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Parenting in the context of chronic pain: A controlled study of parents with chronic pain

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Abstract

Objectives—This study aims to describe what adults with chronic pain experience in their role as parents, utilizing quantitative and qualitative methods. The first aim is to compare parents with chronic pain to parents without chronic pain on perceptions of their adolescent's pain, parental response to pain, and catastrophizing beliefs about pain. The study also examined predictors of parental protective behaviors, and examined whether these associations differed by study group.

Methods—Parents with chronic pain (n=58) and parents without chronic pain (n=72) participated, and completed questionnaire measures of pain characteristics and pain interference, as well as measures of parental catastrophizing and protective pain responses. Parents with chronic pain also completed a structured interview about their experience of being a parent. Interview responses were videotaped and subsequently coded for content.

Results—Compared to controls, parents with chronic pain endorsed more pain in their adolescents, and were more likely to catastrophize about their adolescent's pain and respond with protective behaviors. Parent's own pain interference and the perception of higher pain in their adolescent was associated with increased protective parenting in the chronic pain group. Qualitative coding revealed a number of areas of common impact of chronic pain on parenting.

Discussion—Chronic pain impacts everyday parenting activities and emotions, and impacts pain-specific parent responses that are known to be related to increased pain and pain catastrophizing in children and adolescents. Parents with chronic pain might benefit from interventions that address potential parenting difficulties, and might improve outcomes for their children.

Keywords

Parenting; Chronic pain; Catastrophizing; Pain responses

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Introduction

Research with clinical, community, and epidemiological samples consistently shows increased risk of chronic pain and related disability in the offspring of adults who have chronic pain [1–7]. A recent large epidemiological study found risk of chronic pain in adolescents and young adults significantly higher among those with a parent with chronic pain [8]. In that study, it was also demonstrated that living arrangements influenced this association, such that pain in offspring living primarily with a mother was influenced by maternal, but not paternal, chronic pain. Thus, family models and processes likely play a crucial role in the development of chronic pain in adolescents.

Consideration of the social context in which pain occurs provides crucial information about chronic pain impact. From the extant literature, it is clear that individuals with chronic pain experience a wide array of interpersonal difficulties, including social isolation and loneliness, greater perceived burden on others, lower social support, and greater conflict within the family system and with their romantic partners [9–16]. It is worth noting that the vast majority of research examining the social experiences of adults with chronic pain has focused on family functioning more broadly and on spousal relationships in particular (see [17] for a review). Despite awareness that many adults with chronic pain have children, there has been remarkably little research attention devoted to their role as parents, including what the experience is like for them and their beliefs about how pain influences their parenting.

Research examining parents with chronic pain includes one study comparing mothers with and without Irritable Bowel Syndrome (IBS), which showed that children of mothers with IBS report more stomachaches and have more school absences and physician visits. This study also demonstrated that maternal solicitous responses to children's illness or pain symptoms predicted children's symptom reporting, suggesting that parental solicitousness contributes to the intergenerational transmission of pain experiences, at least for gastrointestinal pain [2]. Additional work has demonstrated that children of mothers with chronic pain in middle childhood (ages 6–12) have significantly more pain complaints and health problems, and higher levels of internalizing problems such as anxiety and depression symptoms [18]. These mothers with chronic pain were more likely than healthy mothers to engage in lax parenting and reported lower relationship quality with their children [19]. In a qualitative analysis of 16 mothers, these mothers were described as being profoundly concerned about the effects of their own health on the health of their 6–12 year old children [20]. Most of the mothers in the study voiced worries about the impact of their current pain on their child's future health and development. Consideration of the consequences of chronic pain and associated disability on parenting across different developmental periods in childhood is crucial to a more comprehensive understanding of the pain experience and can help inform age-specific approaches to treatment. Further, evaluation of parenting behaviors and cognitions in the context of chronic pain may reveal important interpersonal mechanisms that contribute to the intergenerational transmission of pain. In the current study, we examine the impact of chronic pain on parenting in a sample of parents with adolescent children. Adolescence is a developmental period in which pain increases[21], and

parent responses may play a critical role in pain persistence and the development of pain-related disability during this time [22, 23].

Social learning theory (SLT) is posited to be of particular relevance in the intergenerational transmission of pain [24, 25]. As its name would suggest, the central tenet of SLT is that learning occurs in a social context [26]. Although learning can be direct, (i.e., behaviors are influenced as a function of environmental antecedents and consequences), most learning is thought to be indirect (i.e., behaviors are learned by observation, cognitive processing, and imitation). With indirect learning, individuals observe how other people (i.e., models) act in certain situations and then make decisions about whether to enact the behavior themselves based on their interpretation or perception of the consequences. Modeling is well-recognized as a powerful method for teaching new behavior, and parents have long been identified as salient models for their children [27, 28]. This is especially the case with respect to modeling health behaviors in adolescence [29–31]. Indeed, one's family is thought to be the most important influence for the development of health and illness-related attitudes, beliefs, and coping responses [1, 17].

It is presumed that parents with pain model pain behaviors, as well as related disability. From within an SLT perspective, all parents communicate their beliefs about pain, as well as their experience of pain, to their children through their actions, affective expressions, and words (see also [32]). When pain is chronic and debilitating, children have repeated opportunities to learn about pain, including factors that seem to trigger or exacerbate it as well as coping strategies that seem to alleviate it. For example, parents who limit physical activity due to concerns that it will result in increased pain--or who are distressed when their child experiences discomfort with activity--may inadvertently teach their children that physical activity causes pain and thus, should be avoided [33, 34]. Similarly, parents who magnify the threat-value of pain and feel powerless to stop it may transmit such beliefs to their children; in turn, their children may develop pain catastrophizing, regardless of whether they have ever experienced a painful condition themselves [22, 35].

From within the SLT model, parenting behavior may also be shaped by child behavior. Because of their own learning history, parents with chronic pain may respond differently to their child's pain expression than otherwise healthy parents would [20]. For example, they may be more attentive and sensitive to their child's pain cues, and respond in ways that inadvertently promote and encourage pain expression (i.e., by asking lots of questions about the pain, by mutual disclosure and other support provisions). Similarly, if children express fear avoidance or complain of pain with activity participation, parents with chronic pain may more readily promote protective goals to reduce exposure to pain, like encouraging rest or other restrictions of activities. Such protective goals may be amplified if parents have a tendency to catastrophize about their child's pain [34, 36, 37].

Chronic pain may impact a range of factors that are relevant to the tasks associated with the role of parenting [38]. First, pain may impair a parent's ability to complete physical tasks associated with the role of parenting. Tasks of daily living may be impacted, as parents with chronic pain may not always be able to go shopping, prepare meals, take children to school and other activities, carry children, or engage in physical play. Second, parents experiencing

pain may be less likely to provide their children with opportunities for regular physical activity (e.g., walks or hikes, trips to the park) due to their own physical limitations. These health-related habits may contribute to additional risk for chronic pain development. Third, a parent's ability to parent in a warm and consistent manner may be impacted by chronic pain. Difficulties expressing warmth and affection when experiencing pain have been reported by individuals with chronic pain—and this difficulty has been noted by their family members as well [20, 39]. Further, consistency in parenting can require considerable cognitive resources and energy, in addition to adequate supervision and monitoring [40, 41]. The physical, cognitive, and emotional demands of chronic pain may make it difficult for parents to consistently supervise and direct their children's behavior. Finally, the experience of chronic pain may impact a parent's cognitions regarding their child's pain, as well as parenting behaviors in response to children's pain symptoms [20]. Parent's own pain may increase their risk of catastrophizing about their child's pain and may increase the risk for engaging in overly protective behaviors in response to child pain [34, 36, 42].

The current study uses mixed methods (quantitative and qualitative approaches) to provide a more thorough description of what adults with chronic pain experience in their role as parents. The first aim is to compare parents with chronic pain to parents without chronic pain on perceptions of their child's pain, parental response to pain, and beliefs about pain, with the hypothesis that parents with pain will report greater pain in their own adolescent children, and will demonstrate higher levels of protective responding to their child's pain and greater catastrophizing about their child's pain. The second aim is to describe the impact that parents with chronic pain perceive pain has had on their parenting practices via qualitative interview, and to examine associations between these qualitatively assessed parent experiences and parent self-report measures. Converging qualitative and quantitative data in mixed-methods research can lend credibility and greater insight into study findings [43]. The final aim is to test an exploratory model in which family risk factors, including parent pain interference, child pain, and parent catastrophizing about child pain are examined as predictors of parental protective responses to children's pain, and to examine whether these associations are moderated by study group, such that they differ between parents with and without chronic pain. This exploratory model proposes that factors associated with parental protective responses to child pain may be more strongly associated among parents who have chronic pain themselves compared to healthy parents.

Materials and Methods

Participants and Procedures

Parents with chronic pain ($n = 58$) and parents without chronic pain ($n = 72$) were recruited as part of an on-going longitudinal study of family history risk for chronic pain, which aims to examine changes in adolescent pain among adolescents with and without family history risk for pain. All study procedures were approved by the University's Institutional Review Board. Written informed consent was obtained from parents and assent was given by children for participation in the larger study.

Participants with chronic pain were recruited through specialty care providers (flyer posting and mailings to patients through pain management and fibromyalgia clinics) at a major

university medical center, and through web-based research participation recruitment (email targeted to patients and research website postings). Healthy parents were recruited through the university's research website and through posting of flyers throughout the larger metropolitan area. All recruitment materials stated "We are seeking parents with chronic pain and parents without chronic pain and their 11–15 year old children. The purpose of the study is to learn more about the pain experiences of parents, and to learn about health and pain in their children." Parents in both groups had to have a biological child between the ages of 11 and 15 who was willing to participate, and only one parent-child dyad from a single family was invited to participate. Inclusion criteria specified that participants with chronic pain be experiencing weekly or more frequent pain and be receiving specialty care for their pain problem. Parents in the healthy group were excluded if they reported experiencing pain on a weekly or more frequent basis in the past three months, or if they endorsed having a history of a chronic pain problem in the past that persisted for more than 3 months. Parents in the healthy group were also excluded if they reported that the child's other biological parent or other co-habiting parent (e.g., step-parent) had a history of a chronic pain problem. Exclusion criteria for both study groups included known presence of serious or chronic medical conditions (e.g., cancer, arthritis). Potential participants called the study phone number or provided their contact information on the study website. All potential parent participants were screened by phone. Screen failures included 3 families excluded because the child in the target age range was not a biological child (adopted or other biological relation), and 2 were excluded from the healthy sample due to a biological parent having a history of chronic pain. No potential participants declined participation after learning about study procedures during the phone screen, but one child became ill upon arrival for the study visit and the family declined to complete data collection. Two additional participants (one in each group) were unable to attend scheduled study visits and thus were not enrolled despite being eligible and interested at screening.

Parents in both study groups completed all questionnaire measures on a laptop computer during a study visit at the University. Study data were collected and managed using REDCap electronic data capture tools hosted at the University [44]. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

Measures

Sociodemographics—Parent participants reported on individual items assessing their own ethnicity, racial background, educational level, marital status, number of people living in their home, number of children under 18 years of age living in their home, and family income. Parents also reported on their child's sex and date of birth, and on their own date of birth. Birth dates were used to calculate ages of participants on the date of visit.

Parent pain characteristics—Parents completed the Brief Pain Inventory (BPI) [45, 46], which assesses pain characteristics and pain interference. In the current study, *Worst*

pain in the last 24 hours (0–10 NRS), *Usual pain* in the last 24 hours (0–10 NRS), and the *Pain Interference* score were used. The *Pain Interference* score is the average of 8 items rating how much pain interferes with activities such as walking, work, etc., with higher scores indicating higher levels of pain interference.

Child pain characteristics—Parents reported on child pain frequency and intensity in the past 3 months. Pain frequency responses included ‘No pain’ = 1, ‘About 1 time per month’ = 2, ‘1–3 times per week’ = 3, ‘About 1 time per week’ = 4, ‘2–3 times per week’ = 5, ‘4–6 times per week’ = 6, and ‘Daily’ = 7. Similar categorical scales are often used in child pain frequency assessment [47]. Usual pain intensity was rated using a 0–10 numerical rating scale with anchors of ‘No pain’ = 0 to ‘Worst pain possible’ = 10. In order to broadly assess parent perspectives on child pain and capture either more frequent or more intense pain, a *Child Pain Index* was calculated by multiplying pain frequency and pain intensity scores, with a possible range of 0 to 70. This score ranged from 0 to 49 in the current sample. *Child Pain Index* scores of 0 were the result of ‘No pain’ responses on both items assessing pain characteristics. Similar multidimensional approaches to pain scoring and classification have been used in epidemiological studies and clinical trials [48, 49]. In the current sample, parent report of child pain frequency and usual intensity were moderately correlated ($r = .42, p < .001$), while the *Child Pain Index* score was highly correlated with both parent report of child pain frequency ($r = .88, p < .001$) and usual intensity ($r = .71, p < .001$).

Parent responses to child pain—Parents completed two measures assessing their responses to their child’s experience of pain. Parental *catastrophizing about their adolescent’s pain* was measured using the Pain Catastrophizing Scale-Parent Version (PCS-P) [50]. The PCS-P includes 13 items concerning the different thoughts and feelings parents may have when their child experiences pain. Items assessing catastrophic thoughts and feelings about their child’s pain use a Likert-type 5-point scale (0 = ‘not at all’, 4 = ‘extremely’). The PCS-P yields three subscale scores for rumination, magnification and helplessness, as well as a total score ranging from 0 to 52. The total score was used in analyses in the current study, and coefficient alpha for the PCS-P was .89 in the current sample.

Parents also reported on their own *protective responses to their adolescent’s pain* using the 13-item protect subscale of the Adult Responses to Children’s Symptoms (ARCS) questionnaire [51, 52]. Items included questions such as “When your child has pain, how often do you bring your child special treats or little gifts?”. Responses ranged from 0 = ‘never’ to 4 = ‘always’, and were averaged to obtain a protect score. Higher scores indicated higher levels of protectiveness. The ARCS questionnaire has shown good reliability and validity [51–53] and coefficient alpha was .90 in the current sample.

Qualitative interview and coding system—In addition to completing questionnaire measures, parents with chronic pain participated in a brief scripted interview with set prompts (see Table 2) designed to elicit parents’ perspectives on parenting in the context of having chronic pain. Similar open-ended prompts have been used in qualitative studies of mothers with physical illness [54, 55]. This interview was video-taped, and parent responses

were subsequently coded for content. Global ratings of parent positive and negative affect were also made, as well as coding of whether parent was tearful or cried during the interview. The negative affect rating ranged from 0–10, with three anchors: ‘No negative affect’ = 0, ‘Flat, slightly sad’ = 5, ‘Very negative, tearful, angry’ = 10. The positive affect rating ranged from 0–10, with three anchors: ‘No positive affect’ = 0, ‘Some smiles’ = 5, ‘Very positive, lots of smiles, cheerful, laughs’ = 10. Parent crying or tearfulness was rated as ‘Not at all’ = 0, ‘A little/Somewhat’ = 1, and ‘A lot/Very’ = 2. Interviews ranged from 2.5 to 20 minutes in length, with the mean length being 7.5 minutes ($SD = 4.5$ minutes).

A grounded theory approach [56] was used to develop a coding system describing the impact of chronic pain on parenting. The coding system was developed based on a review of a sub-set of interview responses of 8 parents that were randomly selected after data collection was complete. Two research assistants and the principal investigator independently generated lists of the most frequently occurring responses and consensus on codes was achieved for each open-ended item. Saturation of response categories was achieved after independent review of 5–7 interviews, such that no additional codes were generated by viewing additional interviews. Each response that was coded was assigned a single code. The number of responses given was not considered in the coding system, and an individual’s responses to a given prompt might be coded on multiple categories.

Parents’ responses to scripted interview questions (see Table 2) were used to assess parent perceptions of the impact of chronic pain on parenting. Responses to the first 3 open-ended items (items 1–3 in Table 2) were coded using 15 possible coded responses, as the coded responses generated by these 3 prompts were similar. The parent received a 0 (not present) or a 1 (present) for each of the possible responses. The 15 codes were grouped into 5 broad categories. *Reduced parental involvement* included 4 responses (e.g. “Missing out on attending child’s activities”; “Too fatigued or in too much pain to do things with child”; “Less able to engage in play with child”). *More inconsistent discipline* included 2 responses (e.g. “Less able to follow through with rules or limits”; “Makes me more inconsistent”). *Increased impatience* included 1 response (“More grumpy, irritable, impatient or moody with child”). *Guilt and self-disappointment* included 5 responses (e.g. “I feel guilty”; “This is not what I wanted to be like as a parent”; “I am not a good example for my child”). *Reduced child physical activity* included 2 responses (“Less able to do family physical activities (hiking, biking, etc.)”; “Not able to take child to physical activity (park, sports, etc.)”). Responses to items 4–7 were coded as 0 (“No”) or 1 (“Yes”). Ninety percent agreement between research assistants was achieved prior to independent coding. One research assistant coded 30 videos and the other coded 27. Additionally, 7 cases (12%) were randomly selected and coded by both research assistants to assess for inter-rater reliability. Inter-rater reliability on these content category codes was high, with a Cohen’s kappa of .96.

Analyses

All data were screened for normality, appropriate ranges, and univariate outliers prior to performing analyses. One data point was removed as a result of this process (one parent in the healthy group had a *protectiveness* score on the ARCS that was $>4 SD$ ’s above the sample mean). Descriptive statistics were then performed to characterize the sample, and

Chi-squared and t-tests were used to examine potential group differences on parent and child sociodemographic variables. Multivariate analysis of covariance analyses (MANCOVAs) were used to compare parents in the chronic pain group to no chronic pain group on their pain characteristics, parental beliefs about pain, and parental responding to child's pain, after controlling for selected sociodemographic variables. Next, multiple linear regressions were conducted examining child pain index, parental pain catastrophizing, and parental pain interference as predictors of parent protective behavior, with study group tested as a moderator. Post-hoc probing of moderator effects was performed following the procedures outlined by Holmbeck (2002). Bivariate correlations were calculated to broadly evaluate associations between parent responses on questionnaire measures and coded responses to the qualitative interview among parents with chronic pain.

Results

Pain and sociodemographic characteristics

The majority of parent participants were mothers (88.3%). Parent ethnicity was largely non-Hispanic, and the majority of parents reported Caucasian racial background (see Table 1). Participating adolescents were 60.8% female, with a mean age of 13.39 years ($SD = 1.47$). The majority of parents were married or remarried (62.6%), while 30.5% of parents were heading single-parent households (divorced or never married). Mean number of people living in the home was 4.28 ($SD = 3.60$), and mean number of children living in the home was 2.06 ($SD = .85$). Chi-squared and t-test results showed the two study groups (parents with and without chronic pain) did not differ significantly on parent sex, parent ethnicity, parent racial background, parent marital status, child sex, child age, child ethnicity, child racial background, number of people living in the home, or number of children living in the home. The two study groups did differ significantly on parent age, with parents in the chronic pain group being younger than parents in the control group. The groups also differed on parent education and family income, with the chronic pain group having less education and family income compared to the group without pain. Parents with chronic pain were also more likely to be unemployed or disabled. As education level and income were significantly correlated in the sample (Spearman's $\rho = .44$, $p < .001$), education and parent age were selected as covariates and controlled for in subsequent analyses examining group differences.

Primary chronic pain problems in the chronic pain group included fibromyalgia (39.7%), back pain (19.0%), other musculoskeletal pain (e.g., neck pain, shoulder pain; 25.9%), abdominal pain or IBS (6.9%), and headache (8.6%). Parents with chronic pain reported high levels of comorbid pain problems, with the majority of the sample reporting having problems with headaches or migraine (75.9%), IBS or frequent abdominal pain (75.9%), and back pain (86.2%). Parents with chronic pain reported their children to have more frequent and more intense pain compared to parents without chronic pain (see Table 1). Child pain frequency of more than once per week was reported in 25.3% of the chronic pain group compared to 11.1% of the non chronic pain group.

Group differences

Two separate MANCOVAs were used to compare means of parents with chronic pain and healthy parents on pain characteristics and child pain characteristics, protective responses to child's pain, and parental pain catastrophizing about child's pain. Covariates included parent age and education level. In the first analysis evaluating differences between groups on parental pain characteristics, the multivariate result was significant for group, Wilk's $\Lambda = .34$, $F(3, 121) = 73.31$, $p < .001$, $\eta_p^2 = .66$. Follow-up univariate tests revealed differences between the groups on parental pain interference, worst pain, and usual pain (see Table 4), confirming that parents in the chronic pain group differed from the healthy group on pain characteristics. In the second analysis evaluating parental report of child pain characteristics and parental responses to pain, the multivariate result was also significant for group, Wilk's $\Lambda = .87$, $F(3, 119) = 6.01$, $p = .001$, $\eta_p^2 = .13$, indicating a difference in parent report of child pain characteristics and responses to pain between parents with chronic pain and healthy parents. Follow-up univariate tests revealed differences between the groups on child pain index, parental protectiveness, and parental catastrophizing (see Table 4). Thus, the hypothesis that parents with chronic pain would report greater pain in their own adolescent children, and demonstrate higher levels of protective responding and catastrophizing in response to child pain was supported.

Next, hierarchical multiple regression analysis was performed to evaluate the extent to which parental group status (with chronic pain vs. without chronic pain) moderated the relationships between potential familial risk factors for child pain (parental pain interference, catastrophizing about child's pain, and parent report of child pain characteristics) and parental protective responses to child's pain (see Table 5). All continuous predictors were centered prior to model entry following procedures outlined by Aiken and West [57]. These continuous variables were entered into the first step of the regression equation with study group simultaneously entered as the moderator. To evaluate parental pain status as a moderator, the two-way interactions between the three familial risk factors and group status (pain vs. no pain) were entered in the second step of the equation. The full model was significant (adjusted $r^2 = .240$, $F = 6.597$, $p < .001$), with child pain index and parental pain catastrophizing contributing unique variance to parental protective responding. A group by child pain index interaction effect also emerged as significant, with group by pain interference emerging as a trend level effect (see Table 5). Post-hoc probing of all moderation effects was performed following the procedures outlined by Holmbeck [58]. Results revealed that parental protective responding is significantly higher at higher levels of child pain index in the chronic pain parent group, but not in the healthy group, supporting the hypothesis that child pain may be more salient or more strongly associated with protective behaviors for parents who have chronic pain (see Figure 1). The interaction between parent pain interference and group was significant at the trend-level ($p < .06$), and was thus selected for post-hoc probing due to the exploratory nature of the hypothesis. Probing of the interaction revealed a similar pattern as observed with the child pain index; parental protective responding was significantly higher at higher parental pain interference in the chronic pain group (see Figure 2). Contrary to our hypothesis, no evidence of interaction was observed between parental pain catastrophizing and protective responses to

pain; for both groups, higher parental pain catastrophizing was associated with higher protective responding to pain.

Qualitative Interview Coding: Parents with Chronic Pain

Video recording was not available for one parent due to technical problems, therefore the final sample size for this portion of the analyses was 57. Content coding of items 1–3 of the qualitative interview yielded the following results: *Reduced parental involvement* with their adolescent was reported by 86.0% of parents; *More inconsistent discipline* was reported by 28.1% of parents; *Increased impatience* (grumpiness or irritability) was reported by 40.4% of parents; *Guilt and self-disappointment* was reported by 36.8% of parents; *Reduced child physical activity* was reported by 63.2% of parents. Only one parent in the sample reported no impact of chronic pain on their parenting in these areas, and 77.0% reported impact in 2 or more areas.

In response to additional qualitative interview items (items 4–7 in Table 2), 76.4% of the sample identified something positive that had come out of having pain for them as a parent. The most commonly cited positive aspects were feeling they were more empathetic towards their children and feeling that their children learned sympathy or compassion. The majority of parents (81.8%) reported that they did talk about their experiences with chronic pain with their children, most commonly indicating that they told their child when they could not do something because of pain. The majority of parents (75.0%) reported that they were worried that their child might develop a chronic pain problem, and 82.1% reported that their experiences with pain have changed how they respond to their child's pain or discomfort, most frequently reporting increased compassion and understanding of their child's pain. It should be noted that while many parents reported similar enough experiences that themes in content emerged, there was a wide variety of cognitive and emotional experiences reported by parents. We provide some specific quotes from parents in Table 2.

Bivariate correlations were conducted to examine the associations between qualitative content codes and validated self-report measures (see Table 3). All content codes were significantly correlated with at least one self-report measure. The reduced involvement code was positively associated with protective responses and catastrophizing. The parental guilt code was positively associated with protective responses and pain interference. The parental inconsistency code was positive associated with protective responses, and the parental irritability code was positively associated with catastrophizing. Reduced child physical activity was the only code that was not associated with any parent self-report measures. Ratings of positive affect, but not negative affect, were significantly associated with self-report measures, such that higher parent positive affect was associated with lower levels of catastrophizing about child pain and lower parental pain interference. In contrast, parents crying or being tearful during the interview was associated with higher catastrophizing and pain interference.

Discussion

As hypothesized, our results as a whole indicate that having chronic pain has an impact on parents, both in terms of impacting everyday parenting activities and in terms of impacting

pain-specific parent responses that are known to be related to increased pain and pain catastrophizing in children and adolescents [23, 35, 59]. Our results indicate that compared to controls, parents with chronic pain endorse more pain in their adolescents, and are more likely to catastrophize about their adolescent's pain and respond with protective behaviors. These findings are consistent with a social learning perspective, and provide additional support for the important role that parental cognitions and behaviors might play in the intergenerational transmission of chronic pain [2, 60, 61]. In addition to being exposed to a parent modeling pain behaviors and pain coping, children who have a parent with chronic pain are at increased risk of having that parent engage in catastrophizing and protective behaviors in response to child pain.

Notably, parental catastrophizing about child's pain emerged as the strongest predictor of parental protective responding, regardless of parents' pain status. Although contrary to the hypothesis that catastrophizing would be more strongly associated with protective behaviors among parents with chronic pain, this finding is commensurate with a growing literature showing parent catastrophizing to be a key factor in child pain, both in clinical and community samples [22, 34]. Parent pain status did moderate the association between the other family risk variables (parental pain interference; child pain) and protectiveness. Parents are more likely to respond to their child's pain with protective behaviors if they experience greater pain interference or perceive their children as having greater pain and disability—but only if the parents have a chronic pain condition themselves. These findings suggest that child pain may have greater salience for parents with chronic pain than for healthy parents, and that parents with chronic pain are more likely to respond to their child's pain with protective behaviors when they are more disabled by their own pain. Teaching parents more effective pain coping strategies, and providing instruction to parents with chronic pain regarding operant conditioning of pain behaviors may help reduce risk for the intergenerational transmission of pain.

While previous work in this area has highlighted the psychosocial processes important in families with chronic pain (e.g., modeling pain and coping, inadvertent reinforcement of child pain complaints), responses of parents in the current study also highlight the impact that parental chronic pain may also have on the general health habits of the family. Parents with chronic pain in this study reported difficulty providing their adolescents with access to regular physical activity. Our mixed-methods analysis underscores the uniqueness of this concern, as reduced child physical activity were not associated with parental protectiveness, parental pain catastrophizing, or parental pain interference. Lower levels of physical activity are associated with increased pain experiences in adolescence, and this may point to an indirect "general health" pathway of influence, in which chronic pain in parents leads to lower levels of activity and possibly higher BMI, both of which are associated with adolescent chronic pain [62, 63].

The coding results of qualitative interviews highlight the importance of parental emotions around their role as a parent, specifically guilt and self-disappointment. Parents who mentioned these negative emotions in the qualitative interview scored higher on a measure of protective responses to their child's pain. These parents also reported higher levels of pain interference, suggesting that reducing pain interference has the potential to improve parental

emotions around their parenting role. Alternatively, intervention efforts targeting beliefs, expectations, and emotionality regarding the one's role as a parent may reduce perceived pain interference. Results from coding of qualitative interviews also suggest potential directions for measurement development in this area. For example, with the exception of parental guilt, the measure of parent pain interference was not associated with any of the areas identified by parents as areas of pain impact, suggesting that the ways in which we typically assess disability and pain interference may not fully capture the multidimensional impact of pain on the parenting role. Future work might focus on the development of validated self-report measures assessing domains such as parental role interference and parental guilt. Development of measurement tools in this domain might also help identify patients with chronic pain who might benefit from intervention related to parenting.

The majority of these parents are worried that their child might develop a chronic pain problem themselves. As such, a logical next step might be to develop health and behavior interventions that target parent catastrophizing and protectiveness, aim to increase parent involvement with their adolescents, or target parent pain interference or family physical activity. Of note, parental guilt, reduced involvement, and parental inconsistency were significantly correlated with protective responding to pain. While speculative, it is possible that such protectiveness is one way that parents with chronic pain know how to be a 'good parent' to their child. Thus, interventions targeting parental protective responding to pain may wish to address the extent to which parents hold such beliefs. These types of interventions might be delivered individually to parents with the goal of improving parent outcomes, or might be delivered to entire families. Either approach has the potential to increase positive outcomes for the children of adults with chronic pain.

The current study has several strengths, including the use of a sample of parents with a variety of chronic pain conditions and the use of a control group of parents without pain, as well as the use of mixed methods to more fully capture the experiences of parents. Previous work in specific populations (e.g., mothers with IBS) [2] has been seminal in developing models of intergenerational transmission of pain behaviors, and our results appear to support the use of these models in a sample of parents with mixed chronic pain conditions. Additionally, this is the first study to examine chronic pain in parents of adolescents, which may of particular relevance as this is a high-risk developmental period.

Limitations of the current study include that the majority of participants were mothers, which potentially limits our ability to generalize results to fathers who have chronic pain. The low level of inclusion of fathers in research is noted as a problem in many research studies involving families. However, there is some evidence that the behaviors of fathers and mothers differs in painful situations [64], thus the examination of potential differences between fathers and mothers with chronic pain and the ways in which they might influence their children is warranted in future studies. It is also possible that different recruitment methods in the current study (in clinic vs. online methods) may have led to a sample that is not as representative of a clinical sample as if clinic-only approaches had been used. The two study groups also differed on a number of socioeconomic demographic characteristics, including parent age. Of note, recent work following individuals with juvenile fibromyalgia suggests that women with chronic pain may be more likely to marry at a young age [65], a

finding which may account for the age differences observed between the parent groups in our study. We were able to statistically control for some of these factors in our analyses, though this was not the primary focus of the current study, which recruited children of similar ages and genders in both groups. However, it is likely that the children of parents with chronic pain also experience a broad range of social and economic stressors that also have the potential to impact their general health and risk for developing chronic pain and other poor outcomes over time. Future work might directly examine the impact of general family stress, including socioeconomic stress, on parenting and child outcomes in this population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Post-hoc moderation probe: Child Pain Index

Chronic Pain Group [$b=.27$; $t(124)=2.33$, $p=.02$] *Parental protective responding higher at higher levels of child pain index*

No Chronic Pain Group [$b=-.06$; $t(124)=-.47$, $p=.64$]

Figure 2.

Post-hoc moderation probe: Parental Pain Interference

Chronic Pain Group [$b=.16$; $t(124)=2.28$, $p=.02$]; *parental protective responding tends to be higher at higher levels of pain interference*

No Chronic Pain Group [$b= -.02$; $t(124)= -.09$, $p=.93$]