. *Study supervision:* Wallander, Cuccaro, and Schuster.

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**Main Outcome Measure**—The HRQOL measured using the 23-item Pediatric Quality of Life Inventory.

**Results**—Twenty-four percent of children had no reported recent SLEs; 33% had 1, 25% had 2, 12% had 3, and 6% had 4 or more. Mean HRQOL scores (total, physical, and psychosocial scales) were lower for children with more SLEs. The mean total HRQOL score was 80.4 (95% confidence interval, 79.4–81.3) for children with no recent SLEs and 71.8 (70.2–73.5) for children with 4 or more SLEs ( $P<.001$ ). In adjusted logistic regression analyses, children with more SLEs had greater odds of impaired HRQOL compared with children without any SLEs. Psychosocial HRQOL fully mediated the relationship between SLEs and physical HRQOL.

**Conclusions**—The occurrence of multiple family-related SLEs in children is associated with less positive HRQOL. By incorporating the needs of families as part of comprehensive, high-quality care, health care professionals can identify these types of family-level needs and assist families in accessing community resources for support.

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**STRESSFUL LIFE-CHANGE EVENTS** (SLEs) are personal, social, familial, and occupational life changes that require coping or adaptation, and they are generally believed to induce stress.<sup>1</sup> Children may experience multiple SLEs, such as a family member's death or a move to a new home; the accumulation of SLEs is associated with multiple physical and mental health problems. Researchers have found significant associations between SLEs and, for example, episodes of infectious disease,<sup>2,3</sup> worsening chronic conditions,<sup>4–6</sup> autoimmune disease and immune system dysregulation,<sup>7–10</sup> and behavioral problems in children.<sup>11</sup>

Although SLEs have been associated with various physical and mental health conditions in children, the effects of SLEs on broader indications of general child health and well-being across such domains as physical, emotional, social, and school functioning have not been well explored to date. Health-related quality of life (HRQOL) is a comprehensive multidimensional construct that encompasses physical, psychological, and social health dimensions and role functioning.<sup>12,13</sup> The HRQOL distinguishes between healthy children and children with chronic conditions and is sensitive to changes in illness severity over time. It reflects essential everyday functioning of children<sup>14</sup>; any significant reduction in these functions is critical to child well-being and, thus, merits investigation.

Although several studies have linked SLEs and HRQOL in other populations, we are unaware of any research examining whether SLEs are associated with HRQOL in children in the general population. Rather, 1 study found an association between lower HRQOL and recent SLEs in children with and without human immunodeficiency virus,<sup>5</sup> and another found an association between recent SLEs and worse HRQOL in college students.<sup>15</sup>

Based on previous literature, we hypothesized that (1) recent SLEs are associated with reduced HRQOL in fifth-grade children, (2) this association is stronger for the psychosocial vs the physical components of HRQOL, and (3) psychosocial HRQOL mediates the association between SLEs and physical HRQOL.

## METHODS

We used data from Healthy Passages, a multisite study of health and its correlates among youth.<sup>16</sup> Healthy Passages used parent and child interviews to collect data for 5147 fifth graders. Institutional review boards at each study site and at the Centers for Disease Control and Prevention approved this study.

### STUDY POPULATION AND SAMPLING PROCEDURE

Participants were recruited from schools in 3 areas: (1) 10 contiguous public school districts in and around Birmingham, Alabama; (2) 25 contiguous public school districts in Los Angeles County, California; and (3) the largest public school district in Houston, Texas. Eligible schools had an enrollment of at least 25 fifth graders, representing more than 99% of students enrolled in regular classrooms in the 3 areas. To ensure adequate sample sizes of non-Hispanic black, Hispanic, and non-Hispanic white students, we took a random sample of schools using probabilities that were a function of how closely a school's racial/ethnic mix corresponded to the site's racial/ethnic target (described elsewhere).<sup>16</sup>

The 118 sampled schools had 11 532 enrolled fifth graders. A parent or other primary caregiver (henceforth referred to as “parent”) for each student received a letter requesting permission for contact by study personnel, of which 6663 who either agreed to be contacted or were unsure were invited to participate; 77% of them completed an interview. Interviews were conducted at the parent's home, study center, or another preferred location. Before interviews, parents gave informed consent for their participation and their child's participation; children gave assent.

### MEASURES

Data for SLEs and HRQOL were collected via computer-assisted personal interview, with SLE questions preceding HRQOL questions by several unrelated survey sections.

**Stressful Life-Change Events**—To measure the occurrence of recent SLEs (occurring approximately in the past year), we collected data from the child and parent using an abbreviated version of the Adolescent Life Change Event Scale,<sup>1</sup> which has previously been used in studies of children as young as 11 to 12 years old.<sup>17,18</sup> Whereas the full scale covers 31 SLEs, the present analysis focuses on only family-based life-change events that were unlikely to be directly caused by the child or directly related to the child's mental health, similar to other studies investigating the association of SLEs and health in children with a focus on family-based life-change events (either separately or with other types of life-change events).<sup>3,11,19–21</sup> For example, we did not include events that could be attributed to the child's behavior, such as “being arrested by the police.” Child-reported events included the addition of a new baby or child to the household, alcohol or drug problems in a family member, injury or illness in a family member, loss of a pet, and the death of a family member (other than a parent). Data for 4 additional SLEs (recent change of residence and parent death, separation, or divorce) were collected from the parent in another part of the survey. Because SLEs often involve the parent and the child, we combined these parent-reported SLEs with the child-reported SLEs.

For the events of a new baby/child, alcohol/drug problems in a family member, injury/illness in a family member, loss of a pet, death of a family member (other than a parent), and recent change of residence, respondents were asked if the event had occurred and, if so, if it had occurred in the previous 12 months. For the events of parental death, separation, and divorce, parent respondents were asked to provide the year that it occurred. We defined these SLEs as “recent” if they occurred in the year of or the year before the interview.

**Quality of Life**—Children completed the Pediatric Quality of Life Inventory version 4.0, a well-validated instrument designed to measure HRQOL in children aged 2 to 18 years.<sup>22</sup> Its 23 items address physical functioning (8 items; eg, “It is hard for you to run”), emotional functioning (5 items; eg, “You feel sad or blue”), social functioning (5 items; eg, “You have trouble getting along with other kids”), and school functioning (5 items; eg, “It is hard to pay attention in class”). Respondents are asked how much of a problem each item has been during the past 1 month, with 5 response options (never, almost never, sometimes, often, and almost always a problem). Items are reverse scored (so that higher scores represent better HRQOL) and linearly transformed to a range of 0 to 100. We calculated mean scores for the total HRQOL scale and 2 sub-scales: physical (8 items) and psychosocial (15 items combining emotional, social, and school functioning). Cronbach  $\alpha$  (a measure of internal consistency for which a value  $\geq .70$  permits group comparisons<sup>23</sup>) for this sample was .87 (physical subscale=.73; psychosocial subscale=.84). We dichotomized scores to identify children at risk for impaired HRQOL, defined previously as a score 1 SD or more below the population mean for the total, physical, and psychosocial scores.<sup>24</sup>

**Covariates**—We selected child-, parent-, and household-related covariates based on previous literature and models of stress in children and adults.<sup>25,26</sup> Child-related covariates included race/ethnicity (non-Hispanic black, Hispanic, non-Hispanic white, and other), age (10 and 11 years; 91% were 10 or 11 years old), gender, and parent-reported health status (excellent to good vs fair to poor), the parent-related covariates included parent age and educational attainment (no high school degree, high school degree/some college, and college degree or greater), and the household-related covariates included annual household income (<\$20 000, \$20 000–\$34 999, \$35 000–\$69 999, and  $\geq$  \$70 000) and composition (2 parents, 1 parent, and other).

## STATISTICAL METHODS

All the analyses used design and nonresponse weights and account for the effects of weights and of the clustering of children within sites using STATA SE 10 (StataCorp LP, College Station, Texas).<sup>27–29</sup> We used  $\chi^2$  tests of homogeneity to describe the characteristics of children in the sample. We used linear regression to examine differences in mean HRQOL scores (total, physical, and psychosocial health) for children based on the number of reported recent SLEs (parent and child report combined). Next, we collapsed the number of recent SLEs into 5 categories (0, 1, 2, 3, and 4) and again used linear regression to examine differences in mean scores. We used simple and multivariable logistic regression to examine differences in the odds of having impaired HRQOL for children with 1, 2, 3, or 4 or more recent SLEs compared with children with no recent SLEs. We also used a test for linear trend to examine the change in the unadjusted odds ratios as the number of SLEs increased.

The covariates described previously herein were included in the multivariable analyses. Because health status is sometimes included as a part of HRQOL measurement tools,<sup>30</sup> we conducted sensitivity analyses omitting child health status as a covariate.

Based on conceptual models of stress that suggest that stressors might affect physical health through a psychological pathway,<sup>25</sup> we also examined whether psychosocial HRQOL mediates any association between SLEs and physical HRQOL. Mediators are variables that carry the effect of the independent variable to the dependent variable.<sup>31</sup> The Sobel test is widely used to test the significance of a mediation pathway<sup>32</sup>; herein, it was used to examine whether the relationship between SLEs and the physical health summary score was mediated by the psychosocial health summary score.

## RESULTS

Twenty-nine percent of the children were non-Hispanic black, 44% were Hispanic, 22% were non-Hispanic white, and 5% were another race/ethnicity (Table 1). Sixty percent of parents had household incomes less than \$35 000, and almost one-third had less than a high school education. Table 2 provides the number of children reporting each SLE.

Twenty-four percent of children had no reported recent SLE; 33% had 1, 25% had 2, 12% had 3, and 6% had 4 or more (Table 3). In general, as the number of SLEs increased, the mean total, physical, and psychosocial HRQOL scores decreased (Table 3). The mean total HRQOL score for children with no recent SLEs was 80.4 (95% confidence interval [CI], 79.4–81.3), and the mean score for children with 4 or more recent SLEs was 71.8 (70.2–73.5) ( $P<.001$ ). Similarly, the mean physical HRQOL score for children with no recent SLEs was 85.6 (95% CI, 84.6–86.5) compared with 79.8 (77.8–81.8) for children with 4 or more recent SLEs ( $P<.001$ ), and the mean psychosocial HRQOL score for children with no SLEs was 77.6 (95% CI, 76.5–78.6) compared with 67.6 (65.8–69.5) for children with 4 or more SLEs ( $P<.001$ ). In unadjusted analyses (Table 4), we found evidence of a linear trend, indicating that as the number of SLEs increased, the odds of having an impaired HRQOL (total, physical, and psychosocial) score also increased. Children with 3 SLEs had approximately twice the odds and those with 4 or more SLEs had almost 3 times the odds of having an impaired total HRQOL score compared with children without recent SLEs. Children with 3 SLEs had 1.5 times the odds and children with 4 or more SLEs had 2.4 times the odds of having an impaired physical HRQOL score. In comparison, children with 3 SLEs had 2.5 times the odds and children with 4 or more SLEs had 3.4 times the odds of having an impaired psychosocial HRQOL score. In adjusted analyses, the odds of having impaired total, physical, and psychosocial HRQOL scores relative to children with no SLEs were slightly attenuated but persisted for children with more than 1 SLE. In sensitivity analyses, results were similar after omitting child health status as a covariate.

The Sobel test, with bootstrapped standard errors, indicated that psychosocial HRQOL fully mediates the relationship between SLEs and physical HRQOL ( $z=-14.45$ ,  $P<.001$ ; mediated effect:  $-1.48$ , bootstrapped CI,  $-1.68$  to  $-1.24$ ; total effect mediated=100%).

## COMMENT

This study is the first, to our knowledge, to describe the association between SLEs and HRQOL using a population-based sample of children. We found a significant association between the number of recent family-related SLEs experienced by a child and impaired HRQOL. Children who experienced more of these SLEs were more likely to have worse HRQOL. This association was found for the total measure of HRQOL and for the physical and psychosocial components of the measure; however, the relationship was greatest for psychosocial HRQOL. These findings also suggest that the association between SLEs and physical HRQOL may be mediated through the association of SLEs with psychosocial HRQOL. The number of SLEs experienced by a child was indirectly associated with his or her physical HRQOL. It is possible that the direct association between SLEs and psychosocial HRQOL serves as the pathway by which SLEs are associated with physical HRQOL; however, longitudinal data are needed to explore this finding further.

Previous studies of the relationship between health and SLEs in children have reported similar findings. Stressful life-change events have been associated with poorer health (physical and mental) in children. However, few studies have examined population-based samples of children, particularly with a substantial proportion of low-income African American and Latino children, and many have focused on children with a specific chronic illness. By examining the association of HRQOL in a population-based, multisite sample of fifth-grade children, we can generalize these results to a broader population of children. The finding that the number of SLEs is associated with impaired HRQOL is consistent with findings from studies of SLEs in college students<sup>15</sup> and in human immunodeficiency virus-positive children.<sup>5</sup>

Although we have demonstrated a strong association between the number of family SLEs and HRQOL in children, we do not have data to help us understand whether the experience of multiple SLEs is causally related to worse HRQOL. In fact, the present study findings are consistent with multiple conceptual models that could explain such an association. In the family stress model, family economic stress causes emotional distress in parents, which can disrupt parenting and can lead to poor child outcomes.<sup>26</sup> In this model, children's physical and emotional health, and cognitive and social functioning, are influenced by how the family functions. Alternatively, the SLEs may be related to physical HRQOL through neuroendocrine-mediated changes in immune competence, causing alterations in susceptibility to acute and chronic illnesses.<sup>8,9,25</sup> Another possibility is that the stress from life-change events also affects the child's physical health indirectly through impaired psychological health.<sup>25</sup> The present findings suggest that this might extend to HRQOL because we found that the association between impaired physical HRQOL and SLE was mediated by impaired psychosocial HRQOL.

There is extensive literature<sup>33–36</sup> regarding the association between adverse events in childhood and health that should be distinguished from research on SLEs. Adverse childhood exposures generally focus on child maltreatment (abuse and neglect), whereas most research on SLEs and health-related outcomes focuses on a range of social and personal changes that occur throughout life. Indeed, many of the life-change events



examined in this study are common such that most children will experience 1 or more of these during their childhood (eg, residential move, death of a family member, new sibling, and parents separating). It is not that these are extraordinary events; rather, they are normative across a childhood. Nevertheless, when these events accumulate over a shorter time frame, these findings suggest that they may be associated with poor HRQOL.

There are limitations to this study. Because we lacked longitudinal data, we cannot examine causality. This study was conducted in 3 metropolitan areas in the United States but may not generalize to the overall US population of similarly aged children. There are also potential sources of biases that should be noted, including nonresponse bias because we did not have permission to contact all parents for inclusion in the study. However, the sampling weights account for differential nonresponse by gender, race/ethnicity, and school, ensuring the representativeness of the weighted sample with respect to these characteristics and reducing potential nonresponse bias. Other possible sources of bias include question ordering and the inherent biases of self-report data. Also, we did not include a subjective measure of the level of stress caused by each SLE; such a measure would have allowed us to account for individual variation in the reaction to the same SLE.<sup>37</sup> In addition, we did not account for varying stress levels from different SLEs (eg, the level of stress induced from life-change events of a serious illness or injury in a family member vs moving into a new home). However, previous research indicates that the use of such differential weights for various SLEs has little effect on the association between SLEs and psychological distress.<sup>38</sup> There may also be other covariates that we did not include that may have affected the results. Finally, we controlled for the child's parent-reported health status in the adjusted analyses to help account for children who had chronic conditions that may affect their HRQOL. Self- or parent-reported health status is sometimes included as a part of HRQOL measurement tools<sup>30</sup>; however, it is not a part of the Pediatric Quality of Life Inventory. We chose to include a parent-reported general child health status measure as a stable child trait that could affect HRQOL; analyses omitting child health status as a covariate were similar to analyses including it as a covariate.

These findings have important implications for parents and clinicians. Both should recognize that multiple recent SLEs in the family may be negatively associated with children's overall HRQOL. Because families cannot generally prevent these SLEs from occurring, understanding the association that multiple SLEs have with HRQOL can help parents anticipate additional support that children may need when confronted with multiple SLEs. Evidence from other studies<sup>39</sup> indicates that social support may be an important way to moderate the relationship between SLEs and mental health outcomes. Another important implication of these findings is their relevance to family-centered care. All the SLEs examined in this study are events that occur to the child's family. Family-centered care recognizes the family as a partner in the child's health care and the importance of addressing the family's needs as a part of providing comprehensive care to the child. By incorporating the needs of families as part of comprehensive, high-quality care provided to the child, health care professionals may be more likely to identify when children experience multiple SLEs in a short period (eg, parental divorce, illness, injury, death of a family member, and change of residence) and may be able to assist families in accessing community resources

that can provide family counseling, support groups, or other types of family-based support services.

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**Table 1**

## Distribution of Sample Characteristics, Healthy Passages

Characteristic	Participants, No. (Weighted %) <sup>a</sup> (N=5147)
City	
Birmingham	1594 (31)
Houston	1783 (35)
Los Angeles	1770 (34)
Child race/ethnicity	
Non-Hispanic black	1755 (29)
Hispanic	1813 (44)
Non-Hispanic white	1256 (22)
Non-Hispanic other <sup>b</sup>	321 (5)
Child age 11 years <sup>c</sup>	2832 (57)
Child male	2536 (51)
Parent age, y <sup>d</sup>	
18–34	1635 (34)
35–44	2409 (47)
45	1048 (18)
Annual household income, \$	
<20 000	1718 (38)
20 000–34 999	1024 (22)
35 000–69 000	1022 (20)
70 000	1243 (21)
Parent educational attainment <sup>e</sup>	
<High school	1224 (31)
High school/some college	2352 (45)
4-y College degree	1449 (24)
Household composition	
2 Parents	2852 (58)
1 Parent	2015 (38)
Other, nonparent, foster, adoptive <sup>f</sup>	241 (4)
Child health status <sup>g</sup>	
Excellent to good	4646 (90)
Fair to poor	469 (10)

<sup>a</sup>Values do not always total 5147 because of missing data.

<sup>b</sup>The “other” category includes non-Hispanic multiracial children.

<sup>c</sup>The other child age group is 10 years and younger.

<sup>d</sup>Parent age is for the parent responding to the survey.

<sup>e</sup>Highest level of educational attainment in the household.

<sup>f</sup>Most participants in this category are living with nonparent primary caregivers (eg, grandparents).

<sup>g</sup>Parent reported.

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**Table 2**

## Prevalence of Child- and Parent-Reported Recent Stressful Life-Change Events in Fifth-Grade Children

<b>Stressful Life-Change Event</b>	<b>Participants, No. (Weighted %)</b>
Child-reported child life-change events in the past 12 mo (n=5144)	
You lost a pet, ie, your pet got loose and did not come back or your pet died	1686 (34)
A brother, sister, grandparent, great-grandparent, or close friend died	1517 (29)
A parent, brother, or sister was sick or badly hurt	1434 (28)
A new baby or child moved into your house	649 (13)
A family member had trouble with alcohol or drugs	648 (13)
Parent-reported child life-change events	
Your child has lived at current address for <1 y (n=5147)	1245 (25)
You divorced your child's mother or father (in year of or year before interview) (n=5140)	70 (1)
You separated from your child's mother or father (in year of or year before interview) (n=5140)	70 (1)
Your child's mother or father passed away (in year of or year before interview) (n=5140)	7 (<1)

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**Table 3**

PedsQL Scores by Number of Recent Stressful Life-Change Events Reported by Fifth-Grade Children and Their Parents

No. of Events	Participants, No. (%)	PedsQL Scores, Mean (95% CI)		
		Total	Physical Health	Psychosocial Health
	5137 <sup>a</sup>	77.4 (76.7–78.2)	83.8 (83.1–84.5)	74.0 (73.2–74.8)
0	1260 (24)	80.4 (79.4–81.3)	85.6 (84.6–86.5)	77.6 (76.5–78.6)
1	1720 (33)	78.4 (77.5–79.3)	84.4 (83.5–85.3)	75.2 (74.2–76.2)
2	1241 (25)	75.9 (74.8–76.9)	82.9 (81.8–83.9)	72.1 (70.9–73.3)
3	620 (12)	74.8 (73.6–76.0)	82.8 (81.4–84.1)	70.6 (69.3–71.8)
4	234 (5)	72.9 (71.1–74.6)	80.9 (78.9–82.9)	68.6 (66.5–70.7)
4	296 (6)	71.8 (70.2–73.5)	79.8 (77.8–81.8)	67.6 (65.8–69.5)
5	57 (1)	68.4 (64.1–72.7)	76.1 (70.4–81.8)	64.3 (60.0–68.6)
6	5 (<1)	62.5 (52.9–72.0)	70.9 (61.6–80.2)	58.0 (45.7–70.2)

Abbreviations: CI, confidence interval; PedsQL, Pediatric Quality of Life Inventory.

<sup>a</sup>Ten respondents did not answer the questions for the PedsQL.

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**Table 4**

Unadjusted and Adjusted Odds of Having an Impaired HRQOL for Fifth-Grade Children by the Number of Recent Reported Stressful Life-Change Events

No. of Events	Total HRQOL		Physical Health		Psychosocial Health	
	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)	OR (95% CI)	AOR (95% CI)
0	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
1	1.26 (0.98–1.62)	1.19 (0.92–1.53)	1.19 (0.95–1.48)	1.17 (0.95–1.45)	1.39 (1.09–1.76) <sup>a</sup>	1.30 (1.02–1.67) <sup>b</sup>
2	1.65 (1.25–2.19) <sup>a</sup>	1.51 (1.14–1.99) <sup>a</sup>	1.60 (1.28–2.01) <sup>c</sup>	1.53 (1.21–1.95) <sup>a</sup>	1.91 (1.47–2.49) <sup>c</sup>	1.74 (1.33–2.26) <sup>c</sup>
3	2.17 (1.58–2.98) <sup>c</sup>	1.89 (1.39–2.58) <sup>c</sup>	1.50 (1.11–2.02) <sup>a</sup>	1.36 (1.02–1.82) <sup>b</sup>	2.49 (1.90–3.26) <sup>c</sup>	2.25 (1.72–2.96) <sup>c</sup>
4	2.94 (2.02–4.28) <sup>c</sup>	2.38 (1.62–3.49) <sup>c</sup>	2.43 (1.80–3.30) <sup>c</sup>	2.08 (1.52–2.84) <sup>c</sup>	3.37 (2.33–4.87) <sup>c</sup>	2.77 (1.92–4.00) <sup>c</sup>

Abbreviations: AOR, adjusted odds ratio (adjusted for child gender, age, race/ethnicity, and health status; parent age and educational level; and household income and composition); CI, confidence interval; HRQOL, health-related quality of life; OR, odds ratio.

<sup>a</sup>  $P < .01$ .

<sup>b</sup>  $P < .05$ .

<sup>c</sup>  $P < .001$ .