Published in final edited form as:

AIDS Care. 2008 July ; 20(6): 667–676. doi:10.1080/09540120701687042.

Psychosocial predictors of somatic symptoms in adolescents of parents with HIV: a six-year longitudinal study

B. Bursch^{a,*}, P. Lester^b, L. Jiang^c, M.J. Rotheram-Borus^b, and R. Weiss^d

^aDepartments of Psychiatry & Biobehavioral Sciences, and Pediatrics, David Geffen School of Medicine at UCLA, Los Angeles, US

^bCenter for Community Health, Department of Psychiatry & Biobehavioral Sciences, David Geffen School of Medicine at UCLA, Los Angeles, US

^cAmerican Indian and Alaska Native Programs, University of Colorado Health Sciences Center, Aurora, US

^dDepartment of Biostatistics, UCLA School of Public Health, Los Angeles, US

Abstract

The objective of this study was to identify salient parent and adolescent psychosocial factors related to somatic symptoms in adolescents. As part of a larger intervention study conducted in New York, 409 adolescents were recruited from 269 parents with HIV. A longitudinal model predicted adolescent somatization scores six years after baseline assessment. Adolescent somatic symptoms were assessed at baseline and at 3-month intervals for the first two years and then at 6-month intervals using the Brief Symptom Inventory. Baseline data from adolescents and parents were used to predict adolescent somatic symptoms. Variables related to increased adolescent somatic symptoms over six years included being younger and female; an increased number of adolescent medical hospitalizations; more stressful life events; adolescent perception of a highly rejecting parenting style; more parent-youth conflict; no experience of parental death; and parental distress over their own pain symptoms. Our findings extend the literature by virtue of the longitudinal design; inclusion of both parent and child variables in one statistical model; identification of study participants by their potentially stressful living condition rather than by disease or somatic symptom status; and inclusion of serious parental illness and death in the study.

Keywords

psychosocial predictors; biopsychosocial model; somatization

© 2008 Taylor & Francis

*Corresponding author. BBursch@mednet.ucla.edu.

Publisher's Disclaimer: Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf> This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden. The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

Introduction

Persistent somatic symptoms not explained by illness or tissue pathology are common and are often referred to as functional (Campo & Fritsch, 1994). Such symptoms are caused by altered physiological function rather than by structural abnormality (Hyman, 1999). Functional disorders are diagnosed with symptom-based criteria, not traditional medical tests. Examples of functional disorders include headaches, irritable bowel syndrome and non-epileptic seizures. There is interest in understanding early risk and protective factors for functional symptoms (Di Lorenzo et al., 2005).

The biopsychosocial model, positing that illness is the product of interacting biological, psychological and social systems, has been used to explain diseases and functional symptoms (Hyams & Hyman, 1998; Hyman, 1999; Zeltzer, Bursch, & Walco, 1997). For example, biological factors associated with functional abdominal pain include changes in intestinal wall sensory receptors, modulation of sensory transmissions, cortical perceptions, family history of pain and pain memories (Hyams & Hyman, 1998). Related psychological factors include temperament, increased focus on pain-related stimuli, emotional responses to pain, pain memories and efforts to cope with pain (Zeltzer et al., 1997). Social factors include family history of pain, parental responses to a child's pain and stressful life events (Walker, 1999). Central to this model is the role of stressful events and their impact on functioning (Tan, Tillisch, & Mayer, 2004). Ongoing daily stressors, such as a chronic family illness, have been found to be more important than single major stressors in provoking pain (Walker, Garber, Smith, Van Slyke, & Claar, 2001). While general and symptom-specific biological mechanisms are involved with the development of specific somatic symptoms, research suggests that important psychosocial variables are consistent across symptoms. For example, anxiety disorders and family stress are both commonly present in childhood abdominal pain and non-epileptic seizures (Walker & Greene, 1989; Wyllie, Glazer, Benbadis, Kotagal, & Wolgamuth, 1999). Most research has been conducted with individuals with a common symptom (e.g. headaches) rather than with those living in similar high stress situations (Walker et al., 2001; Walker & Greene, 1989; Wyllie et al., 1999).

Adolescents and young adults living with parents with HIV (PWH), provide an opportunity to examine risk factors for the development and maintenance of somatic symptoms. Families living with PWH have often endured stressors including poverty, residential instability, substance abuse, physical deterioration, emotional distress or early parental death (Rotheram-Borus, Stein, & Lin, 2001). In a previous study (Lester, Stein, & Bursch, 2003) we found that symptoms during adolescence persisted over 12 months and were predicted by female gender. This study also revealed that: (1) parental distress over pain predicted adolescent somatic symptoms at baseline and the 12 month follow-up, (2) adolescents who experienced their parents as highly rejecting and uncaring were more likely to report somatic symptoms at follow-up and (3) school problems and parental rejection correlated with somatic symptoms at baseline.

The current study re-examines these psychosocial predictors of somatic symptoms over six years and extends our research by examining additional predictors expected to increase symptoms due their potentially stressful nature, including: adolescent medical illness and hospitalizations (Pilowsky, Bassett, Begg, & Thomas, 1982), stressful life events (Walker, Garber, & Greene, 1993; Wyllie et al., 1999), adolescent sexual abuse (Wyllie et al., 1999), adolescent substance use, parent-child conflict (Walker et al., 1993), parental illness status and death (Wyllie et al., 1999), parental emotional distress (Garber, Zeman, & Walker, 1990; Wyllie et al., 1999) and substance use, and poor parental coping style (Garber et al., 1990). Our aim was to identify parent and adolescent psychosocial factors related to somatic

symptoms within a longitudinal model among adolescents living with a seriously ill parent. Institutional Review Board approval was obtained.

Methods

Participants

The New York City Division of AIDS Services provides case management services to 95% of people with HIV/AIDS who qualify for assistance. Parents with HIV were selected between August 1993 and March 1995 from a consecutive series of clients dependent on governmental financial support. Of the 429 eligible PWH, 307 were recruited, 65 (15.1%) were untraceable, 46 (10.7%) refused and 11 (3%) were not recruited due to severe illness or incarceration. Thus, 71.6% (307) of eligible PWH were recruited.

After recruiting and consenting the PWH, recruitment of their adolescents required both parental and adolescent informed consent. Some PWH ($n = 38$) did not have custody of their children or did not allow them to participate. A total of 409 adolescents/young adults were recruited from 269 PWH (1.5 per family, range 1–5). The term ‘adolescent’ will be used to refer to the teens and young adult children of the parent with HIV.

Assessments

Baseline measures were collected from parents. Adolescents were followed longitudinally starting between 1993 and 1998, with the final interview completed in 2002 (mean = 63.5 months). They were reassessed at 3-month intervals for two years and then at 6-month intervals. An ethnically diverse and bilingual team of interviewers conducted 2-hour individual assessments with participants in their homes. Retention was high, with an annual re-evaluation rate ranging from 79% to 94%.

Intervention

The purpose of the larger study was to evaluate an intervention designed to reduce risk in children of PWH (see Rotheram-Borus et al., 2003 for results of the larger study). While the analyses described in this paper reflect a secondary investigation focused on factors influencing somatic symptoms over time, the intervention is described here for context. The intervention was not designed to reduce somatic symptoms.

At baseline, PWH and adolescents were randomly assigned to the intervention ($n = 132$ PWH; 203 youth) or standard care ($n = 137$ PWH; 206 youth). Participants received the intervention the first year after the baseline measures were administered. The intervention was delivered in three modules at a central location, with two sessions each day. Eight sessions were for parents and addressed illness disclosure, adjustment to disease status and parenting skills. Twelve sessions were for parents and adolescents, focused on custody planning, reduction of risk and parent-youth communication. Eight sessions were for bereaved youth and new caregivers after parental death, focused on grieving, setting life goals and establishing a positive relationship with the guardian. Similar numbers of PWH died in the intervention ($n = 63$) and standard care ($n = 70$) conditions. Intervention manuals are available at: <http://chipts.ucla.edu/interventions/manuals/index.html>

Procedures

Adolescent measures

- Somatic symptoms were assessed at baseline and each follow-up for up to 72 months, using the average somatization subscale score of the Brief Symptom Inventory (BSI; Derogatis, 1993). This variable was skewed, so a log 2 transformation was used as

the outcome variable. The subscale consists of 7 items, rating distress ranging from 0 (not at all) to 4 (extremely). It is a valid and reliable measure with an internal consistency coefficient of 0.80, and test-retest reliability of 0.68 (24). We found coefficient $\alpha = 0.79$ at baseline, coefficient $\alpha = 0.83$ at follow-up.

- Adolescent sex, age and ethnicity were recorded at baseline.
- Number of medical diagnoses was recorded at baseline. Twenty disease categories (e.g. kidney disease, cancer) were asked, as was 'any other serious illness'.
- Number of lifetime hospitalizations was recorded at baseline: this variable was skewed so was truncated at three.
- Lifetime substance use was self-reported at baseline, including alcohol, marijuana and hard drugs (amphetamines, inhalants, cocaine, crack, hallucinogens, heroin, injected drugs).
- School problems were assessed at baseline with four items scaled 1–5, higher scores indicating more problems. Problems included: dislikes school, is a poor student, has poor relations with teachers and has poor relations with classmates).
- A sum of stressful life events was calculated at baseline (adapted from Olson and colleagues, 1982). The 38 items used a 4-point rating scale of the impact of each event endorsed, ranging from having a very bad (1) to very good (4) effect. Items include illness and family strains, losses, family transitions, family legal problems and community based stressors. Internal consistency measured $\alpha = 0.57$.
- Parental bonding was assessed at baseline using the Parker Parental Bonding Instrument (Parker, Tupling, & Brown, 1979). This measure consists of two subscales, with items rated from very unlikely (1) to very likely (4). The first subscale called 'Parental care' has 12 items that cover the dimensions: Affection, closeness, empathy and reciprocity in one direction and rejection, coldness and indifference in the other direction. The second scale called 'Protection' has 13 items with the dimensions: overprotection and extensive intrusion and control in one direction and promotion of independence and autonomy in the other direction. Internal consistencies for parental care (0.75–0.83) and protection (0.82–0.86) (Canetti, Bachar, Galili-Weisstub, Kaplan De-Nour, & Shalev, 1997; Fendrich, Warner, & Weissman, 1990) are acceptable. The test-retest reliability is 0.76. It has good validity as a measure both of perceived and of actual parenting style (Parker, 1981).
- Parent-youth conflict was measured using an adapted version of the Life Experiences Survey (Sarason, Johnson, & Siegel, 1978). It included five items, with ratings of the impact of events are on 7-point scale ranging from extremely negative (−3) to extremely positive (+3). An averaged score was used as an index of conflict. Items include arguments with the parent about household responsibilities, behavioral trouble at school, peers, academic achievement and adolescents' jobs.
- At adolescent baseline and during the follow-up period, death rate of the study HIV-positive parent was recorded by routinely contacting the family and monitoring state records. Occurrence of non-study parental death was collected during follow-up assessment.

Parent measures (all were baseline measures only)

- Parental illness status was self-reported (HIV asymptomatic, HIV symptomatic or AIDS).

- Emotional distress over their own pain symptoms was measured with an 8-item scale uses a 6-point scale of distress from not at all (1) to extremely (6). Symptoms included: physical or bodily pain; sore throat; dry or painful mouth; trouble swallowing; and pain, numbness, or tingling in hands or feet (Hein, Dell, Futterman, Rotheram-Borus, & Shaffer, 1995; Rotheram-Borus & Stein, 1999; Rotheram-Borus, Stein & Lin, 2001).
- Parent emotional distress was measured using The Brief Symptom Inventory (Derogatis, 1993; Derogatis & Lazarus, 1994). The 53 items use a 5-point rating scale of distress from 0 (not at all) to 4 (extremely). This scale is valid and reliable measure with an internal consistency coefficient ($\alpha = 0.97$). Among men in our sample, 64% were in the clinical range for depression and 40% for anxiety. Among women, 39% were in the clinical range for depression and 38% for anxiety.
- Lifetime substance use was self-reported, including alcohol, marijuana and hard drugs (amphetamines, inhalants, cocaine, crack, hallucinogens, heroin and injected drugs).
- Parental Coping Style was assessed at baseline using 29 items on a coping with AIDS questionnaire (Namir, Wolcott, Fawzy, & Alumbagh, 1987). Five subscales were used. Items were rated on a 1 (never) to 5 (always) Likert scale and parental coping was categorized as positive (subscales: positive action, spiritual hope and social support) or negative (sub-scales: passive problem solving, self-destructive escape).

Statistical analysis

We fit longitudinal models with SAS proc mixed (SAS Institute, Cary, NC, US) to the BSI somatization scale, which was log transformed after adding a small constant to adjust for skewness. The analysis generally followed that described by Weiss (2005). We used the autoregressive moving average (ARMA, 1,1) covariance model for the correlation of observations from the same adolescent and included a random parent effect to model the correlation between adolescents with the same parent.

We allowed for a bent line time trend that was linear with changes in slope at months 18 and 36. We first fit separate models with the adolescent or parent predictors one at a time, always including the bent line time trend and adolescent demographic characteristics. For the model with intervention as a predictor, we also allowed for separate bent lines in the intervention and control groups. We then fit a bent line time trend model, with adolescent demographic variables, and all other developmental and family predictors with significant associations with the outcome from the separate models. To produce a more parsimonious final model, non-significant predictors were deleted.

Results

Descriptive statistics are summarized in Table 1. At baseline, the adolescents were 11–21 years old. Their primary caretakers (PWH) were 25–71 years old, including mothers (71.7%), fathers (16.7%), grandparents (3.3%), aunts (1.9%), uncles (0.4%) and step/ foster parents (0.4%). Relationship information was missing for 5.6%. The preponderance of mothers in the sample reflects social norms for mothers to be the custodial parent or primary parental caretaker. Correlations of all continuous variables are summarized in Table 2.

Adolescent somatic symptoms

Baseline somatic symptom levels were not significantly different between the adolescents in intervention and standard care conditions ($p = 0.11$), mean baseline of 0.42 ($SD = 0.57$; range, 0–3.43). Lower than a standardization sample (Derogatis, 1993), only 2% of boys and 11% of girls were in the clinical range. In the first 18 months, symptoms of adolescents in the

intervention condition decreased faster than the adolescents receiving standard care (slope difference = -0.013 ; $p = 0.03$). After 18 months, there were no differences in the rates of change of symptoms between the two conditions. The mean symptom score ranged from 0.25–0.28 ($SD = 0.48$ – 0.55 ; ranges = 0–3.71) at each of six subsequent assessment points.

Individual predictors of adolescent somatic symptoms

Adolescent predictors, adjusted by age, gender and ethnicity—As shown in Table 3, adolescent variables predictive of increased somatic symptoms over six years included: being female ($p < 0.0001$), being Latino ($p = 0.03$), increased medical diagnoses ($p = 0.002$), hospitalizations ($p = 0.0003$), school problems ($p = 0.02$), parent-youth conflict ($p = 0.0008$) and stressful life events ($p < 0.0001$). Additionally, adolescent substance use including alcohol ($p = 0.0003$), marijuana ($p = 0.010$) and hard drugs ($p = 0.0003$), was related to increased symptoms over time. Variables related to fewer symptoms over a 6-year period included: adolescent perception of parental caring ($p < 0.0001$) and parental death ($p = 0.03$). Adolescent age, sexual abuse and parental overprotection were not related to symptoms.

Parent predictors, adjusted by adolescent age, gender and ethnicity—Also displayed in Table 3, parent variables related to increased somatic symptoms over a 6-year period included parental distress over their own pain symptoms ($p = 0.02$), parental global emotional distress ($p = 0.003$) and negative coping ($p = 0.03$). Parental disease status and substance use were not related to youth symptoms.

Longitudinal multiple regression model of adolescent somatic symptoms

Adolescent predictors—In the final model (Table 4), adolescent variables related to increased somatic symptoms over a 6-year period included being younger and female ($p = 0.04$ and $p < 0.0001$, respectively). Ethnicity was a marginally significant predictor ($p = 0.06$), with Latino youth tending to report more symptoms. Increased symptoms were also predicted by more hospitalizations ($p = 0.02$), stressful life events ($p < 0.0001$), less parental care/highly rejecting ($p = 0.0002$), more parent-youth conflict ($p = 0.03$) and no experience of parental death ($p = 0.04$). The school problems variable was a marginally significant predictor for symptoms ($p = 0.07$). Predictors that dropped out in the final model included number of medical diagnoses and substance use.

Parent predictors—Once both distress over pain and parental emotional distress were included in the longitudinal model simultaneously, neither of them was a significant predictor. We kept parental distress over pain symptoms in the final model ($p = 0.03$) because it can be more easily targeted for intervention. Also dropped in the final model was negative coping.

Discussion

Rates of somatic symptoms for these high-risk youth were similar to a non-clinical sample (Derogatis, 1993), revealing that having an HIV-positive parent is not sufficient to cause high levels of symptoms. Other than the expected demographic variables, chronic stress, specifically family distress, predicted symptoms. Within the biopsychosocial model, persistent stressors result in illness and somatic symptoms due to a disturbance in the internal response systems, balance and homeostasis, such as the allostatic load and/or emotional motor system (McEwen & Seeman, 1999).

While it seems counter-intuitive that experiencing parental death predicts *fewer* somatic symptoms, exposure to medical problems and the anticipation of parental death can be more traumatizing than parental death (Saldinger, Cain, & Porterfield, 2003). The current sample of adolescents was previously found to report less emotional distress following the parental death

compared to before the parental loss (Rotheram-Borus, Weiss, Alber, & Lester, 2005). Over half of PWH made custody plans, enabling a newcaretaker to care for the child (Rotheram-Borus, Lester, Wang, & Shen, 2004), often providing a more stable household than the PWH (Rotheram-Borus et al., 2002). The finding that parental distress over their own pain predicted increased symptoms better than severity of parental illness supports the idea that the parent's response to physical illness rather than the illness itself is central to the child's functioning.

The number of adolescent medical *hospitalizations*, but not the number of medical *diagnoses*, predicted symptoms. This is consistent with previous research that painful or traumatic childhood hospitalization can increase somatic sensitivity over time (Taddio, Katz, Ilersich, & Koren, 1997). Additionally, hospitalizations in childhood have previously been related to maternal healthcare utilization, family conflict and maternal worry, suggesting increased medical hospitalizations may be a proxy measure of increased family distress (Janicke, Finney, & Riley, 2001; Riley et al., 1993). Childhood hospitalizations may be related to severity of adolescent medical disorder; we do not have illness severity data to allow this analysis.

Adolescents who experienced their parents as highly rejecting/less caring reported increased symptoms over time. A perception of greater parental emotional responsiveness appeared to be a protective factor. Our findings are not consistent with clinical observations that parents of children with more symptoms are overprotective (Minuchin et al., 1975). It may be that those parents who are high utilizers of medical care are more overprotective than parents who normalize somatic complaints in their children.

School problems approached significance related to symptoms. The relationship between school problems and disability among those with chronic pain has been identified in the literature, with academic competence being an important factor (Claar, Walker, & Smith, 1999). Had our study measured self-competence and functioning, we expect the importance of school problems would have emerged.

While the intervention taught active coping strategies (e.g. problem solving, emotional expression, emotional modulation, decision making), resulting in a more rapid decline in somatic symptoms during the first 18 months, the intervention youth did not have fewer symptoms when compared with the control group. Research on childhood pain has revealed that active coping strategies (e.g. doing something to get rid of the pain, such as asking someone for help or trying to figure out how to make it go away) have been inconsistently related to pain severity, while accommodative coping (e.g. distraction, acceptance, positive thinking, cognitive restructuring) has been related to less pain (Compas & Thomsen, 1999). Other implications for clinical intervention include the potential value of targeting parental distress regarding pain and transmission of distress to adolescents via parent-child conflict and rejecting interactions.

Strengths of the study include the longitudinal design, collection of data from both adolescents and caregivers, identification of participants by living condition rather than by symptom and inclusion of serious parental illness and death as variables. Limitations of the study provide directions for future research. Future research would benefit from inclusion of a low-risk comparison group, wider variation in socioeconomic backgrounds, biological data, assessments of cognitive competence and functional status, measurement of time since parental death and longitudinal measurement of potentially key measures, such as substance use, hospitalizations and stressful life events.

Acknowledgments

This paper was completed with the support of National Institute of Mental Health (NIMH) grants K-23 MH02050-03; MH068194; P30MH-58107; and R01MH63779.

References

- Canetti L, Bachar E, Galili-Weisstub E, Kaplan De-Nour A, Shalev AY. Parental bonding and mental health in adolescence. *Adolescence* 1997;32(126):381–394. [PubMed: 9179334]
- Campo JV, Fritsch SL. Somatization in children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry* 1994;33:1223–1235. [PubMed: 7995788]
- Claar RL, Walker LS, Smith CA. Functional disability in adolescents and young adults with symptoms of irritable bowel syndrome: The role of academic, social and athletic competence. *Journal of Pediatric Psychology* 1999;24:271–280. [PubMed: 10379142]
- Compas BE, Thomsen AH. Coping and responses to stress among children with recurrent abdominal pain. *Journal of Developmental and Behavioral Pediatrics* 1999;20:323–324. [PubMed: 10533990]
- Derogatis, LR. Brief Symptom Inventory: Administration, scoring & procedures manual. National Computer Systems; Minneapolis, MN: 1993.
- Derogatis, LR.; Lazarus, L. SCL-90--R, Brief Symptom Inventory and matching clinical rating scales.. In: Maruish, ME., editor. The use of psychological testing for treatment planning and outcome assessment. Lawrence Erlbaum Associates; Hillsdale, NJ: 1994. p. 217-248.
- Di Lorenzo C, Colletti RB, Lehmann HP, Boyle JT, Gerson WT, Hyams JS, et al. Chronic abdominal pain in children: A clinical report of the American academy of pediatrics and the North American society for pediatric gastroenterology, hepatology and nutrition. *Journal of Pediatric Gastroenterology and Nutrition* 2005;40:245–248. [PubMed: 15735475]
- Fendrich M, Warner V, Weissman MM. Family risk factors, parental depression, and psychopathology in offspring. *Dev Psychol* 1990;26:40–50.
- Garber J, Zeman J, Walker LS. Recurrent abdominal pain in children: Psychiatric diagnoses and parental psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry* 1990;29:648–656. [PubMed: 2387802]
- Hein K, Dell R, Futterman D, Rotheram-Borus MJ, Shaffer N. Comparison of HIV-positive and HIV-negative adolescents: Risk factors and psychosocial determinants. *Pediatrics* 1995;95:96–104. [PubMed: 7770318]
- Hyams JS, Hyman PE. Recurrent abdominal pain and the biopsychosocial model of medical practice. *Journal of Pediatrics* 1998;133:473–478. [PubMed: 9787683]
- Hyman, P. Pediatric functional bowel disorders. Academy of Professional Information Services, Inc.; New York: 1999.
- Janicke DM, Finney JW, Riley AW. Children's healthcare use: A prospective investigation of factors related to care-seeking. *Medical Care* 2001;39:990–1001. [PubMed: 11502956]
- Lester P, Stein JA, Bursch B. Developmental predictors of somatic symptoms in adolescents of parents with HIV: A 12-month follow-up. *Journal of Developmental and Behavioral Pediatrics* 2003;24:242–250. [PubMed: 12915796]
- McEwen BS, Seeman T. Protective and damaging effects of mediators of stress: Elaborating and testing the concepts of allostasis and allostatic load. *Annals of the New York Academy of Sciences* 1999;896:30–47. [PubMed: 10681886]
- Minuchin S, Baker L, Rosman BL, Liebman R, Milman L, Todd TC. A conceptual model of psychosomatic illness in children, family organization and family therapy. *Archives of General Psychiatry* 1975;32:1031–1038. [PubMed: 808191]
- Namir S, Wolcott D, Fawzy F, Alumbagh M. Coping with AIDS: Psychological and health implications. *Journal of Applied Social Psychology* 1987;17:309–28.
- Olson, D.; McCubbin, H.; Barnes, H.; Larsen, A.; Muxem, A.; Wilson, M. Family inventories: Inventories used in a national survey of families across the family life cycle. University of Minnesota; St. Paul, MN: 1982.

- Parker G. Parental report of depressives: An investigation of several explanations. *J Affect Disord* 1981;3(2):131–140. [PubMed: 6454707]
- Parker G, Tupling H, Brown LB. A parental bonding instrument. *British Journal of Medical Psychology* 1979;52:1–10.
- Pilowsky I, Bassett DL, Begg MW, Thomas PG. Childhood hospitalization and chronic intractable pain in adults: A controlled retrospective study. *International Journal of Psychiatry in Medicine* 1982;12:75–84. [PubMed: 6980197]
- Riley AW, Finney JW, Mellits ED, Starfield B, Kidwell S, Quaskey S, et al. Determinants of children's healthcare use: An investigation of psychosocial factors. *Medical Care* 1993;31:767–783. [PubMed: 8366679]
- Rotheram-Borus MJ, Lee M, Leonard N, Lin YY, Franzke L, Turner E, et al. Four-year behavioral outcomes of an intervention for parents living with HIV and their adolescent children. *AIDS* 2003;17:1217–1225. [PubMed: 12819524]
- Rotheram-Borus MJ, Leonard NR, Lightfoot M, Franzke LH, Tottenham N, Lee SJ. Picking up the pieces: Caregivers of adolescents bereaved by parental AIDS. *Clinical Child Psychology and Psychiatry* 2002;7:115–124.
- Rotheram-Borus MJ, Lester P, Wang PW, Shen Q. Custody plans among parents living with human immunodeficiency virus infection. *Archives of Pediatrics and Adolescent Medicine* 2004;158:327–332. [PubMed: 15066871]
- Rotheram-Borus MJ, Stein JA. Problem behaviors among adolescents whose parents are living with AIDS. *American Journal of Orthopsychiatry* 1999;69:228–239. [PubMed: 10234388]
- Rotheram-Borus MJ, Stein JA, Lin YY. Impact of parent death and an intervention on the adjustment of adolescents whose parents have HIV/AIDS. *Journal of Consulting and Clinical Psychology* 2001;69:763–773. [PubMed: 11680553]
- Rotheram-Borus MJ, Weiss R, Alber S, Lester P. Adolescent adjustment before and after HIV-related parental death. *Journal of Consulting and Clinical Psychology* 2005;73:221–228. [PubMed: 15796629]
- Saldinger A, Cain A, Porterfield K. Managing traumatic stress in children anticipating parental death. *Psychiatry* 2003;66:168–181. [PubMed: 12868295]
- Sarason IG, Johnson JH, Siegel JM. Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology* 1978;46:932–946. [PubMed: 701572]
- Taddio A, Katz J, Illersich AL, Koren G. Effect of neonatal circumcision on pain response during subsequent routine vaccination. *Lancet* 1997;349:599–603. [PubMed: 9057731]
- Tan S, Tillisch K, Mayer E. Functional somatic syndromes: Emerging biomedical models and traditional Chinese medicine. *Evidence-Based Complementary and Alternative Medicine* 2004;1:35–40. [PubMed: 15257324]
- Walker, L. The evolution of research on recurrent abdominal pain: History, assumptions, and a conceptual model. In: McGrath, PJ.; Finley, GA., editors. *Chronic and recurrent pain in children and adolescents*. IASP Press; Seattle, WA: 1999. p. 141–172.
- Walker LS, Garber J, Greene JW. Psychosocial correlates of recurrent childhood pain: A comparison of pediatric patients with recurrent abdominal pain, organic illness, and psychiatric disorders. *Journal of Abnormal Psychology* 1993;102:248–258. [PubMed: 8315137]
- Walker LS, Garber J, Smith CA, Van Slyke DA, Claar RL. The relation of daily stressors to somatic and emotional symptoms in children with recurrent abdominal pain. *Journal of Consulting and Clinical Psychology* 2001;69:85–91. [PubMed: 11302281]
- Walker LS, Greene JW. Children with recurrent abdominal pain and their parents: More somatic complaints, anxiety and depression than other patient families? *Journal of Pediatric Psychology* 1989;14:231–243. [PubMed: 2754574]
- Weiss, R. *Modeling longitudinal data*. Springer-Verlag; New York, NY: 2005.
- Wyllie E, Glazer JP, Benbadis S, Kotagal P, Wolgamuth B. Psychiatric features of children and adolescents with pseudoseizures. *Archives of Pediatric Adolescent Medicine* 1999;153:244–248.
- Zeltzer L, Bursch B, Walco G. Pain responsiveness and chronic pain: A psychobiological perspective. *Journal of Developmental and Behavioral Pediatrics* 1997;18:413–422. [PubMed: 9431505]

Table 1

Descriptive statistics of child and parent baseline variables.

Adolescents (n = 409)	
Age (years), Mean (SD)	15.25 (2.05)
Gender,% (n)	
Female	53 (216)
Male	47 (193)
Race,% (n)	
Black	38 (156)
Latino	49 (200)
White	3 (13)
Other/don't know	10 (40)
Intervention,% (n)	50 (203)
Number of medical diagnosis, Mean (SD)	0.53 (0.70)
Number of hospitalizations, Mean (SD)	1.34 (3.39)
Total life events, Mean (SD)	6.28 (4.47)
Sex abuse,% (n)	5 (21)
Lifetime substance use,% (n)	
Alcohol use	50 (203)
Marijuana use	36 (145)
Hard drug use	6 (24)
School problems, Mean (SD)	
Dislike school	2.49 (1.24)
Poor student	2.40 (0.82)
Poor relations with teachers	2.54 (1.00)
Poor relations with classmates	2.20 (0.84)
Composite school problems	2.41 (0.69)
Parker Parental Bonding, Mean(SD)	
Overprotection	2.13 (0.50)
Parental care	3.27 (0.57)
Parental-youth conflict, Mean (SD)	0.56 (0.32)
Parental bereavement, *% (n)	48 (198)
*Parental death before or during the study	
Parents (n = 269)	
Age (years), Mean (SD)	38.26 (5.67)
Gender,% (n)	
Female	83 (222)
Male	17 (47)
Race,% (n)	
Black	35 (95)
Latino	46 (123)
White	9 (24)

Parents (n = 269)	
Other/don't know	10 (27)
Diagnosis% (n)	
Asymptomatic	19 (50)
Symptomatic	42 (113)
Diagnosed with AIDS	39 (106)
Distress over pain, Mean (SD)	
Physical/body pain	3.52 (1.70)
Dry, painful mouth	2.70 (1.76)
Pain in hands or feet	3.05 (1.87)
Sore throat	2.25 (1.58)
Composite pain	2.88 (1.27)
Emotional distress, Mean (SD)	
Somatization	1.16 (0.92)
Depression	1.05 (0.94)
Anxious	0.94 (0.90)
Global Severity Index	1.00 (0.74)
Lifetime substance use,% (n)	
Alcohol use	82 (216)
Marijuana use	70 (185)
Hard drug use	68 (180)
Coping style, Mean (SD)	
Positive coping	2.91 (0.82)
Negative coping	2.14 (0.59)

Table 2

Correlations of continuous variables.

Continuous variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Adolescent age at baseline	1.000	.065	.178***	.036	.161**	-.215***	-.126*	.157**	-.021	.026	-.027	-.102*	-0.062
2. Adolescent # of medical diagnoses	.065	1.000	.265***	.228***	.019	-.012	.017	.091	.045	.057	.032	-.000	0.195***
3. Adolescent # of hospitalization	.178***	.265***	1.000	.164***	.006	-.039	-.009	.075	.047	.034	.035	.045	0.144**
4. Adolescent total life events	.036	.228***	.164***	1.000	.102*	.044	-.063	.131**	.134**	.120*	.146**	.104*	0.277***
5. Mean of four school problems	.161**	.019	.006	.102*	1.000	-.078	-.123*	.119*	-.074	-.035	-.053	-.064	0.119*
6. Parental overprotection	-.215***	-.012	-.039	.044	-.078	1.000	-.304***	.129**	-.011	-.026	.010	.072	0.057
7. Parental care	-.126*	.017	-.009	-.063	-.123*	-.304***	1.000	-.169***	.032	.029	.070	-.088	-0.086
8. Parent-youth conflict	.157**	.091	.075	.131**	.119*	.129**	-.169***	1.000	-.047	.012	.067	-.017	0.088
9. Parent distress over own pain	-.021	.045	.047	.134**	-.074	-.011	.032	-.047	1.000	.374***	.071	.233***	0.127*
10. Parent BSI global severity index	.026	.057	.034	.120*	-.035	-.026	.029	.012	.374***	1.000	.172***	.524***	0.138**
11. Parent positive coping	-.027	.032	.035	.146**	-.053	.010	.070	.067	.071	.172***	1.000	.404***	-0.002
12. Parent negative coping	-.102*	-.000	.045	.104*	-.064	.072	-.088	-.017	.233***	.524***	.404***	1.000	0.075
13. Adolescent Somatic Symptoms	-0.062	0.195***	0.144**	0.277***	0.119*	0.057	-0.086	0.088	0.127*	0.138**	-0.002	0.075	1.000

Note: Parent distress over their own pain, Parent BSI global severity index, and parental coping styles are the only four continuous parent report variables. The remaining variables included above are adolescent report.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$.

Table 3

Predictors of adolescent somatic symptoms over 72 months: parameter estimates for individual longitudinal regression models adjusted by adolescent age, gender and ethnicity.

	Somatic symptoms (Log)		
	Estimate	Standard error	p-value
Adolescent predictors			
Age at baseline	-0.004	0.020	0.82
Female	0.472***	0.081	< 0.0001
Latino	0.188*	0.084	0.03
Intervention	0.176	0.110	0.11
Intervention * Time	-0.014*	0.006	0.03
Intervention * Slope18	0.016	0.010	0.12
Intervention * Slope36	-0.003	0.008	0.74
Number of medical diagnosis	0.177**	0.058	0.002
Number of hospitalizations	0.142***	0.039	0.0003
Stressful life events	0.051***	0.009	< 0.0001
Sex abuse	0.132	0.189	0.48
Lifetime substance use			
Alcohol use	0.264**	0.090	0.003
Marijuana use	0.247**	0.096	0.010
Hard drug use	0.520**	0.177	0.003
Alcohol or drug use	0.260**	0.092	0.005
Composite school problems	0.140*	0.059	0.02
Parker Parental Bonding			
Overprotection	0.074	0.086	0.39
Parental care	-0.311***	0.071	< 0.0001
Parent-youth conflict	0.429***	0.128	0.0008
Parental death	-0.126*	0.058	0.03
Parent predictors			
Disease status Prob F: 0.34			
Have AIDS (ref)	0	-	-
Asymptomatic	-0.111	0.119	0.35
Symptomatic	0.054	0.096	0.57
Composite distress over pain	0.080*	0.034	0.02
Global emotional distress severity index (log)	0.079**	0.027	0.003
Lifetime substance use			
Alcohol use	-0.086	0.113	0.45
Marijuana use	0.098	0.093	0.29
Hard drug use	0.071	0.092	0.44
Alcohol or drug use	-0.015	0.130	0.91

	Somatic symptoms (Log)		
	Estimate	Standard error	p-value
Coping style			
Positive coping	0.068	0.052	0.19
Negative coping	0.157*	0.073	0.03

*
 $p < 0.05$

**
 $p < 0.01$

 $p < 0.001$.

Table 4

Predictors of adolescent somatic symptoms over 72 months: parameter estimates for final multivariate longitudinal regression model.

	Somatic Symptoms (Log)		
	Estimate	Standard error	p-value
Intercept	-1.380**	0.424	0.001
Time (relative month)	-0.022***	0.004	<0.0001
Slope change at month-18	0.024**	0.008	0.002
Slope change at month-36	0.001	0.006	0.86
Slope between month-18 and month-36	0.002	0.004	0.75
Slope after month-36	0.003	0.003	0.34
Adolescent predictors			
Age at baseline	-0.040*	0.019	0.04
Female	0.473***	0.076	<0.0001
Latino	0.153	0.083	0.06
Number of medical diagnosis	0.055	0.058	0.34
Number of hospitalizations	0.088*	0.038	0.02
Stressful life events	0.037***	0.009	<0.0001
Composite school problems	0.102	0.057	0.07
Parental care	-0.256***	0.069	0.0002
Parent-youth conflict	0.261*	0.124	0.03
Parental death	-0.119*	0.059	0.04
Parent predictors			
Composite distress over pain	0.073*	0.033	0.03

*
p <0.05

**
p <0.01

p <0.001.