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Agreement between Parent Proxy- and Child Self-Report of Pain Intensity and Health-Related Quality of Life after Surgery

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Abstract

OBJECTIVES—Monitoring patient-centered health outcomes after hospital discharge is important for identifying patients experiencing poor recovery after surgery. Utilizing parent reports may improve the feasibility of monitoring recovery when children are not available to provide self-report. We therefore aimed to examine agreement between parent and child reports of child pain and health-related quality of life (HRQOL) in children after hospital discharge from inpatient surgery.

METHODS—295 children aged 8–18 years and their parents reported on child pain intensity using an 11-point Numerical Rating Scale and on HRQOL using the 0-to-100 point Pediatric Quality of Life Inventory Version 4.0 Generic Core Scales™ by phone or online, 4 to 8 weeks post-surgery. Agreement between parent and child ratings was assessed by absolute discrepancy scores, Pearson product-moment correlations, two-way mixed effects intraclass correlation coefficient (ICC) models, and linear regression models.

RESULTS—We found good to excellent agreement between child and parent reports of pain intensity and HRQOL. Average absolute discrepancy scores of pain intensity and HRQOL were 0.6 points and 7.8 points, respectively. Pearson product-moment correlation coefficients were 0.74 and 0.80, and ICCs were 0.72 and 0.79, for pain intensity and HRQOL respectively. Regression coefficients for models examining pain intensity and HRQOL were 0.93–0.98 and 1.0, respectively.

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Conflicts of Interest: None

CONCLUSIONS—Although child and parent reports may both contribute important information, parent report is a valid proxy for child self-reported pain intensity and HRQOL after discharge from inpatient pediatric surgery, which may prove important for better understanding pain experiences and intervention needs.

Keywords

pain; quality of life; pediatrics; inpatients

Introduction

Despite a focused effort in recent years to document and address postsurgical pain, pain remains a significant issue for children undergoing inpatient surgery, both in the hospital and after discharge.^{1–3} About 50% of children experience moderate-severe pain in the hospital after inpatient surgery.¹ While many recover well, recent research has shown that a significant portion of children have poorer recovery. In children undergoing general, orthopedic, neurologic, plastic, cardiac, urologic, and oral surgeries in the inpatient setting, around 10% of children experience intense pain and deterioration in their physical and psychosocial health-related quality of life (HRQOL) at one month following hospital discharge.⁴ Children following a poorer pattern of recovery at home are also at risk for developing longer-term problems with pain and poor physical and psychological functioning.⁵ Among children undergoing invasive general or orthopedic surgeries (e.g. spinal fusion), about 20% experience chronic postsurgical pain even at one year after surgery.^{4,6} Whereas routine postsurgical follow up is often limited to a single postoperative visit for many surgeries, these recent findings indicate that it is important to implement closer patient monitoring during the initial days and weeks following hospital dismissal. This may help identify those children experiencing persistence of pain and poorer recovery at home in order to implement targeted treatment.

Large scale monitoring of pain and health status in children after hospital discharge from surgery presents logistical challenges to healthcare systems. Obtaining child self-report presents further challenges once the child has left the hospital and returned to school and activities. While child self-report and parent-reports each provide important perspectives on pain and health outcomes, parent reports are often relied on when a child is not well enough to respond on their own.⁴ Parent report of their child's pain is based on observation of the child's verbal and non-verbal expressions of pain, and is influenced by their own appraisal and potential biases.⁷ It is unknown whether parent reports are a valid proxy for child self-reports of pain intensity or HRQOL in children after surgery.

The Pediatric Quality of Life Inventory, Version 4.0 Generic Core Scales (PedsQL™) has been used extensively in healthy and medical populations to assess HRQOL of children and demonstrates good construct validity, predictive validity, and responsiveness in outpatient and inpatient pediatric patients.^{8,9} Parent-proxy reporting on the PedsQL™ is widely used in medical patients. A number of studies have evaluated agreement between parent and child ratings of HRQOL using the PedsQL™ in healthy patients or in medical patients, with high correlations found in samples of children with medical problems.^{10–16} A few studies include

patients who underwent surgery as part of their treatment for a specific condition, but do not specifically evaluate these patients independently of their non-surgical counterparts.^{17,18} Agreement between parent proxy- and child self-reports of HRQOL using the PedsQL™ has not been examined in surgical patients. Parent-child agreement on pain intensity in surgical settings has been predominantly examined during the immediate postoperative setting after minor surgery.^{19,20} These studies show good agreement between parent and child reports of pain intensity in this context. It is unknown if parent-child agreement on pain intensity is consistent in the weeks following inpatient surgery when pain is being managed in the home setting, where it is often necessary to rely on parent reports.

This study therefore aimed to characterize agreement between parent proxy- and child self-reports of pain intensity and HRQOL at home at 1–2 months after hospital discharge by (1) examining discrepancy between parent proxy- and child self-reports of pain intensity and HRQOL, and (2) assessing concordance between parent proxy- and child self-reports of pain intensity and HRQOL and examining concordance by child age and sex. Based on prior literature, we hypothesized that there would be good agreement between parent proxy- and child self-report of pain intensity and HRQOL.^{10–17,19–21}

Methods

Study Population

Participants were 295 children aged 8–18 who underwent inpatient surgery at a specialty children's hospital in the Northwestern US between January 2012 and September 2015, and their parents or legal guardian. Children were eligible for the study if they were (1) aged 8–18 at the time of surgery, and (2) could speak and read English or Spanish. Age eight was established as the minimum cutoff for the patient sample as eight is the lower age limit for which the numerical rating scale for pain has been validated for self-report after surgery.²² Children were excluded from the study if (1) they had cognitive disability, (2) they did not live with their parent, (3) their parent was unable to speak or read English or Spanish, (4) child protective services were involved for suspicion of child abuse during the admission, (5) the child was in protective isolation for infection prevention, or (6) the family had been approached to participate during a prior admission within the past 2 months. Parent-reported data of 66 participants were previously included as part of a larger sample of 915 children in a manuscript assessing predictors of health-related quality of life after surgery⁴. In the prior study, child report data was only available for a small sub-sample of participants; child-reported data has not previously been published.

Procedures

The infrastructure of the Outcomes Assessment Program (OAP) at a tertiary care children's hospital was used for data collection. This program routinely collects data on patient HRQOL and family experiences with healthcare from all eligible, consenting families with a child admitted to the hospital. These data are used to track hospital performance and conduct quality improvement projects. For the purposes of this study, we added questions about pain to the ongoing data collection, and offered children a \$10 gift card for completion of assessments to encourage child participation.

After approval by the Institutional Review Board, eligible families were recruited on the inpatient surgical unit by trained OAP research assistants within 72 hours after surgery. Research assistants obtained verbal consent from parents and assent from children. Families then completed OAP admission surveys and provided contact information for the follow up assessment. Participants were contacted by phone or email to complete follow-up surveys at 4 to 8 weeks after hospital discharge. Surveys were administered online through a secure web portal, or over the phone by a research assistant who then entered responses via the web portal, based on the parent's preference. Parents and children were asked to complete the surveys independently. Parents and children reported on the child's current pain intensity and the child's HRQOL during the past 7 days. To address the present aims, only the follow up assessment was included in this study. During the enrollment timeframe of this study, 674 dyads completed OAP admission surveys of which 295 (44%) participated in this follow up assessment. Thus 295 dyads were included in this study. Of those 295 dyads, 294 dyads completed the HRQOL assessments and 243 dyads completed the pain intensity assessments.

Measures

Demographics—Demographic factors (child sex and age), surgical service, and hospital length of stay were collected from the electronic medical record by OAP research assistants. Parents provided additional demographic data including child race, ethnicity, and caregiver education level as part of admission survey.

Pain intensity—Children rated their pain intensity experienced that day using an 11-point Numerical Rating Scale (NRS), with a score of 0 indicating “no pain” and a score of 10 indicating “worst possible pain.” Parents provided proxy-report of pain experienced by their child on a similar NRS. Numeric rating scales for pain intensity have been found to be valid and reliable in children of this age range during the perioperative period.²²

HRQOL—Children reported HRQOL using the PedsQL™, which is a tool consisting of 23 items that assess patients on four domains: physical functioning, emotional functioning, social functioning, and school functioning.⁹ Children reported problems performing functions over the past 7 days using a Likert-type scale, with 0 indicating “never a problem” to 4 indicating “almost always a problem.” Each response was reverse-scored and linearly transformed to a 0–100 scale (0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0). Responses in each domain were averaged for Total HRQOL, and two summary scores (Physical Health and Psychosocial Health), with higher scores reflecting better HRQOL. The Physical Health summary score consists of scores from the physical functioning domain, and the Psychosocial Health summary score consists of scores from the emotional, social, and school functioning domains. Parents provided proxy-reporting of their child's quality of life on the parent version of the PedsQL™. The PedsQL™ has been found to be valid and reliable in children of this age range and their parents.²³

Medical complexity—Medical complexity was determined using the Pediatric Medical Complexity Algorithm (PMCA).²⁴ This algorithm places children into three medical complexity categories based on up to three years of retrospective *International Classification*

of Diseases, Ninth Revision, Clinical Modification (ICD-9) codes available in administrative hospital discharge billing data. Children are classified as having no chronic illness (eg, bronchiolitis), noncomplex chronic illness (eg, asthma), or complex chronic illness (eg, asthma and epilepsy).

Statistical Analysis

Analysis was conducted at the level of the patient admission so multiple entries for each parent-child dyad were possible in children readmitted to the hospital after two months within the study time frame. We therefore used only the first admission, and removed readmissions (n=6) from the dataset.

We used t-tests and chi-square tests to compare demographic data between families that completed the follow-up survey and those that did not. Absolute discrepancy scores (absolute value of parent score minus child score) were calculated to describe the magnitude of the difference between parent proxy- and child self-reported pain intensity and HRQOL scores. Higher scores indicate a greater discrepancy between parent proxy- and child self-report. Histograms (Figure 1) were included to represent the magnitude and direction of discrepancy between parent proxy- and child self-report visually. Bland-Altman plots (Figure 2) were included to display differences between and means of child and parent reports at different levels of pain and HRQOL. Values for means and differences were rounded to the nearest ten.

We used multiple statistical approaches to examine agreement between parent proxy- and child self-report of pain intensity, Total HRQOL, Physical Functioning, and Psychosocial Functioning, including Pearson correlation, intraclass correlation (ICC), and linear regression models. The Pearson product-moment correlation coefficient (Pearson's r) was used to assess correlation between parent proxy- and child self-reports of pain intensity and HRQOL scores as continuous variables.²⁵ Effect sizes for the Pearson's r were interpreted as follows: 0.1–0.29, small; 0.30–0.49, medium; and 0.50, large.²⁶ A two-way mixed effects ICC model was used to measure concordance between parent proxy- and child self-reports of pain intensity and HRQOL for individual parent-child dyads. Consistent with methods used in PedsQL™ development, we defined ICC cutoffs as follows: 0.4, poor to fair agreement; 0.41–0.60, moderate agreement; 0.60–0.80, good agreement; and 0.81–1.00, excellent agreement.^{23,27} Linear regression models were used to determine the association between parent proxy- and child self-report of pain intensity and PedsQL™ scores. Separate models were conducted for pain intensity, Total HRQOL, Physical Functioning, and Psychosocial Functioning. Multivariate regression models were conducted to examine the influence of sex, age, race/ethnicity, parent education level, and medical complexity on the relationship between child and parent reports. Linear regression models were also conducted to examine the influence of child HRQOL on pain agreement and child pain on HRQOL agreement.

Results

Descriptive Statistics

Demographic and clinical information for the study sample is shown in Table 1. Patients were on average 12.7 years ($SD = 2.5$). Fifty-six percent of children were without chronic medical conditions. Patients underwent a range of surgical procedures with the majority of the patients (73%) undergoing orthopedic or general surgery. Patients were admitted to the hospital for an average of 2.5 days (range 1–19). There were no differences in demographic characteristics between families that responded to the follow-up survey and those that did not ($p's > 0.05$).

Summary statistics and absolute discrepancies for pain intensity and HRQOL scores for the whole sample and by sex and age category (8–12 and 13–18) are summarized in Table 2. Mean parent and child scores of pain intensity were 0.8 and 1.0 respectively. Twenty-five patients (10%) had a pain score of 4, indicating moderate-severe pain.²⁸ There was a mean absolute difference of 0.6 points between parent and child reports of pain intensity. Mean parent and child scores of total HRQOL were 80.3 and 82.4 respectively. There was a mean absolute difference of 7.8 between parent and child reports of Total HRQOL. Figure 1 shows histograms of the raw discrepancies between parent proxy- and child-self report for pain intensity and Total, Physical, and Psychosocial HRQOL at follow-up.

Agreement between parent proxy- and child self-report of pain and HRQOL

Pearson product-moment correlations, intraclass correlations, and linear regressions for parent and child pain intensity and HRQOL scores are shown in Table 3. The Pearson product-moment correlation coefficients had large effect sizes for pain intensity ranging from 0.68 to 0.79, and for total HRQOL ranged from 0.76 to 0.82. Intraclass correlation coefficients showed good agreement for pain intensity ranging from 0.65 to 0.77, and good to excellent agreement for total HRQOL ranging from 0.75 to 0.81. Regression coefficients for pain intensity ranged from 0.93 to 0.99. Regression coefficients for total HRQOL were 1.0 for the sample and all subsets. Regression coefficients for parent proxy-report of pain and HRQOL variables were similar in models adjusted for sex, age, race, medical complexity, and parent educational level; none of the covariates changed the relationship between parent-child agreement in the regression models ($P's > .05$). Additionally, HRQOL and pain were not significant covariates in the pain and HRQOL models, respectively.

Discussion

To our knowledge, this is the first study to examine agreement between parent proxy- and child self-reports of pain intensity and HRQOL after hospital discharge in a pediatric surgical population undergoing a wide variety of inpatient surgeries. As hypothesized, we found good agreement between parent proxy-reports and child self-reports of pain intensity and HRQOL at 1–2 month post-discharge follow-up, across subsets of sex and age. Although child self-reports and parent proxy-reports both provide valuable information on pain intensity and HRQOL, our findings suggest that parent proxy-reports are valid for

assessing follow-up of patient-centered outcomes in children after discharge from inpatient surgery.

In line with our study findings, prior studies of parent-child agreement on pain intensity in children of a similar age range also report good agreement in the initial days after surgery. Two studies of children evaluated after minor outpatient surgery found correlations of 0.76 and 0.54 between parent proxy- and child self-report of pain intensity, while another study of children evaluated 48 hours after general, orthopedic, urologic, or plastic surgeries found a correlation of 0.71.^{19–21} In contrast to our study, these prior studies were small and only recorded pain intensity within the first 48 hours after surgery. Our study expands this literature by using a robust study sample and measuring agreement between parent proxy- and child self-reports of pain intensity 1–2 months after discharge.

Our findings of good agreement between parent proxy- and child self-report of HRQOL are consistent with results from pediatric studies in medical patients.^{10–17} A study of pediatric asthma patients found that parent proxy- and child self-reports of Total, Physical, and Psychosocial HRQOL had moderate to excellent correlation,¹⁵ while a study of pediatric rheumatology patients found that parent proxy- and child self-reports of Total, Physical, and Psychosocial HRQOL had moderate to good correlation.¹⁶ Similarly, parents and children in our study also had good agreement on HRQOL outcomes across both physical and psychosocial domains. Our study extends this work to pediatric postsurgical patients. Integrating patient-centered HRQOL measures that capture aspects of physical and psychosocial functioning with pain reports can help capture the broader impact of surgery and subsequent pain.

Prior research shows that while the majority of children recover uneventfully after inpatient surgery, a significant subgroup develop longer-term problems with pain and health-related quality of life after discharge which is already apparent during the initial weeks of recovery.⁴ Although the average child self-report pain score was 1.0, 10% of patients had a pain score 4 at 4–8 weeks after surgery, indicating moderate-severe pain. This is consistent with prevalence rates reported in similar studies, and highlights the importance of assessing patient-centered outcomes in children after hospital discharge to identify and treat problems with pain and recovery at home after surgery.⁴ Research is critically needed to examine the feasibility of broad monitoring of pain intensity and HRQOL outcomes after surgery and real-time integration of results into clinical practice. In addition to impacting individual patient care, broad monitoring of postsurgical outcomes could improve hospital performance by tracking variation in postsurgical outcomes with changes in hospital systems and protocols, in order to improve health outcomes in children.

The strengths of our study include a broad study sample composed of pediatric inpatients that underwent a variety of surgical procedures leveraging large-scale data collection in a clinical setting. A further strength is the use of multiple statistical methods to characterize and assess agreement between parent proxy- and child-self reports. All methods found consistently good agreement between parent and child reports, supporting the robustness of our results. Previous research of parent-child agreement in reports of pain intensity has highlighted the inadequacy of only using correlations to analyze agreement between parent

proxy- and child self-reports of pain intensity.¹⁹ By supplementing statistical tests of agreement with absolute discrepancy scores, histograms, and Bland-Altman plots, our study more comprehensively describes the nature of discrepancies in parent proxy- and child self-reports of pain intensity and HRQOL. Child self-reports and parent proxy-reports provide valuable yet different perspectives of postsurgical recovery, as children report on their internal experiences while parents report on their own appraisal of their child's expression of pain. As our understanding of these progresses, we may be able to better tailor questionnaires. In future research, interviews with parent-child dyads, especially for non-agreeing outliers, may further supplement our understanding of the reasons for discrepancies between parent proxy- and child self-reports of pain and HRQOL.

Our findings should be interpreted in the light of the following limitations. This study was conducted at a tertiary care children's hospital, and the population served at our hospital may be different compared to other settings. For example, only about half of our sample was without a chronic medical condition. However, presence of a chronic medical condition did not influence agreement between parent and child reports, suggesting that these findings may be generalizable to other settings. Another limitation was that a large portion of potentially eligible participants were not included due to failure of children to complete surveys at follow-up. While there were no baseline differences between respondents and non-respondents, this may have biased results. Furthermore, as our study sample excluded patients with intellectual disability, non-English or non-Spanish speaking patients, and patients younger than the age of 8, these groups of patients require further study. In addition, although child and parent participants were given instructions to complete online surveys separately, there is a possibility that child and parent participants influenced the other's responses. Because the method of survey completion was not documented in the database, we were unable to compare agreement by survey method to examine this influence.

In summary, we found good agreement between parent proxy- and child self-report of pain intensity and HRQOL in a population of pediatric surgical patients 4–8 weeks after surgery. In this setting, it may be reasonable to substitute parent proxy-report for child self-report when the child is too sick or not available to participate. Future research is needed to examine the feasibility of broad monitoring of pain intensity and HRQOL outcomes after surgery and real-time application of outcomes to clinical practice.

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What's New

This is the first study to examine agreement between parent and child reports of pain intensity and HRQOL in an inpatient pediatric surgical population after discharge. Parent-report is a valid proxy for child self-reported of these metrics in this setting.

Figure 1.

Distribution of raw discrepancy scores between parent proxy- and child self- reported pain intensity (a), total (b), physical (c), and psychosocial health-related quality of life (d).

Figure 2.
Bland-Altman plots showing means of and differences between child and parent (1) pain intensity, and (b) HRQOL scores

Table 1**Demographic and Clinical Characteristics of Children and Parents**

	Respondents (N= 295)	Non-Respondents (N = 369)
	n, %	n, %
Child age		
8–12	134, 45%	169, 46%
13–18	161, 55%	200, 54%
Child female sex	160, 54%	187, 51%
Child race/ethnicity		
White	180, 61%	225, 61%
Black	4, 1%	8, 2%
Hispanic	43, 15%	61, 17%
Asian	15, 5%	21, 6%
Other/mixed/unknown	53, 18%	54, 15%
Child language		
Spanish	20, 7%	33, 9%
English	275, 93%	336, 91%
Child PMCA ^a category		
No chronic illness	164, 56%	197, 53%
Noncomplex chronic illness	79, 27%	102, 28%
Complex chronic illness	52, 18%	70, 19%
Surgical specialty		
Cardiac Surgery	3, 1%	4, 1%
General Surgery	117, 40%	145, 39%
Neurosurgery	12, 4%	15, 4%
Oral and Maxillofacial Surgery	8, 3%	11, 3%
Orthopedics	98, 33%	131, 36%
Otolaryngology	29, 10%	27, 7%
Plastic Surgery	17, 6%	17, 5%
Urology	11, 4%	19, 5%
Length of stay		
<3	205, 69%	273, 74%
3	90, 31%	96, 26%
Parent education level		
< High school	20, 7%	31, 8%
High school graduate	36, 12%	59, 16%
Some college	94, 32%	119, 33%
Bachelor's degree	144, 49%	157, 43%
Other/ not reported	1, <1%	3, <1%

	Respondents (N= 295)	Non-Respondents (N = 369)
	n, %	n, %
Parent age		
18 to 34	28, 9%	50, 14%
35 to 44	148, 50%	184, 50%
45 to 74	116, 39%	131, 36%
Other/ not reported	3, 1%	4, 1%

^aPMCA – Pediatric medical complexity algorithm

Table 2

Parent- and Child-Reported Pain Intensity and Total, Physical, and Psychosocial HRQOL Scores by Sex and Age

	n	Parent Report, Mean (SD)	Child Report, Mean (SD)	Discrepancy Score ^a
Pain Intensity^b				
Sample	243	0.8 (1.5)	1.0 (1.7)	0.6
Female	138	0.9 (1.6)	1.1 (1.9)	0.6
Male	105	0.6 (1.2)	0.8 (1.4)	0.5
8–12	114	0.6 (1.3)	0.9 (1.7)	0.6
13–18	129	0.9 (1.6)	1.1 (1.7)	0.6
Total HRQOL^c				
Sample	294	80.3 (17.9)	82.4 (17.9)	7.8
Female	160	77.9 (19.4)	80.2 (19.1)	7.8
Male	134	83.1 (17.4)	85.0 (16.1)	7.8
8–12	134	82.9 (17.4)	84.5 (15.7)	7.4
13–18	160	78.1 (19.2)	80.6 (19.5)	8.1
Physical HRQOL				
Sample	294	75.5 (26.0)	78.1 (24.4)	10.0
Female	160	72.1 (26.8)	75.1 (25.6)	10.7
Male	134	79.6 (24.0)	81.8 (22.6)	9.2
8–12	134	79.3 (25.0)	81.8 (21.2)	9.4
13–18	160	72.4 (26.0)	75.1 (26.5)	10.6
Psychosocial HRQOL				
Sample	294	85.0 (15.0)	86.6 (15.1)	7.9
Female	160	83.6 (15.4)	85.3 (16.5)	7.9
Male	134	86.6 (14.4)	88.3 (13.3)	7.9
8–12	134	86.4 (14.1)	87.3 (14.1)	7.5
13–18	160	83.8 (15.6)	86.1 (16.0)	8.3

^aDiscrepancy score – absolute value of parent score minus child score

^bPain intensity – numeric rating scale (0–10, higher score indicates greater pain intensity)

^cHRQOL – health-related quality of life (PedsQL; 0–100, higher score indicates better HRQOL)

Table 3
Agreement between Parent proxy- and Child self-reported Pain Intensity and HRQOL^a Scores

	N	Pearson Correlation			ICC		Regression		
		r	P		ICC	95% CI	Beta	P	
Pain Intensity									
Sample	243	0.74	<0.0001		0.72	0.66–0.78	0.97 (0.88–1.06)	<0.0001	
Female	138	0.76	<0.0001		0.74	0.66–0.81	0.98 (0.86–1.10)	<0.0001	
Male	105	0.69	<0.0001		0.67	0.56–0.76	0.93 (0.78–1.09)	<0.0001	
8–12	114	0.68	<0.0001		0.65	0.54–0.75	0.98 (0.82–1.15)	<0.0001	
13–18	129	0.78	<0.0001		0.77	0.70–0.84	0.96 (0.85–1.06)	<0.0001	
Total HRQOL ^b									
Sample	294	0.80	<0.0001		0.79	0.75–0.83	1.0 (1.00–1.03)	<0.0001	
Female	160	0.82	<0.0001		0.81	0.75–0.86	1.0 (0.99–1.04)	<0.0001	
Male	134	0.76	<0.0001		0.75	0.67–0.82	1.0 (0.99–1.03)	<0.0001	
8–12	134	0.77	<0.0001		0.76	0.68–0.82	1.0 (0.98–1.03)	<0.0001	
13–18	160	0.81	<0.0001		0.81	0.75–0.86	1.0 (1.00–1.04)	<0.0001	
Physical HRQOL									
Sample	294	0.79	<0.0001		0.79	0.74–0.83	1.0 (0.98–1.03)	<0.0001	
Female	160	0.79	<0.0001		0.78	0.71–0.83	1.0 (0.97–1.04)	<0.0001	
Male	134	0.79	<0.0001		0.78	0.71–0.84	1.0 (0.97–1.04)	<0.0001	
8–12	134	0.77	<0.0001		0.75	0.67–0.82	1.0 (0.96–1.03)	<0.0001	
13–18	160	0.80	<0.0001		0.80	0.74–0.85	1.0 (0.98–1.05)	<0.0001	
Psychosocial HRQOL									
Sample	294	0.68	<0.0001		0.67	0.61–0.73	1.0 (0.99–1.03)	<0.0001	
Female	160	0.70	<0.0001		0.70	0.61–0.77	1.0 (0.99–1.03)	<0.0001	
Male	134	0.64	<0.0001		0.63	0.52–0.72	1.0 (0.98–1.03)	<0.0001	
8–12	134	0.69	<0.0001		0.69	0.59–0.77	1.0 (0.98–1.02)	<0.0001	
13–18	160	0.68	<0.0001		0.66	0.57–0.74	1.0 (1.00–1.04)	<0.0001	

^aHRQOL – health-related quality of life (PedsQL; 0–100, higher score indicates better HRQOL)

numerical rating scale (0–10, higher score indicates greater pain intensity)

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