Patterns and predictors of health service utilization in adolescents with pain: comparison between a community and a clinical pain sample

Marisol Toliver-Sokol, M.D.[1], **Caitlin B. Murray, B.A.**[2], **Anna C. Wilson, Ph.D.**[3], **Amy Lewandowski, Ph.D.**[2], and **Tonya M. Palermo, Ph.D.**[2]

[1] Department of Psychiatry, Oregon Health & Science University, Portland, OR

[2] Department of Anesthesiology & Pain Medicine, University of Washington School of Medicine, Seattle, WA

[3] Department of Pediatrics, Oregon Health & Science University, Portland, OR

Abstract

There is limited research describing the patterns of healthcare utilization in adolescents with chronic pain. This study describes healthcare utilization in a clinical chronic pain sample, and compares the patterns of service use of this group to a community sample with intermittent pain complaints. We also investigated demographic and clinical factors that predicted healthcare visits and medication use in the clinical sample. Data on 117 adolescents (aged 12-18; n=59 clinical pain sample, n=58 community) were collected. Caregivers and adolescents reported on sociodemographics, medical visits, current medications, pain, activity limitations, and depression. As hypothesized, the clinical pain sample had higher rates of healthcare consultation on all types of medical visits (general, specialty care, complementary medicine, mental health, OT/PT), and higher medication use compared to the community sample. Regression analyses revealed that higher annual income, greater pain frequency, and higher levels of caregiver reported activity limitations were associated with a greater number of healthcare visits for the total sample. Within the clinical pain sample, higher pain frequency and greater activity limitations (caregiver-report) predicted more specialty care visits. Additionally, higher income and greater levels of depressive symptoms predicted a higher number of prescribed medications.

Perspective—This study contributes to the limited available data on health service and medication use in a clinical chronic pain sample versus a community sample of adolescents. We also identify clinical factors (pain frequency, parent-reported activity limitations, depressive symptoms) and demographic factors (gender, income) associated with healthcare utilization.

Keywords

adolescent; chronic pain; health service use; activity limitations

Corresponding author: Tonya M. Palermo, Ph.D., Seattle Children's Hospital Research Institute, 1100 Olive Way, Suite 500, M/S 8-1, Seattle, WA, 98101; Tel.: +1-206-884-4208, Fax: +1-206-884-7802; tonya.palermo@seattlechildrens.org.

Disclosures: None of the authors have any conflicts to disclose.

Introduction

Chronic and recurrent pain is a common problem in children and adolescents, and occurs in an estimated 25% to 34% of the general population of youth.[16, 20, 24] Researchers are beginning to identify high financial costs associated with pediatric chronic pain treatment. In a study of adolescents recruited from pain management and rheumatology clinics in the UK, Sleed et al. found that the estimated yearly cost of pain treatment including direct and indirect costs of a range of services was £8,000 GBP (about $16,000 USD) per child.[23] Additionally, these patients most commonly consulted general practitioners and physiotherapists (67% and 23%, respectively).[23]

Most data describing health service use in youth who experience pain are derived from epidemiological studies of community samples in Europe and Asia.[2,10,18, 20] For example, a community school-based study found that 45.5% of Malaysian youth sought medical care for recurrent abdominal pain in a course of a year.[2] A broader study of Dutch youth with different types of chronic pain found that 78% of children and adolescents consulted a general practitioner, 35% consulted a specialist, 29% consulted a physiotherapist, 7% consulted a psychologist and 10% consulted an alternative healthcare provider for pain in a 3-month period.[18]

Several studies also describe predictors of healthcare utilization in community samples of youth with pain. Various pain characteristics predict consultation rate, such as pain frequency, intensity, and duration.[12, 18, 20] Pain location has also emerged as a predictor of consultation rate; one study found that youth with back, limb, and abdominal pain reported more visits than those with headache pain.[20] In addition, studies indicate that activity limitations or disability can predict consultation rate in this population.[18, 20]

While epidemiological studies provide some insight on healthcare utilization in youth with chronic pain, this research has been limited to community samples from Europe and Asia. Studies comparing healthcare use among community samples and clinical samples of youth with pain could provide additional insight about differences in healthcare consumption when pain problems reach the arena of tertiary care. For example, Walker et al[27] demonstrated a greater frequency of medical visits by children with abdominal pain being treated by specialists compared with healthy children. However, this study provided little information regarding different types of medical visits or medication use.

Additional data are needed on healthcare utilization among clinical samples of youth with chronic pain to better understand patterns and predictors of service use among youth engaged with the U.S. healthcare system for pain treatment. A more complete description of the frequency of healthcare use in clinical and community samples of youth with pain is especially important given the recent identification of economic factors as a clinically relevant treatment outcome in this population.[13] Changes in health service and medication use may constitute a treatment goal, but currently there are little normative data on patterns (e.g., type and frequency of health services) of health service or medication use to guide interpretation of such outcomes.

The aims of the current study were to characterize healthcare utilization in a sample of adolescents with chronic pain and to compare patterns of health service use (visits and medication use) in a clinical pain sample with a community sample. We also investigated demographic and clinical factors that predict healthcare utilization. It was hypothesized that the clinical pain sample would have greater healthcare utilization across visit type and would use more over the counter and prescription medications compared to the community sample. Exploratory analyses examined clinical and demographic characteristics found to be related

to service use in previous studies (income, gender, pain frequency, depression, and activity limitations) as predictors of visits and medication use.[1,16,20]

Participants

This cross-sectional study was approved by the Institutional Review Board at Oregon Health & Science University. Participants were recruited as part of a larger study designed to study sleep-wake patterns in adolescents with chronic pain. The clinical pain participants were recruited just following their initial evaluation in a multidisciplinary clinic at the study institution. Participants were contacted either through an informative letter with study and contact information, or in person by the study coordinator. Providers in the pediatric pain management center include physician, nursing, psychology, and physical therapy practitioners. Multi-modal treatment plans are typically offered to patients that may include medication management (including management of previously prescribed medications), physical therapy, acupuncture, and psychological therapy. Inclusion criteria for the clinical pain group required that (a) the participants were between 12 and 18 years and had received an evaluation from the pain clinic; (b) pain had been unremitting for at least 3 months; (c) pain was occurring at a frequency of at least 1 day per week and was of at least moderate intensity; (d) pain was not related to chronic disease; (e) there was no diagnosis of developmental disabilities; and (f) able to speak and understand English.

The community sample was recruited through flyers advertising the study in the local metropolitan area with contact information. Inclusion criteria for the community sample included (a) age between 12 and 18 years; (b) does not currently have chronic pain; (c) age (within 6 months) and sex match to an adolescent in the chronic pain group; (d) absence of any serious chronic medical conditions or developmental disabilities; and (e) able to speak and understand English.

All interested participants were screened either by phone or in person by the research team. Written informed consent was obtained from parents and guardians, and written assent was obtained from adolescents for participation in this study. Ninety-six adolescents with chronic pain were screened for inclusion in the clinical pain group, 20 were excluded for failing to meet eligibility criteria, 16 declined, and 60 were enrolled. One hundred seven community participants were screened; 41 were excluded due to not meeting eligibility criteria, 6 declined, and 60 were enrolled. Due to missing data, 59 youth in the clinical sample and 58 youth in the community sample were retained for this analysis.

Procedure

Data collection was conducted after the initial screening and enrollment by a research assistant. Adolescents completed measures of pain characteristics, depression, and activity limitations. Caregivers completed measures about their family sociodemographics, their teen's health services and medication use, and about their teen's pain and activity limitations. After completion of the study, the participants were compensated for their time with gift cards to local stores.

Measures

Sociodemographics

Caregivers completed a background questionnaire assessing participants' age, sex, race, parental marital status, occupation, and family income.

Pain Characteristics

Both caregivers and adolescents were asked to complete a questionnaire reporting pain frequency, duration, intensity and location. Usual pain intensity was reported using an 11-point numerical rating scale, with 0 reflecting no pain and 10 reflecting the worst possible pain.[4, 26] Pre-coded categories were used to assess the frequency of pain in a retrospective three-month time period from "not at all" to "daily," and the duration of pain from "less than one hour" to "all day." Pain location was assessed using a body diagram, in which the participant marked all areas of experienced pain across nine locations: face, head, shoulders, chest, arms, abdomen, spine, lower back, legs.[9, 11] Due to the infrequency of some pain locations, pain sites were grouped into three locations: 1) head pain including head and face pain, 2) musculoskeletal pain including shoulder, limb, chest, spine, and back pain, and 3) abdominal pain.

Questions pertaining to medication use and primary and specialty care medical visits were developed for the purposes of this study.

Medical Service Use

Caregivers were asked to mark "yes" or no" to report whether or not services had been obtained in the past six months for treatment of their adolescent's pain symptoms by any of the listed healthcare providers, as well as how many appointments the adolescent had attended. Healthcare providers included in the questionnaire were: primary care physician; specialty care physician (e.g., a physician who provides specialized healthcare services such as a neurologist or rheumatologist); psychiatrist or psychologist; mental health counselor; physical therapist; massage therapist; acupuncture specialist; chiropractor, naturopath or herbal remedies specialist; and an "other" category to report specialists not listed. Total numbers of visits were calculated by summing visits per healthcare service and across all healthcare services.

Medication Use

Caregivers were asked to mark "yes" or "no" to the types of medications currently used by their adolescent for "aches and pains." The list included five different categories of prescription medications (antidepressants, anticonvulsants, prescription pain medications, prescription sleep medications, and other prescription medications) and three different categories of over the counter (OTC) medications (pain medications, sleep medications, and other medications). Other prescription medications included antibiotics and allergy medications. Caregivers were asked to write down the names of these medications, which were then coded into subcategory classes of medications by research staff (e.g. TCA, SNRI, or SSRI within the antidepressant category). The total number of medications was summed per category and per class, and the total number of prescription medications per participant was also calculated.

Activity Limitations

Caregivers and adolescents completed the Child Activity Limitations Interview (CALI-21), a 21 item self-report questionnaire that assesses adolescent physical activity limitations due to pain.[14, 15] The twenty-one activities are rated according to the level of difficulty that the adolescent experiences completing them. A total score is derived from the sum of difficulty ratings, which are obtained on a 5-point scale from "not very difficult" to "extremely difficult," ranging from 0 to 84. Higher scores indicated greater restriction in activities due to pain. The CALI has shown good reliability and validity.[14] In the current sample, reliability of the caregiver and child report were moderate ($\alpha = .75$ and .73 respectively).

Depressive symptoms

To assess depressive symptoms, adolescents completed the Center for Epidemiological Studies Depression Scale (CES-D).[19] Scores were calculated by summing all items to yield a total score (range 0 – 60) with higher scores indicating greater depressive symptoms. The validity of the CES-D has previously been established through relationships with other anxiety and depression measures and has demonstrated adequate one-week test-retest reliability.[3, 19] For the current sample, the internal consistency of the CES-D was adequate (α = .73).

Data Analysis

All analyses were conducted with SPSS v. 18.0. Descriptive statistics, including medical services and medication use, were summarized using frequency statistics and cross-tabulations. Differences in sociodemographics, pain characteristics, depression and activity limitations between study groups (clinical pain vs. community) were compared using t-tests for continuous variables and chi-square for nominal variables (see Table 1). ANOVAs were conducted to test for differences in total visits and medications by the three pain locations (head, musculoskeletal, and abdomen) in the total sample of participants.

Testing for multicollinearity was nonsignficant, and therefore, we proceeded with conducting linear regressions to test income, gender, pain frequency, depression, and activity limitations as predictors of the number of medical visits and medications used. Income and gender were included in regression models as these sociodemographic factors have been associated with healthcare use in previous studies.[17, 22] The first linear regression model tested predictors of total medical visits (general practitioner, specialty care, physical therapy, complementary medicine, mental health) using the total sample of participants. Because few individuals in the community sample attended any healthcare visits beyond primary care (see Table 2), regression models examining predictors of specialty care, physical therapy, complementary medicine, and mental health were tested exclusively with the clinical pain group.

Results

Descriptive characteristics of the sample

The total sample was comprised of 117 adolescents (n = 59 clinical sample of adolescents with chronic pain, n= 58 community sample of adolescents) ages 12-18 years (M = 14.97 years, SD = 1.72). The majority of the sample was female (66.7%). Descriptive statistics on sociodemographics and clinical characteristics for the sample are summarized in Table 1. None of the sociodemographic characteristics were statistically different between groups.

As expected, adolescents in the clinical pain sample experienced higher pain intensity than the community sample (t(2,114)=9.20, *p*<.001). Their pain was more frequent and longer lasting than the community sample, with 78% experiencing pain daily and 66% experiencing pain that lasted all day. The community sample presented with some pain symptoms, with 39.3% of the sample experiencing pain at least once a week, and 23.6% of the sample experiencing pain lasting at least half of the day. Head and musculoskeletal pain were the most common primary pain locations for both the clinical chronic pain and community samples. As anticipated, the clinical chronic pain sample reported more activity limitations (t(2,114)=11.09, p<.001) and greater depressive symptoms compared to the community sample (t(2,114)=3.80, p<.001).

Description of health service use

ANOVA results indicated that the number of health service visits was not associated with pain location, $F(2,35) = 1.39$, p = .13. The extent and type of healthcare services used by participating adolescents in the previous six-month period are shown in Table 2. A greater proportion of the clinical sample of adolescents with chronic pain used all types of healthcare services compared to the community sample, with 79.7% of the clinical sample having consulted a primary care physician and 76.3% a specialty care physician, compared to 15.5% and 3.4% of the community sample, respectively (p's<.001). A higher total number of medical visits was reported by youth in the clinical pain sample (M = 19.8, SD=16.8) compared to youth in the community sample (M=0.7 SD=2.4, $t(2,109)$ =8.43, p<.05). Adolescents in the clinical sample consulted complementary and alternative medicine specialists most frequently, with physical therapy and primary care visits as the second most frequent types of visit.

Description of medication use

ANOVA results indicated that the number of prescription medications taken was not associated with pain location. The majority of adolescents in the clinical pain group were taking one or more prescription medications (72.9%) whereas none of the community sample were taking prescription medications. The most commonly prescribed medications were anticonvulsants, antidepressants (most commonly tricyclic antidepressants), and analgesics. Fifteen percent of adolescents in the sample were prescribed opioids. Over the counter (OTC) medication use was also significantly different between groups ($t(2,115)$=3.19, p<.001), with 61.0% of the clinical pain sample taking OTC medications compared to 39.7% of the community sample.

Predictors of health service use in the total sample

Linear regression analyses were performed to examine clinical and demographic factors as predictors of health service visits for the total sample. Annual income, gender, adolescent perception of pain frequency, depression, and adolescent and parent perception of activity limitations were tested as predictors. Results indicated that annual income (β=0.16, p<.05), pain frequency (β=0.31, p<.01), and caregiver-reported activity limitations (β=0.37, p<.01) were significant predictors of healthcare visits. Higher annual income, greater pain frequency, and higher levels of caregiver reported activity limitations were associated with a greater number of healthcare visits. See Table 3.

Predictors of health service use in the clinical pain sample

Regression models were also used to test specific clinical and demographic factors as predictors of different types of healthcare utilization within the clinical pain sample. Specifically models tested five types of health service use: specialty care, complementary and alternative medicine, mental health, physical therapy, and prescription medications (see Table 4). As noted in the data analysis section, because the frequency of visits and number of prescription medications were low for the community sample, only participants from the clinical pain sample were included in this analysis.

Results revealed that adolescent-reported pain frequency (β=.29, p<.05) and caregiver-reported activity limitations (β=.42, p<.05) predicted total number of specialty care visits. Specifically, higher pain frequency and greater activity limitations were associated with more specialty visits. Gender (β=-0.45, p<.05) predicted mental health visits, with male gender associated with more visits with a mental health practitioner. Finally, income (β=0.28, p<.05) and depressive symptoms (β=0.43, p<.05) emerged as predictors of

prescription medication use, with higher income and greater levels of depressive symptoms associated with a higher number of prescribed medications.

Discussion

This study aimed to characterize and compare healthcare service and medication use in a clinical sample of adolescents with chronic pain and a community sample of adolescents with intermittent pain complaints. As expected, our findings demonstrate that the clinical sample utilized healthcare services more frequently than the community sample, reporting about twenty times more healthcare consultations.

In particular, the clinical sample of youth with chronic pain had the highest total visits to a CAM provider. A number of factors may explain the high rate of CAM visits. Learning about the effectiveness of CAM procedures, worrying about the side effects of traditional medicine, or being dissatisfied with traditional medicine are among some reasons for CAM use.[21] The high number of visits could also be a function of how frequently providers of these services suggest that patients be seen for treatment, or how often these services are scheduled based on family or provider availability. For example, the same number of adolescents in the clinical sample utilized mental health or CAM services, but consulted mental healthcare providers less frequently than CAM providers (2.5 times and 13.5 times, respectively). Future research is needed concerning reasons (e.g., access, scheduling availability, etc.) that might explain health service use patterns in this population.

As hypothesized, we found higher levels of medication use among adolescents in the clinical pain sample compared to the community sample. Most adolescents in the clinical sample were prescribed one or more medications for pain management. There was a significant amount of off label use of anticonvulsants and antidepressants among the clinical sample of adolescents with chronic pain, with gabapentin, tricyclic antidepressants, and selective serotonin reuptake inhibitors prescribed the most. Given the severity and frequency of pain in the clinical sample, and the fact that pharmacological treatment is a component of the multidisciplinary approach to pain management[5], it is not surprising that we found higher prescription medication use and a higher number of medical visits. This finding is also consistent with previous research assessing treatment expectations. In a sample of youth with chronic pain, Tsao et al[25] found that both parents and children with chronic pain expected medications to be among the most helpful interventions.

In analyzing predictors of healthcare utilization, income emerged as a significant predictor of healthcare visits in the total sample, as well as medication use in the clinical pain sample. This finding is consistent with studies that indicate that higher income is related to better access to health services[7]. Our data also indicate that greater pain frequency is associated with increased healthcare visits, which is consistent with one previous study[18]. In other studies, pain duration and pain intensity have emerged as stronger predictors of health service use.[1, 2, 12, 17, 18] Further research is needed to clarify the clinical pain characteristics that may relate to health service use.

Greater activity limitations perceived by parents predicted a greater number of healthcare visits. This finding suggests that parental perception of their child's disability influences consultation rate, rather than the child's own perception of his or her disability. Because the decision to consult for health services is made by the parents, rather than the child, studies have investigated the associations between parental factors (e.g., stress, worry) and child consultation rate [8, 10]. For example, Levy et al.[10] found that child consultation rate for abdominal pain is best predicted by maternal psychological distress. Our data suggests that healthcare utilization should be considered in the context of parental influences as well as

characteristics of the young person. Further research is needed to determine the role that parental factors and other social and contextual variables have on healthcare utilization within this clinical population.

Recently, the Pediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (Ped-IMMPACT) identified economic factors as an important treatment outcome.[13] As the consensus group noted, there are not available measures of economic factors and thorough consideration of economic factors will require collaboration with health system economists. Data on the frequency and type of medical services and medications used may serve as a springboard for more sophisticated cost analyses that are needed. Comprehensive economic data such as direct and indirect healthcare costs will be important to assess in future research, potentially influencing healthcare policies in this population. Moreover, these data may increase understanding of typical or usual patterns of health services used in the pediatric chronic pain population and therefore facilitate interpretation of changes that may occur in health service use in clinical trials. Future studies could also determine whether certain patterns of healthcare services lead to better clinical outcomes in this population.

There were several limitations of this study that should be considered in interpreting the findings. First, we were only able to use cross-sectional data in analyzing the associations among clinical factors and healthcare utilization. Potential mediators that might predict healthcare usage over time could not be assessed. Recall bias could be a potential limitation associated with asking parents to recall medical use over the past six months. However, studies have demonstrated a high level of agreement between caregiver reports and actual documented medical use.[6]

Medical insurance status, a factor that may have impacted health service use, was not examined in this study. Insurance status may have a much stronger association with the frequency of healthcare consultation and dictate what types of medications are prescribed, secondary to insurance reimbursement rates. Out-of-pocket expenses and the availability of healthcare services may be associated with healthcare utilization in this population. Gathering data on healthcare insurance, expense, and availability will be important in future studies. Additionally, our data on adolescents were derived from convenience samples in the Pacific Northwest, and unknown characteristics may be specific to this region and other selection factors may exist. Finally, this study had a relatively small sample size and we were therefore unable to examine the influence of race and ethnicity. A larger sample size would provide additional power needed to detect further associations between clinical factors and health service patterns.

Future studies might also compare healthcare utilization between children with chronic pain and children with other illnesses (e.g., asthma, diabetes) to better understand the burden of healthcare that may or may not be unique to pain. Furthermore, collecting longitudinal treatment data will provide opportunities for examining complex models of predictors of health service use and preferences for treatment.

Acknowledgments

References

1. Boey CC, Goh KL. Predictors of health-care consultation for recurrent abdominal pain among urban schoolchildren in Malaysia. Journal of Gastroenterology and Hepatology. 2001; 16:154–159. [PubMed: 11207895]

2. Boey CC, Goh KL. Recurrent abdominal pain and consulting behaviour among children in a rural community in Malaysia. Digestive and Liver Disease. 2001; 33:140–144. [PubMed: 11346142]

3. Chorpita BF, Yim L, Moffitt C, Umemoto LA, Francis SE. Assessment of symptoms of DSM-IV anxiety and depression in children: a revised child anxiety and depression scale. Behav Res Ther. 2000; 38:835–855. [PubMed: 10937431]

4. Dworkin RH, Turk DC, Farrar JT, Haythornthwaite JA, Jensen MP, Katz NP, Kerns RD, Stucki G, Allen RR, Bellamy N, Carr DB, Chandler J, Cowan P, Dionne R, Galer BS, Hertz S, Jadad AR, Kramer LD, Manning DC, Martin S, McCormick CG, McDermott MP, McGrath P, Quessy S, Rappaport BA, Robbins W, Robinson JP, Rothman M, Royal MA, Simon L, Stauffer JW, Stein W, Tollett J, Wernicke J, Witter J. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. Pain. 2005; 113:9–19. [PubMed: 15621359]

5. Gatchel RJ, Okifuji A. Evidence-based scientific data documenting the treatment and cost-effectiveness of comprehensive pain programs for chronic nonmalignant pain. J Pain. 2006; 7:779–793. [PubMed: 17074616]

6. Hoagwood K, Horwitz S, Stiffman A, Weisz J, Bean D, Rae D, Compton W, Cottler L, Bickman L, Leaf P. Concordance between parent reports of children's mental health services and service records: The Services Assessment for Children and Adolescents (SACA). Journal of Child and Family Studies. 2000; 9:315–331.

7. Hurley J, Grignon M. Income and equity of access to physician services. CMAJ Canadian Medical Association Journal. 2006; 174:187–188.

8. Janicke DM, Finney JW, Riley AW. Children's health care use: a prospective investigation of factors related to care-seeking. Medical Care. 2001; 39:990–1001. [PubMed: 11502956]

9. Lester N, Lefebvre JC, Keefe FJ. Pain in young adults--III: Relationships of three pain-coping measures to pain and activity interference. Clin J Pain. 1996; 12:291–300. [PubMed: 8969874]

10. Levy RL, Whitehead WE, Walker LS, Von Korff M, Feld AD, Garner M, Christie D. Increased somatic complaints and health-care utilization in children: effects of parent IBS status and parent response to gastrointestinal symptoms. Am J Gastroenterol. 2004; 99:2442–2451. [PubMed: 15571594]

11. Margolis RB, Chibnall JT, Tait RC. Test-retest reliability of the pain drawing instrument. Pain. 1988; 33:49–51. [PubMed: 3380550]

12. Masiero S, Carraro E, Sarto D, Bonaldo L, Ferraro C. Healthcare service use in adolescents with non-specific musculoskeletal pain. Acta Paediatr. 2010; 99:1224–1228. [PubMed: 20219047]

13. McGrath PJ, Walco GA, Turk DC, Dworkin RH, Brown MT, Davidson K, Eccleston C, Finley GA, Goldschneider K, Haverkos L, Hertz SH, Ljungman G, Palermo T, Rappaport BA, Rhodes T, Schechter N, Scott J, Sethna N, Svensson OK, Stinson J, von Baeyer CL, Walker L, Weisman S, White RE, Zajicek A, Zeltzer L. Core outcome domains and measures for pediatric acute and chronic/recurrent pain clinical trials: PedIMMPACT recommendations. J Pain. 2008; 9:771–783. [PubMed: 18562251]

14. Palermo TM, Lewandowski AS, Long AC, Burant CJ. Validation of a self-report questionnaire version of the Child Activity Limitations Interview (CALI): The CALI-21. Pain. 2008; 139:644–652. [PubMed: 18692316]

15. Palermo TM, Witherspoon D, Valenzuela D, Drotar D. Development and validation of the Child Activity Limitations Interview: a measure of pain-related functional impairment in school-age children and adolescents. Pain. 2004; 109:461–470. [PubMed: 15157707]

16. Perquin CW, Hazebroek-Kampschreur AA, Hunfeld JA, Bohnen AM, van Suijlekom-Smit LW, Passchier J, van der Wouden JC. Pain in children and adolescents: A common experience. Pain. 2000; 87:51–58. [PubMed: 10863045]

17. Perquin CW, Hazebroek-Kampschreur AA, Hunfeld JA, van Suijlekom-Smit LW, Passchier J, van der Wouden JC. Chronic pain among children and adolescents: physician consultation and medication use. Clin J Pain. 2000; 16:229–235. [PubMed: 11014396]

18. Perquin CW, Hunfeld JA, Hazebroek-Kampschreur AA, van Suijlekom-Smit LW, Passchier J, Koes BW, van der Wouden JC. Insights in the use of health care services in chronic benign pain in childhood and adolescence. Pain. 2001; 94:205–213. [PubMed: 11690734]

19. Radloff LS. The CES-D scale: A self-report depression measure for research in the general population. Applied Psychological Measurement. 1977; 1:385–401.

20. Roth-Isigkeit A, Thyen U, Stoven H, Schwarzenberger J, Schmucker P. Pain among children and adolescents: Restrictions in daily living and triggering factors. Pediatrics. 2005; 115:152–162.

21. Sawni-Sikand A, Schubiner H, Thomas RL. Use of complementary/alternative therapies among children in primary care pediatrics. Ambulatory Pediatrics. 2002; 2:99–103. [PubMed: 11926840]

22. Schwille IJ, Giel KE, Ellert U, Zipfel S, Enck P. A community-based survey of abdominal pain prevalence, characteristics, and health care use among children. Clin Gastroenterol Hepatol. 2009; 7:1062–1068. [PubMed: 19602449]

23. Sleed M, Eccleston C, Beecham J, Knapp M, Jordan A. The economic impact of chronic pain in adolescence: Methodological considerations and a preliminary costs-of-illness study. Pain. 2005; 119:183–190. [PubMed: 16297552]

24. Stanford EA, Chambers CT, Biesanz JC, Chen E. The frequency, trajectories and predictors of adolescent recurrent pain: A population-based approach. Pain. 2008; 138:11–21. [PubMed: 18093737]

25. Tsao JC, Meldrum M, Bursch B, Jacob MC, Kim SC, Zeltzer LK. Treatment expectations for CAM interventions in pediatric chronic pain patients and their parents. Evid Based Complement Alternat Med. 2005; 2:521–527. [PubMed: 16322810]

26. von Baeyer CL. Numerical rating scale for self-report of pain intensity in children and adolescents: recent progress and further questions. Eur J Pain. 2009; 13:1005–1007. [PubMed: 19766028]

27. Walker LS, Guite JW, Duke M, Barnard JA, Greene JW. Recurrent abdominal pain: a potential precursor of irritable bowel syndrome in adolescents and young adults. J Pediatr. 1998; 132:1010–1015. [PubMed: 9627595]

Characteristic	Clinical pain sample (*n*=59) n (%) / M (SD)	Community sample (*n*=58) n (%) / M (SD)	Total sample (*n*=117) n (%) / M (SD)	X^2 or t
Age (mean years)	15.12 (1.69)	14.74 (1.72)	14.97 (1.72)	1.19
Gender				
Male	18 (30.5 %)	15 (25.9%)	33 (28.2%)	.312
Female	41 (69.5 %)	43 (74.1%)	84 (71.8%)	
Child Racial Background				
Caucasian	52 (88.1%)	46 (79.3%)	98 (83.8%)	8.36
African American	0 (0.0%)	7 (12.1%)	7 (6.0%)	
Amer. Indian/Alaskan Native	3 (5.1%)	1 (1.7%)	4 (3.4%)	
Asian	1 (1.7%)	1 (1.7%)	2 (1.7%)	
Other/biracial	3 (5.1%)	3 (5.2%)	6 (5.1%)	
Ethnicity[a]				
Latino	4 (6.9%)	6 (10.7%)	10 (8.8%)	2.72
Non-latino	54 (93.1%)	48 (85.7%)	102 (89.5%)	
Unknown	0 (0.0%)	2 (3.6%)	2 (1.8%)	
Family Income[a]				
< $29,999	5 (8.9%)	6 (10.3%)	11 (9.6%)	4.81
$30,000 – $49,999	11 (19.6%)	7 (12.1%)	18 (15.8%)	
$50,000 – $69,999	8 (14.2%)	11 (19.0%)	19 (16.7%)	
> $70,000	32 (57.1%)	34 (58.6%)	66 (57.9%)	
Primary Pain Location				
Head	23 (39.0%)	9 (15.5%)	32 (27.4%)	10.80[*]
Abdomen	16 (27.1%)	7 (12.1%)	23 (19.7%)	
Musculoskeletal	20 (33.9%)	31 (53.4%)	51 (43.6%)	
No Location	0 (0.0%)	11 (19.0%)	11 (9.4%)	
Pain Frequency[a]				
None	0 (0.0%)	8 (14.3%)	8 (7.0%)	83.49[***]
<1 mos	0 (0.0%)	14 (25.0%)	14 (12.2%)	
<1-3x mos	0 (0.0%)	12 (21.4%)	12 (10.4%)	
Once a week	0 (0.0%)	9 (16.1%)	9 (7.8%)	
2-3 x/week	8 (13.6%)	7 (12.5%)	15 (13.0%)	
3-6 x/week	5 (8.5%)	4 (7.1%)	9 (7.8%)	
Daily	46 (78.0%)	2 (3.6%)	48 (41.7%)	
Pain Duration[b]				
< 1 hr	2 (3.4%)	32 (58.2%)	34 (29.8%)	48.94[***]
A few hrs	10 (16.9%)	10 (18.2%)	20 (17.5%)	

Characteristic	Clinical pain sample (*n*=59) *n (%) / M (SD)*	Community sample (*n*=58) *n (%) / M (SD)*	Total sample (*n*=117) *n (%) / M (SD)*	X^2 *or t*
Half the day	8 (13.6%)	6 (10.9%)	14 (12.3%)	
All day	39 (66.1%)	7 (12.7%)	46 (40.4%)	
Usual Pain Intensity	6.44 (1.75)	3.14 (2.11)	4.82 (2.54)	9.20[***]
Depression (CES-D)-Total Score	14.41 (10.23)	8.44 (6.16)	11.47 (8.95)	3.80[**]
Activity Limitations (CALI-21)				
Adolescent	29.72 (15.18)	5.81 (5.96)	17.97 (16.66)	11.10[***]
Caregiver	28.73 (16.84)	2.34 (4.84)	15.65 (18.14)	11.50[***]

[*] p<.05

[**] p<.01

[***] p<.001

[a] $n = 114$

[b] $n = 115$

Table 2

Comparison of healthcare utilization in previous 6 months among the clinical pain sample and community sample of youth

	Clinical pain sample (*n*=59) n (%) / M (SD)	Community sample (n=58) n (%) / M (SD)	*t or X²*
Healthcare service (yes/no)			
Primary Care	47 (79.7%)	9 (15.5%)	48.2***
Specialty Care	45 (76.3%)	2 (3.4%)	64.5***
Physical Therapy	28 (47.5%)	2 (3.4%)	29.7***
Mental Healthcare	36 (61.0%)	1 (1.7%)	47.6***
CAM[c]	36 (61.0%)	2 (3.4%)	44.2***
Total number of visits			
Primary Care Provider	3.55 (3.90)	0.13 (0.33)	6.56***
Speciality care provider	2.45 (2.87)	0.03 (.18)	6.38***
Physical Therapist	3.34 (6.24)	0.40 (2.28)	3.38***
Mental Health Provider	2.11 (2.53)	0.05 (0.40)	6.10***
CAM[a] Provider	7.14 (13.45)	0.09 (0.47)	4.00***
Total	19.63 (16.87)	0.71 (2.40)	8.31***
Total healthcare visits[b]			
<5 visits	13 (24.1%)	54 (96.4%)	61.14***
5-10	5 (9.25%)	1 (1.8%)	
10-15	6 (11.1%)	0 (0.0%)	
15-20	9 (16.7%)	1 (1.8%)	
>20	21 (38.9%)	0 (0.0%)	
Total over the counter meds			
0	23 (39.0%)	36 (62.1%)	10.52***
1	17 (28.8%)	15 (25.9%)	
2-3	13 (22.1%)	6 (10.3%)	
4-6	6 (10.2%)	1 (1.7)	
Total prescription meds[c]			
0	16 (27.1%)	58 (00.0%)	71.70***
1	23 (39.0%)	0 (0.0%)	
2-3	15 (25.4%)	0 (0.0%)	
4-6	5 (8.5%)	0 (0.0%)	
Type of prescription meds			
Anticonvulsant	28 (47.5%)	0 (0.0%)	36.19***
Antidepressant	25 (42.4%)	0 (0.0%)	26.64***

	Clinical pain sample (*n*=59) *n (%) / M (SD)*	Community sample (n=58) *n (%) / M (SD)*	*t or X²*
TCA	13 (52.0%)	0 (0.0%)	15.20***
SNRI	2 (8.0%)	0 (0.0%)	2.11
SSRI	10 (40.0%)	0 (0.0%)	11.35***
Analgesics	18 (30.5%)	0 (0.0%)	20.91***
Opioids	9 (50.0%)	0 (0.0%)	10.12**
Sleep	6 (10.2%)	0 (0.0%)	6.22**
Other[d]	11 (18.6%)	0 (0.0%)	20.56**

[**]
p<.01

[***]
p<.001

[a]Complementary and alternative medicine

[b]*n* = 115

[c]Includes anticonvulsants, antidepressants, prescription analgesics, and prescription sleep medications only

[d]Prescription antibiotics, acne medications

Table 3
Linear regression predicting health service use in combined sample (n = 105)

Clinical factors	R^2	F	β
Income			0.16[*]
Gender			-0.04
Pain frequency			0.31[**]
Depression			-0.12
Activity limitations (adolescent)			0.11
Activity limitations (caregiver)			0.37[**]
Total R²	0.42	12.05[**]	

[*]
p<.05

[**]
p<.01

Table 4
Linear regression predicting healthcare visits in the clinical pain sample (n=59)

	R^2	F	β
Total health care visits			
Income			0.28
Gender			-0.03
Pain Frequency			0.15
Depression			-0.09
Activity limitations (adolescent)			0.01
Activity limitations (caregiver)			0.26
Total R²	0.11	0.96	
Specialty care			
Income			-0.08
Gender			0.09
Pain frequency			0.29[*]
Depression			0.01
Activity limitations (adolescent)			-0.06
Activity limitations (caregiver)			0.42[*]
Total R²	0.22	2.16	
CAM			
Income			0.23
Gender			-0.02
Pain frequency			0.13
Depression			-0.12
Activity limitations (adolescent)			0.07
Activity limitations (caregiver)			0.01
Total R²	.06	0.54	
Mental Health			
Income			0.04
Gender			-0.45[*]
Pain frequency			0.17
Depression			0.29
Activity limitations (adolescent)			-0.07
Activity limitations (caregiver)			-0.01
Total R²	0.29	3.21[*]	
Physical Therapy			
Income			0.14
Gender			0.24
Pain frequency			0.04

	R²	F	β
Depression			-0.14
Activity limitations (adolescent)			-0.09
Activity limitations (caregiver)			0.31
Total R²	0.13	1.21	
Prescription Medication			
Income			0.28[*]
Gender			-0.11
Pain frequency			0.19
Depression			0.43[*]
Activity limitations (adolescent)			-0.14
Activity limitations (caregiver)			0.13
Total R²	0.28	3.21[*]	

[*] $p<.05$