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Relationship between Daily Mood and Migraine in Children

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Abstract

Background—Retrospective and cross-sectional studies have suggested a bidirectional relationship between migraine and mood disturbance.

Objective—The present prospective daily diary study examined the prevalence and temporal associations between migraine and daily mood, mood and next-day headache, and headache and next-day mood.

Methods—Sixty-nine children (50 females, 19 males) between the ages of 7–12 years and their parents attending neurology clinic appointments and having a diagnosis of migraine as defined by ICHD-II criteria completed measures on quality of life, headache disability, child emotions and child behaviors. Children and parents then recorded children's headache occurrence, headache duration, headache severity, mood, daily hassles, and medication use on paper diaries once a day for two consecutive weeks. "Mood" was defined using the facial affective scale, which is a visual representation of negative and positive affect. Data were analyzed using multilevel models.

Results—Controlling for age, sex, quality of life, headache disability, and medication use, worse mood was associated with same-day occurrence, longer duration and more severe headache in both child and parent report. Today's mood was not consistently associated with next-day headache and today's headache was not associated with next-day mood in either child or parent report.

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Conflicts of Interest: No conflict.

Conclusions—Results of this study lend support for a complex relationship between mood and headache in children with migraine. More research is needed to further elucidate the temporal nature of this relationship within a given day and over an extended period of time.

Keywords

children; migraine; mood; daily hassles; daily diary

Research in the general pain literature has shown that presence of a pediatric chronic pain condition, such as recurrent abdominal pain[1] and juvenile fibromyalgia syndrome,[2] is related to increased symptoms of depression relative to children without recurrent abdominal pain and healthy norms. The reverse relationship has also been reported for children, where symptoms of depression are associated with the presence of pediatric chronic pain[3–5] and functional disability from chronic pain.[1,3,6,7] Research on the relationship between mood disturbance and recurrent headache in children and adolescents has suggested a similar complex relationship. Cross-sectional and retrospective studies have identified an association between primary headaches in children and higher levels of anxiety and depressive mood symptoms relative to healthy controls.[8–13] Headache has been found to be more prevalent among girls who meet diagnostic criteria for an anxiety disorder or depression compared to girls who do not meet diagnostic criteria for an anxiety disorder or depression.[14,15] A study utilizing standardized assessment tools and face to face interviews with169 youth with chronic daily headache and chronic migraine found no increased rate of mood disorders compared to the general population and no relationship between mood disorders and headache frequency, duration, or severity.[16] This study did find though that children with comorbid headache and psychiatric disorders reported greater headache-related disability and poorer quality of life.

A prospective study involving 776 youth age 9 to 18 years found that increases in depressive symptoms over time was associated with new onset chronic migraine or chronic headache two and nine years later.[15] A prospective study of 78 children, age 6–16 years, found that subjects with chronic migraines were no more anxious than their peers without headache but that anxious children experienced more frequent and severe headaches over the course of the 4-month follow-up period.[17] A bidirectional relationship between depressive symptoms and headache at initial assessment and follow-up has been suggested. In a large nationally representative sample of 6,072 adolescents, recurrent headache at initial assessment was associated with depressive symptoms measured at one-year follow-up.[18] Depressive symptoms measured at initial assessment was also associated with headache at one-year follow-up. Though both pathways were significant in this study, the strength of the relationship between depressive symptoms as a predictor of headache was greater in magnitude.

The potential bidirectional relationship between mood and pediatric headache, whether negative mood triggers increased headache or whether the experience of headache leads to increased negative mood in children and adolescents, has yet to be examined at the daily level.[19,20] The current study examined temporal daily associations between headache and normal fluctuations of daily mood in children with migraines to explore the following

questions: (1) Is worse mood associated with the occurrence of a headache, longer headache duration, or more severe headache on the same day?, (2) Is worse mood associated with the occurrence of a headache, longer headache duration, or more severe headache the next day?, and (3) Is the occurrence of a headache, longer headache duration, or more severe headache associate with worse mood the next day?

METHOD

Participants

Institutional Review Board approval was granted for this study at all recruitment institutions. Informed consent was obtained from parent/legal guardian (parent) participants and assent from child participants. A multicenter, prospective daily diary methodology was used. This study was based on baseline data collected from December 2004 to March 2010 for a larger cognitive-behavioral intervention study for children with primary headaches. Participants were recruited for this study from three tertiary medical centers: (1) the Pediatric Neurology Division of the University of Kansas Medical Center, (2) the Outpatient Neurology Division of Children's Mercy Hospitals and Clinics in Kansas City, and (3) the Headache Center in the Division of Neurology of Cincinnati Children's Hospital Medical Center. Children and a parent were invited to participate. Study inclusion criteria for child participants were (a) being 7 to 12 years of age; (b) having recurrent, episodic, headaches that met the ICHD-II for migraine without aura or migraine with aura;[21–23] and (c) having a headache occurring at least once per week[24] by parent or child report and separated by symptom-free periods (to provide adequate variability). Children were excluded if: (a) their medical history and/or neurological exam suggests that their headaches are secondary to another physical or developmental condition; (b) their parent reports they have been diagnosed with a mental health condition or they are receiving concurrent psychotherapy; (c) the child and/or their parent do not speak English; or (d) their parent reports they have headaches on average less than once per week.

Seven-hundred thirty-eight children were screened for eligibility to participate in this study. Five hundred eleven (69%) children did not meet inclusion criteria due to having headaches less than once per week. Sixty-four (9%) families declined to participate. Ninety-four participants (13%) were excluded due to greater than 20% missing data. Participants with complete data were more likely to be female, $\chi^2_{(1)} = 5.25$, $p < .05$, be White, non-Hispanic, $\chi^2_{(1)} = 3.98$, $p < .05$, have more frequent headaches on child report, $t(35.74) = 2.93$, $p < .01$, and have more negative mood on parent report, $t(94) = 2.48$, $p < .05$, compared to participants with incomplete data. The final sample included 69 child-parent dyads.

Child participants were 10 ± 1.6 years old, primarily female (72.5%), and 82.6% were White, non-Hispanic (Table 1). Approximately 70% of parent participants were married. The majority of mothers (95.6%) and fathers (86.2%) completed the 12th grade and 75.4% of parents reported an annual family income greater than $30,000 (*Median* = $50,001–$70,000). The only significant difference in demographic information between study sites was that children recruited from the University of Kansas Medical Center had a longer time since headache diagnosis ($M = 18.8 \pm 20.6$ months) compared to children recruited from Children's Mercy Hospitals and Clinics ($M = 7.7 \pm 15.1$ months), $t(45) = 2.17$, $p = .04$.

Measures

Demographics—Data on child's age, sex, grade in school, time since diagnosis of headache, parent age, parent marital status, parent education, and family income were collected on a demographics questionnaire completed by the parent.

Medication Use—Parents reported the types and dosages of prescribed medications and over-the-counter medications at baseline. Parents and children also reported daily medication use for headaches in daily headache diaries. Daily medication types were coded into classes: acetaminophen, antihistamine, beta-blocker, dihydroergotamine, nonsteroidal anti-inflammatory drug, preventative medicine, steroid, tricyclic antidepressant, triptan, and other.[25] The total number of medication classes used each day was then summed and controlled for in analyses.

Child Behavior Checklist (CBCL)/6–18—The CBCL/6–18[26] is a parent report of children age 6 to 18 years' competencies and difficulties over the past six months. The CBCL assesses leisure activities, school, and social competencies, as well as a wide range of behavioral and emotional problems. Responses are 0 = not true, 1 = somewhat or sometimes true, and 2 = very or often true. This study reported a Total Problems T-score, where above 70 is in the clinical problems range.

PedsQL 4.0—The PedsQL 4.0[27,28] encompasses the essential core domains for pediatric health-related quality of life specified by the World Health Organization. Children report on aspects of physical functioning, emotional functioning, social functioning, and school functioning. Total scores for chronically ill (M = 77.2), acutely ill (M = 78.7), and healthy children (M = 83.0), differ significantly between groups according to child and parent report.[27] In the current study, Cronbach's alpha ranged from 0.66 to 0.90 for both child and parent report.

PedMIDAS—The PedMIDAS assesses headache-related disability during the past three months at school, home, sports and social activities.[29,30] Responses are summed and then graded as reflecting little to none (Grade I), mild (Grade II), moderate (Grade III), and severe disability (Grade IV).[31] The PedMIDAS correlates significantly with frequency, duration, and severity of headache and is sensitive to treatment response. Cronbach's alpha for the present study was 0.77 for child report and 0.81 for parent report.

Headache diaries—The dependent variables of headache occurrence, duration, and severity were derived from daily headache diaries.[32,33,34] A daily mood rating,[35,36,37] daily hassles rating,[38] and daily medication use score were also derived from the headache diaries. Children and parents were asked to independently complete a diary entry before going to bed each day. Headache diaries were provided in the form of a paper booklet that contained entries for one week.

HEADACHE OCCURENCE: Children reported whether or not they had a headache that day by circling yes or no. Two items were available each day in the event of more than one

headache.[32] A dichotomized score of 0 = no headache or 1 = one or more headaches was used in analyses. Parents reported child daily headache occurrence using the same method.

HEADACHE DURATION: Children reported daily headache duration by recording the time a headache started and the time it stopped. Two items were available each day in the event of more than one headache with the sum of the separate durations being used in analyses. Parents reported child daily headache duration using the same method.

HEADACHE SEVERITY: Daily headache severity was rated using a visual analog scale (VAS) ranging from 0 millimeters (no pain) to 60 millimeters (severe pain).[39] Millimeter scores were converted to a 6 centimeters scale by dividing by 10. Two scales were available to children each day in the event of more than one headache, with the mean of the separate severities being used in analyses. Parent report of child headache severity was assessed using a four point Likert scale item where 1 = mildly painful and 4 = extremely painful.

MOOD: Using the Facial Affective Scale (FAS), children were asked to mark the face that captured how he or she felt "deep down inside" today to obtain a daily mood rating. [35,36,37] The FAS is nine faces that vary in their expression of distress ranging from a very upset face to a very happy face.[35,36,37] Numerical values have been determined experimentally and transformed to a 0–1 scale with maximum negative affect equal to 1 and maximum positive affect equal to 0. The FAS has been used as a measure of general mood in previous research with children.[38,40,41,42] In the current study, FAS mood ratings were reverse scored so that lower values corresponded to worse mood. Parents reported child mood using the same method. Worse child-reported ($r = -.11$, $p = .001$) and parent-reported ($r = -.09$, $p < .01$) mood on the FAS were significantly correlated with more problems on the CBCL.

DAILY HASSLES: Each day children circled any number of 17 common potentially stressful events from a "daily events inventory".[38] This daily events inventory demonstrated acceptable internal consistency ($\alpha = 0.70$) and sensitivity to changes in stressful events across days.[38] The number of stressful events circled was summed for each day to provide a daily hassles rating. Daily hassles ratings were only available for child report.

Procedures

Potential child participants were identified by a physician, advanced practice nurse, or clinic nurse at a regularly scheduled neurology appointment and then approached in person or over the phone regarding study participation by a research assistant. Research assistants conducted a brief screening interview to determine initial eligibility and obtained informed consent. Participating families were then provided two weeks of child and parent headache diaries, the CBCL,[26] the child and parent version of the PedsQL 4.0,[27,28] and PedMIDAS.[29,30] Research assistants called families each week to remind them to complete the headache diaries and surveys. Families then mailed back headache diaries and surveys.

Analysis

Demographic characteristics of the sample were summarized using descriptive statistics in the Statistical Package for the Social Sciences Version 19.0 (SPSS 19.0; Table 1).

According to standard recommendations of the authors the subscale mean was imputed for missing data (1.5%) on the PedsQL 4.0[27,28] and the total scale mean was imputed for missing data (1.1%) on the PedMIDAS.[29,30] Between group differences were examined using Analysis of Variance (ANOVA) and independent sample *t*-tests for continuous data and chi-squared test for categorical data. Pearson correlations were used to assess the relationship between continuous predictor and outcome variables. Analyses of within-subject changes over time were conducted using "intercepts- and slopes-as-outcomes" hierarchical linear models (HLM) with a logit link function in HLM software for the dichotomous headache occurrence outcome variable[43] and maximum likelihood estimation multilevel modeling (MLM) in LISREL 8.71 for all other outcome variables.[44] Missing child (3.6%) and parent (5.3%) daily diary data were handled in HLM and MLM analyses which uses full information maximum likelihood estimation to examine the temporal relationship between variables and can account for differences in numbers of observations (diary days) due to missing data.[45,46] Specifically, up to 14 diary days were nested within 69 participants. *Level 1* variables were those measured on a repeated basis (e.g., headache duration, mood, medication use). Variables that were measured once (i.e., child age, child gender) contained only between person variance and were modeled as *Level 2* variables. To examine the independent relationships between daily mood, daily hassles, and headache, the variables age, gender, quality of life and headache-related disability were controlled for in all analyses. Same-day variables (i.e., headache and mood) were controlled for in next-day analyses. A significance threshold of $p < .05$ was used throughout analyses.

RESULTS

Descriptive statistics

Subjects reported Grade II headache-related disability on the PedMIDAS and a PedsQL 4.0 quality of life score consistent with pediatric chronic illness (Table 2). During the two week study period, children reported experiencing a mean of 7.2 ± 5.0 headaches (*Median* = 6.0, range = 1–24). Mean headache duration was 5.0 hours (± 4.6 hours) and mean headache severity was moderate (range = 0.1–6.0) on a 6 cm VAS scale. Child-reported mood was generally positive and children reported a mean of one daily hassle.

Parent report of headache occurrence, headache duration, headache severity, mood, quality of life, and headache-related disability correlated highly with child report, as shown in Table 2. Parents reported Grade II headache-related disability on the PedMIDAS, a quality of life score consistent with pediatric chronic illness on the PedsQL 4.0, and normal behavioral functioning on the CBCL. During the two week study period, parents reported a mean of 7.1 ± 4.8 headaches (*Median* = 7.0, range = 1–24). Mean parent-reported headache duration was 5.1 hours (± 4.6 hours) and mean headache severity was moderate on a 4 point scale. Parent-reported mood was slightly worse than child-reported mood but still generally positive.

Daily medication use

Children reported using at least one medication on 22.7% of the study days and parents on 26.0% of the study days as a response to their headache. The most frequently used categories of medications were over the counter medications, including nonsteroidal anti-

inflammatory drugs (child report = 12.0% of days; parent report = 15.5% of days) and acetaminophen (child report = 5.3% of days; parent report = 6.4% of days). Other medication categories reported by children as used in response to headache were antihistamines (0.3% of days), betablockers (0.7% of days), dihydroergotamine (0.2% of days), preventative medicine (1.8% of days), steroids (0.5% of days), tricyclic antidepressant (0.3% of days), triptan (1.2% of days), and other (0.4% of days). More total medication categories used that day correlated with longer same-day headache duration ($r = .30$, $p < .001$) and more severe same-day headache ($r = .36$, $p < .001$) on child report, as well as longer same-day headache duration ($r = .30$, $p < .001$) and more severe same-day headache ($r = .42$, $p < .001$) on parent report. Number of medication categories used that day was controlled for in analyses.

Mood as associated with same-day headache

Child report—On headache days, children reported significantly more negative affect (worse mood) ($M = 0.5 \pm 0.2$) compared to non-headache days ($M = 0.8 \pm 0.2$), $t(909) = 17.81$, $p < .001$ (see Table 3). Worse mood was significantly associated with the same-day occurrence of a headache, $t(883) = -8.75$, $p < .001$, longer duration of headache ($z = -9.07$, $p < .001$), and more severe headache ($z = -19.05$, $p < .001$). Children reported a significantly greater number of daily hassles on headache days ($M = 1.0 \pm 1.4$), than on non-headache days ($M = 0.9 \pm 1.4$), t (909) = 17.81, $p < .001$. .

Parent report—Similar to child report, on days with headaches, parent report of child mood ($M = 0.5 \pm 0.2$) was significantly worse than on non-headache days ($M = 0.8 \pm 0.2$), $t(883) = 19.95$, $p < .001$. Parents reported worse mood to be significantly associated with the same-day occurrence of a headache, $t(883) = -8.98$, $p < .001$, longer duration of a headache ($z = -9.40$, $p < .001$), and more severe headache ($z = -21.00$, $p < .001$).

Mood as associated with next-day headache

Child report—Mood was associated with headache severity the next day in child report ($z = 2.11$, $p = .04$), controlling for same-day headache severity (see Table 4). Mood was not associated with the occurrence of a headache, $t(883) = -0.66$, $p = .51$, or duration of headache ($z = -0.25$, $p = .80$) the next day.

Parent report—In parent report, mood was not significantly related to next-day occurrence of a headache, $t(882) = -0.85$, $p = .39$, the duration of headache ($z = -0.12$, $p = .90$), or the se verity of headache ($z = 1.24$, $p = .22$).

Headache as associated with next-day mood

Child report—Headache was not significantly associated with next-day mood in child report (see Table 5). Neither the occurrence of a headache ($z = 1.26$, $p = .21$), duration of headache ($z = 1.07$, $p = .29$), nor severity of headache ($z = 1.83$, $p = .07$) were significantly associated with mood the next day.

Parent report—Headache also was not significantly associated with next-day mood in parent report. Neither the occurrence of a headache ($z = 1.65$, $p = .10$), duration of headache

($z = 1.21$, $p = .23$), nor severity of headache ($z = 1.02$, $p = .31$) were significantly associated with mood the next day.

DISCUSSION

Cross-sectional and prospective studies suggest that emotional factors such as negative mood and daily hassles may play a role in pediatric headache.[8–17] Research also suggests that the relationship between mood disturbance and headache may be bidirectional in nature.[18] While a few studies have shown that negative daily mood is related to more pain in children with juvenile arthritis[40] and sickle cell disease[42], the current study is the first to prospectively examine the temporal relationship between normal daily mood fluctuations and headache in otherwise healthy children. Study results indicate that worse mood is associated with the occurrence of a headache, longer duration of headache and more severe headache within the same day on both child and parent report. This confirms that the children and their parents detect an altered mood and behavior during the day in which they have a headache. It is not clear whether the altered mood contributed to the headache initiation or persistence of headache, or if the headache was the etiology of the mood changes either during the premonitory phase of the headache, during the headache itself, or during the recovery period.

In this study, mood was not consistently associated with next-day headache and headache itself was not associated with next-day mood. Taken together, these findings suggest that mood changes may be correlated or a component to the experience of headache within a given day for children with migraine but that children are often able to recover emotionally the day after a headache. Perhaps the noticed mood changes were temporary and potentially only related to the events surrounding the headache itself. Headache does not seem to generate prolonged mood changes that continue to the next day. Future studies are warranted that examine potential mediators of the relationship between headache and mood.

An electronic daily diary study that measured common triggers of primary headache in children and adolescents found that an increase in stress (self-reported stress intensity) was the most reliable predictor of headache onset.[47] Similarly, utilizing an experimental stress paradigm, children with migraine exhibited altered physiological arousal and longer recovery when exposed to emotional stressors relative to healthy controls.[48] In the present study, children reported a greater number of daily hassles on the days they had a headache and children's negative mood was associated with headache occurrence, as well as headache duration and severity. It may be that while a higher number of stressful events are associated with headache occurrence, it is a child's perceived "stress" and negative emotional response to stressful events that play the greatest role in headache occurrence, duration, and severity. This is consistent with cognitive theory of depression, which states that negative affect is maintained by negatively focused information processing.[49]

This study utilized daily paper diaries that were not time stamped like electronic diaries and is therefore limited by potential retrospective reporting errors and a time determination of mood changes and headache onset. Both headache symptoms and mood were reported at the end of the day, making temporal analyses within a given day impossible. While our data

showed an association between mood and same-day headache, the current methodology did not permit determination of whether captured headache episodes were migraine or another type of headache. Future studies will benefit from using an electronic daily diary design to examine the temporal relationship between mood and headache within a single day as well as to capture daily symptoms to distinguish between daily migraine and other types of headache. Generalizability is limited for the broader pediatric migraine population given our exclusion of children with headaches less than once per week, exclusion of children with mental health conditions and small recruitment (24%) and retention (42%) rates, which may lead to sample biases. These limitations are somewhat tempered by our recruitment of children and families from three different medical centers. Additional research is needed with larger and more inclusive study samples to confirm the findings of this study.

The present study is a step toward clarifying the temporal relationship between headache and mood. On the daily level, headache appears to be associated with same-day mood but does not appear to be associated with worse mood the next day. Worse mood today also does not appear to be associated with headache the next day. The temporal nature of this relationship within a given day and over an extended amount of time, however, remains unclear. More research is needed to further elucidate this complex relationship between pediatric migraine and mood in order to inform and improve treatment.

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Abbreviations

PedsQL 4.0	Pediatric Quality of Life Inventory 4.0 Generic Core Scales
PedMIDAS	Pediatric Migraine Disability Assessment
VAS	visual analog scale
FAS	Facial Affective Scale

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Table 1

Child and Parent Demographic Characteristics by Study Site

	KUMC *n* = 16	CMH *n* = 31	CCHMC *n* = 22
Child			
Age (years)	10.2 (±1.5)	10.0 (±1.7)	9.9 (±1.7)
Male	3 (18.8%)	12 (38.7%)	4 (18.2%)
White	11 (68.8%)	26 (83.9%)	19 (86.4%)
Black	2 (12.5%)	1 (3.2%)	2 (9.1%)
Time since diagnosis (months)	18.8 (±20.6)	7.4 (±15.1)	7.2 (±26.0)
Mother			
Age (years)	36.0 (±7.2)	35.5 (±7.0)	37.26 (±6.3)
12^{th} grade/GED	5 (33.3%)	7 (22.6%)	1 (4.5%)
Some college/ college graduate	8 (53.3%)	19 (61.3%)	18 (81.8%)
Advanced degree	2 (13.3%)	2 (6.5%)	3 (13.6%)
Father			
Age (years)	38.7 (±6.8)	40.3 (±6.5)	39.0 (±4.1)
12^{th} grade/GED	2 (13.3%)	8 (28.6%)	1 (5.3%)
Some college/ college graduate	9 (60.0%)	12 (42.9%)	15 (78.9%)
Advanced degree	2 (13.3%)	4 (14.3%)	3 (15.8%)

Note: Data presented as Mean (*SD*) for continuous variables (Age, Time since diagnosis) and *n* (%) for categorical variables (Male, White, Black, 12^{th} grade/GED, Some college/college graduate, Advanced degree). GED = General equivalency diploma.

Table 2

Child and Parent Descriptive Statistics on Predictor and Outcome Variables

	Child report ***N* = 69** ***M* (*SD*)**	**Parent report** ***N* = 69** ***M* (*SD*)**	***r***	***p***
Headache frequency	7.2 (5.0)	7.1 (4.8)	.93	< .001
Headache duration (min)	296.9 (276.7)	306.6 (275.2)	.83	< .001
Headache severity	3.2 (1.5)	2.5 (0.9)	.60	< .001
Mood	0.6 (0.3)	0.6 (0.3)	.69	< .001
Daily hassles[a]	0.9 (1.4)		---	---
Child Behavior Checklist[b]		51.7 (11.1)	---	---
PedsQL 4.0	78.7 (14.1)	78.8 (13.2)	.84	< .001
PedMIDAS	14.9 (13.3)	14.3 (12.7)	.90	< .001

Note:

[a] Number of daily hassles rating is a child-only headache diary question.

[b] Child Behavior Checklist is a parent only survey.

Table 3

HLM and MLM Linear Regressions Examining Mood and Daily Hassles as Associated with Same-Day Headache

	Headache occurrence			Headache duration			Headache severity		
	β	*SE*	*p*	β	*SE*	*p*	β	*SE*	*p*
Child report									
Mood	−6.94	0.79	<.001	−236.10	25.02	<.001	−3.88	0.20	<.001
Daily hassles	0.03	0.12	.83	0.81	5.09	.87	0.03	0.04	.39
Medication	3.48	0.38	<.001	124.32	12.39	<.001	1.01	0..09	<.001
Parent report									
Mood	−8.36	0.93	<.001	−234.84	24.97	<.001	−2.80	0.13	<.001
Medication	2.84	0.34	<.001	94.41	11.12	<.001	0.99	0.06	<.001

Note: Adjusted for age, gender, PedsQL 4.0 pediatric quality of life, and PedMIDAS pediatric headache-related disability. β values for headache occurrence represent the expected change in the likelihood of a headache occurring for a unit change in the predictor variable (mood, daily hassles, medication); β values for headache duration represent the expected change in minutes of a headache episode for a unit change in the predictor variable; β values for headache severity represent the expected change on a 0–6 scale for a unit change in the predictor variable.

Table 4

HLM and MLM Linear Regressions Examining Mood and Daily Hassles as Associated with Next-Day Headache

	Headache occurrence			Headache duration			Headache severity		
	β	*SE*	*p*	β	*SE*	*p*	β	*SE*	*p*
Child report									
Mood	−0.31	0.47	.51	−17.13	67.40	.80	0.88	0.42	.04
Daily hassles	0.07	0.08	.39	−12.67	11.09	.25	−0.02	0.06	.72
Medication	0.17	0.17	.30	21.10	19.23	.27	0.08	0.10	.46
Parent report									
Mood	−0.40	0.47	.39	−7.00	56.99	.90	0.30	0.25	.22
Medication	0.19	0.16	.23	14.41	18.05	.42	0.04	0.07	.60

Note: Adjusted for age, gender, PedsQL 4.0 pediatric quality of life, and PedMIDAS pediatric headache-related disability. β values for headache occurrence represent the expected change in the likelihood of a headache occurring for a unit change in the predictor variable (mood, daily hassles, medication); β values for headache duration represent the expected change in minutes of a headache episode for a unit change in the predictor variable; β values for headache severity represent the expected change on a 0–6 scale for a unit change in the predictor variable.

Table 5

MLM Linear Regressions Examining Headache as Associated with Next-Day Mood

	Child report mood			Parent report mood		
	β	*SE*	*p*	β	*SE*	*p*
Headache occurrence	0.03	0.02	.21	0.04	0.02	.10
Medication	0.00	0.01	.96	0.01	0.01	.39
Headache duration	0.00	0.00	.29	0.00	0.00	.23
Medication	0.01	0.01	.63	0.02	0.01	.18
Headache severity	0.02	0.01	.07	0.01	0.01	.31
Medication	0.00	0.02	.91	0.01	0.01	.36

Note: Adjusted for age, gender, PedsQL 4.0 pediatric quality of life, and PedMIDAS pediatric headache-related disability. β values for child report mood represent the expected change in child mood on a 0–1 scale for a unit change in the predictor variable (headache occurrence, headache duration, headache severity, medication); β values for parent report mood represent the expected change in child mood on a 0–1 scale for a unit change in the predictor variable.