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Evaluation of the Psychometric Properties of the Pediatric Parenting Stress Inventory (PPSI)

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Abstract

Objective—The goal of this work was to evaluate the psychometric properties of the Pediatric Parenting Stress Inventory (PPSI), a new measure of problems and distress experienced by parents of children with chronic illnesses.

Method—One sample of English-, Spanish-, and Hebrew-speaking mothers of children recently diagnosed with cancer ($n = 449$) and one sample of English- and Spanish-speaking mothers of children recently diagnosed with cancer ($n = 399$) participated in two problem-solving skills training interventions (Askins et al., 2009; Sahler et al., 2005). The PPSI was administered at baseline with other measures of maternal distress. All analyses used baseline data. Factor structure was evaluated using exploratory factor analysis (EFA) on the first sample and confirmatory factor analysis (CFA) on both samples. Internal consistency was evaluated using Cronbach's alpha. Construct validity was assessed via Spearman correlations with measures of maternal distress.

Results—EFA resulted in a stable four-factor solution with 35 items. CFA indicated that the four-factor solution demonstrated reasonable fit in both samples. Internal consistency of the subscales and full scale was adequate to excellent. Construct validity was supported by moderate

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to strong correlations with measures of maternal distress, depression, and posttraumatic stress symptoms.

Conclusions—The PPSI demonstrated good psychometric properties in assessing current problems and distress experienced by mothers of children newly diagnosed with cancer. This tool may be used to identify individualized targets for intervention in families of children with cancer. Future studies could evaluate the utility and psychometrics of the PPSI with other pediatric populations.

Keywords

pediatric; parental stress; parental distress; assessment

Validation of the Pediatric Parenting Stress Inventory

Parents of children recently diagnosed with cancer are faced with numerous challenges related to their child's care, as well as the impact of cancer and its treatment on themselves and other family members. There are many reports of increased parental distress (i.e., symptoms of depression, anxiety, and posttraumatic stress) following a child's diagnosis (Barrera et al., 2004; Grootenhuis & Last, 1997; Kazak et al., 1997; Sloper, 2000; Vrijmoet-Wiersma et al., 2008). Parents of children newly diagnosed with cancer experience more distress than comparison samples of parents of physically healthy children, and mothers tend to report greater distress than fathers (Pai et al., 2007; Vrijmoet-Wiersma et al., 2008).

Although generic life event and parenting stress measures can be useful for identifying stressors and distress, these measures are not specific to issues frequently encountered by parents of children with serious illnesses, and therefore likely miss illness-related stressors that can be targeted clinically to assist parents in coping and managing their child's illness. A brief, psychometrically sound measure that identifies the specific problems and symptoms experienced by parents is needed to understand their experiences and identify appropriate services. The Pediatric Parenting Stress Inventory (PPSI), a listing of problems and symptoms of distress experienced by parents of children with pediatric conditions, was developed to be used within the context of a Problem-Solving Skills Training (PSST) intervention for mothers of children newly diagnosed with cancer (Sahler et al., 2002). The instrument was created for mothers to rate how bothersome common problems were within the past week so that mothers and interventionists could identify issues to be addressed using problem-solving skills. The PPSI was developed using a social-ecological framework, attempting to capture influential factors within various systems (e.g., related to the ill child, family, school, work, hospital). We aimed to measure the constructs of parenting stress and distress specific to having a child with a serious illness such as cancer. Although we evaluated the measure with two samples of mothers of children with cancer, the items of the PPSI are sufficiently generic to be applicable to fathers and parents of children with other chronic conditions, although this remains to be studied.

The PPSI was first developed in the mid-1990's as part of a randomized trial of a problem-solving skills training intervention to reduce distress in mothers of children recently diagnosed with cancer. At the time of development of the PPSI, there were no

psychometrically sound measures for identifying the problems and illness-related stressors experienced by parents of children with serious illness. Since the initiation of the validation studies for the PPSI, a measure of illness-related parenting stress, the Pediatric Inventory for Parents (PIP; Streisand, Braniecki, Tercyak, & Kazak, 2001), has been developed based on a transactional model of stress and coping. The PIP consists of 42 items measuring the frequency and difficulty of illness-specific stress (thus requiring 84 responses). Although there are four rationally-derived scales, no factor analytic work has been done and the initial validation paper was based on a small English-speaking sample at a single institution. Thus, the PPSI is distinct from the PIP, its most closely related tool, in its theoretical basis, the domains measured, and its simpler focus on the degree to which each stressor has been a problem rather than degree of difficulty and frequency. Further, as described in this report, the PPSI was validated on two large samples of English-, Spanish-, and Hebrew-speaking mothers from multiple institutions.

The goal in developing the PPSI was to create an easy-to-use validated instrument that identifies clinically-relevant problems and symptoms of distress experienced by parents of children with serious illnesses such as cancer to inform the types of services that might be beneficial to families. Further, we believed that this instrument would complement measures of parental stress and screening tools for family psychosocial distress (e.g., Kazak et al., 2001; Pai et al., 2008) by identifying specific targets for intervention. The goal of this paper is to evaluate the psychometric properties of the PPSI, including the factor structure, internal consistency, and construct validity of the measure.

Method

The validation of the Pediatric Parenting Stress Inventory was based on data from two independent studies of mothers of children recently diagnosed with cancer. The first study was a large, multi-center randomized controlled trial of a problem-solving skills training (PSST) intervention (Sahler et al., 2005). Briefly, mothers were randomized to receive either the 8-session PSST intervention or usual psychosocial care (see Sahler et al., 2005 for details). The second was a large, multi-center randomized controlled trial evaluating the effects of three interventions: (1) traditional PSST; (2) PSST with a personal digital assistant (PDA); and (3) a non-directive supportive approach as a time and attention control (for details, see Askins et al., 2009). The present study examined data only from the baseline assessments for each study, completed by all mothers prior to randomization.

Procedures

For both studies, institutional review board approval was obtained at each participating site. Informed consent was obtained prior to any study procedures. At baseline, mothers completed questionnaires either in outpatient or inpatient meeting rooms.

Participants

Sample A—Mothers were recruited from seven pediatric cancer centers in the United States and one pediatric cancer center in Israel between two and 16 weeks after their children were diagnosed with any form of cancer. Eligibility criteria were: (1) child

diagnosed with any form of cancer; (2) ability to speak and read English, Spanish, or Hebrew; and (3) residence within 50 miles of the participating center (to reduce the transportation burden for data collection). A mother was excluded if her child was determined to be in a medical crisis by the oncologist. A total of 454 mothers enrolled in the study (73%); 449 completed the measures of interest and were included in analyses.

Sample B—Mothers were recruited from four pediatric cancer centers in the United States between two and 16 weeks after their children were diagnosed with any form of cancer. Eligibility and exclusion criteria were the same as those for Sample A. A total of 402 mothers participated (54%); 399 completed the measures of interest and were included in these analyses. Demographic information is presented in Table 1 for both samples. There were several significant differences in demographic factors between Sample A and Sample B. Sample A had more mothers of non-Caucasian race and non-Hispanic ethnicity, which was expected due to inclusion of the site in Israel. Mothers and children in Sample A tended to be younger than mothers and children in Sample B. Also, children in Sample A on average were longer from diagnosis (9.4 weeks versus 6.5 weeks) and there were more diagnoses of solid tumors in Sample A compared with B.

Measures

Demographics—Mothers provided such information as the age and gender of the child diagnosed with cancer as well as their own age, education level, ethnicity (Hispanic vs. Non-Hispanic), racial background, and marital status.

Illness-Related Parenting Stress and Distress—Mothers completed the Pediatric Parenting Stress Inventory (PPSI), a listing of potential problems experienced by parents of a child with a serious illness within the past week. The time frame was kept brief to identify the most pressing, relevant, and current problems. Modeled on a social-ecological framework (Bronfenbrenner, 1979), the PPSI attempted to capture influential factors within various systems (e.g., related to the ill child, family, work, hospital). The initial version of the PPSI was developed by a panel of experts in pediatric oncology, including pediatricians and psychologists, based on literature review and their clinical experiences working with families of children with cancer. The 45-item PPSI administered in these two studies was a refinement based on responses collected during a PSST pilot study and feedback from parents (Sahler et al., 2002).

The 50 mothers in the pilot study receiving PSST treatment completed the measure and used it to identify topic areas for discussion during problem-solving sessions with the interventionist. After completing the intervention, these mothers provided feedback regarding item content (including issues not included) and organization of the measure. On the basis of this pilot experience, infrequently endorsed items were excluded, the response scale was shifted from a 3-point to a 5-point scale to capture wider variability, and items were re-organized from 5 categories into 7 face-valid categories for presentation to families (managing the ill child's needs, managing the needs of immediate family, financial/occupational problems, social problems, personal physical health, personal emotional problems, and managing daily activities). In this refined version, respondents indicate how

much of a problem various issues were during the past week using the following scale: 0 (*none*), 1 (*minor*), 2 (*moderate*), 3 (*major*), or 4 (*overwhelming*). The PPSI also allows respondents to list up to five additional problems of importance and rate each additional problem. These responses could be used for clinical purposes but are not scored as part of the questionnaire.

The PPSI was adapted for Spanish speakers by first translating it from English into Spanish by a translator at one institution and then translating it back from Spanish into English by an independent translator at a different institution. Translators were instructed to minimize awkward or confusing wording by taking into account culturally-sensitive phrasing and wording (Marin & Marin, 1991). The same procedure was used to adapt the PPSI for Hebrew speakers.

Maternal Distress—Mothers completed three measures of negative affectivity: Profile of Mood States (POMS), Beck Depression Inventory-II (BDI-II), and Impact of Event Scale – Revised (IES-R). The POMS (McNair, Lorr, & Droppleman, 1992) is a 65-item inventory of positive and negative adjectives to describe feelings during the past week. It is a widely used instrument and has acceptable reliability and validity. Respondents endorse each item using a 5-point scale from 1 (*not at all*) to 5 (*extremely*). The POMS yields six subscale scores (tension/anxiety, depression/dejection, anger/hostility, fatigue/inertia, confusion/bewilderment, and vigor/activity) and a total mood disturbance score, calculated by summing the five negative mood scales and subtracting the vigor scale score. Higher scores indicate greater negative affectivity. The internal consistency of the total scale was excellent ($\alpha = .96$ in Sample A and $\alpha = .97$ in Sample B).

The BDI-II (Beck, Steer, & Brown, 1996) is a valid, reliable 21-item self-report inventory assessing depressive symptoms. Each item requires respondents to endorse one of four statements regarding the severity of a depressive symptom. Internal consistency in our sample was excellent, $\alpha = .91$ in Sample A and $\alpha = .90$ in Sample B. Higher scores indicate more severe depressive symptoms. A square root transformation was used due to positive skew in both samples.

The IES-R (Weiss & Marmar, 1997) is a valid, reliable 22-item self-report measure of posttraumatic stress symptoms. Participants report on how distressing each item was during the past week using a 5-point Likert-type scale from 0 (*not at all*) to 4 (*extremely*). The IES-R yields three subscales: Intrusion, Avoidance, and Hyperarousal. The total score demonstrated excellent internal consistency ($\alpha = .93$ in both samples) and was used in analyses. Higher scores indicate more severe symptoms of posttraumatic stress.

Data Analysis

Exploratory Factor Analysis (EFA)—Multivariate analysis was conducted using the data from Sample A to identify meaningful subscales of the PPSI. Horn's method of parallel analysis was used to identify the number of factors to be extracted using exploratory factor analysis (Horn, 1965). Horn's method was chosen because of its merits as an objective test for identifying the dimensionality of multivariate data and its advantages over other tests (Hubbard & Allen, 1987). Specifically, Horn's method is more objective than judging the

elbow of a scree plot (Cattell scree test) and reflects sampling error, unlike the Kaiser-Guttman (eigenvalue greater than one) criteria, which tends to retain too many factors (Hubbard & Allen, 1987; Netemeyer, Bearden, & Sharma, 2003). Exploratory factor analysis with the GEOMIN oblique rotation (Browne, 2001) was used to analyze the items on the PPSI with Mplus Version 6 (L. Muthén & Muthén, 1998–2010). We used the methods of Muthén (B. Muthén, 1997) for factor analysis of ordinal categorical data because the PPSI uses a Likert-type 0 to 4 scale for its items. We used the robust weighted least squares estimator using a diagonal weight matrix (WLSMV). Oblique rotation was used because the factors of the PPSI are likely to correlate with each other. In the first step, all 45 items were included. Subsequent factor analyses were run in a stepwise fashion to eliminate items until a stable factor solution emerged. Items that had a factor loading $< .40$ were excluded, and, after the first step, items that loaded at $> .40$ on more than one factor were excluded. Loadings in the $.40$ range or above are generally considered substantial (Floyd & Widaman, 1995; Netemeyer et al., 2003).

Confirmatory Factor Analysis (CFA)—CFA was conducted on Sample A and Sample B using Mplus Version 6. We used the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) to assess model fit. We interpreted CFI $> .90$ as an indication of good fit (Hu & Bentler, 1999), and RMSEA $.05$ as a close fit, RMSEA between $.05$ and $.08$ as a reasonable fit, and RMSEA $.10$ as a poor fit (Browne & Cudeck, 1993).

Multigroup structural equation modeling using the robust chi square testing with mean and variance-adjusted test statistics procedure (“DIFFTEST”; Asparouhov & Muthén, 2006) was conducted to examine partial invariance across our two samples. The first multi-group model allowed all parameters to vary across groups, and the second multi-group model constrained the loadings and thresholds to be equal for both groups. We interpreted the change in model fit to indicate that the factor structure fit equally well for Sample A and Sample B if the change in chi-square fit was not significant using the Mplus DIFFTEST procedure. Due to the relatively small number of mothers who spoke Hebrew or Spanish in both samples, we were unable to test for measurement invariance across these groups.

Reliability & Construct Validity—Data analyses concerning internal consistency and construct validity were conducted using SPSS Version 17.0. Cronbach’s α was used to determine subscale and total scale reliability. The construct validity of the PPSI was evaluated using Spearman correlations with measures of maternal distress (i.e., mood disturbance, depression, and posttraumatic stress symptoms). We also evaluated whether PPSI subscale scores were related to specific demographic and medical factors (i.e., marital status, maternal education, maternal age, number of children living in the home, age and sex of the child with cancer, and weeks since diagnosis) using MANOVA (Wilk’s Lambda). If MANOVA results were significant, follow-up one-way ANOVAs were conducted, and differences in marginal means were examined.

Results

Exploratory Factor Analysis (EFA)

Data from Sample A were used in these analyses. The parallel analysis indicated that a four-factor solution was the most appropriate. EFA was then conducted, with four factors extracted. The eigenvalues and cumulative percentage of variance accounted for by each factor were: 13.82 (40%), 3.57 (50%), 2.24 (56%), and 1.78 (61%). At the first step, four items did not have a factor loading greater than .4 on any factor and were excluded (#s 10, 17, 18, and 25 – see list of excluded items in Table 2 note). The EFA was run with the remaining items. At the second step, one item (#16) did not load $> .40$ on any factor, and two items (#s 27 and 28) loaded $> .40$ on two factors and were excluded. At the third step, one item (#26) did not load $> .40$ on any factor and was excluded. At the fourth step, all remaining items (37 total) loaded $> .40$ on only one factor. Next, the items remaining on the four factors were reviewed to ensure conceptual fit with other items on each factor to create a meaningful subscale. Cronbach's α was then calculated for each subscale and items were removed if removal would result in a substantially increased alpha. Two items (#s 19 and 22) were excluded based on a lack of meaningful fit with other items on the factor and a substantially increased alpha for that factor if the items were deleted. The final scale consisted of 35 items. The factors were named: managing the ill child's needs, emotional & physical problems, managing finances, and managing family life.

Confirmatory Factor Analysis (CFA)

CFA was conducted separately on data from Samples A and B using the 35 items determined from EFA. Table 2 presents the standardized factor loadings in Samples A and B. The CFI indicated a good fit for both datasets, CFI = .95 for Sample A and CFI = .93 for Sample B. The RMSEA indicated a reasonable fit for both data sets, RMSEA = .06 for both samples.

Next, we tested for partial measurement invariance across the two samples. Both models (where factor loadings and thresholds were allowed to vary and where factor loadings and thresholds were constrained to be equal) fit the data well, with minimal difference in fit between the groups. For the first model (loadings and thresholds allowed to vary), CFI = 0.94, RMSEA = 0.06, and for the second model (loadings and thresholds constrained to be equal), CFI = 0.95, RMSEA = 0.06. We used the Mplus DIFFTEST procedure to compare the nested models to test for equality of the loadings and thresholds obtaining $p = 0.06$. These results support partial invariance across our two samples.

Reliability and Construct Validity

Preliminary evidence for scale reliability was evaluated by calculating Cronbach's α for the total 35-item scale and each subscale in Samples A and B. As shown in Table 3, the four subscales demonstrated adequate to excellent reliability ($\alpha = .72$ to $.94$), and the total scale demonstrated excellent reliability ($\alpha = .94$ for both samples). For each subscale, the intensity of problems score was calculated by computing the average score across items within a subscale (0 to 4 range). Subscale scores were not calculated for participants who were missing more than half of the items on the subscale. Means, standard deviations, and 95%

confidence intervals are presented for each subscale in Table 3. Mothers from Sample A reported a total problem intensity score of 1.32 (SD = 0.72), suggesting that problems were bothersome at a minor to moderate degree. Mothers from Sample B reported a total problem intensity score of 1.59 (SD = 0.75), also suggesting that problems were bothersome at a minor to moderate degree. Notably, mothers from Sample B generally reported higher scores across all subscales compared with mothers from Sample A. The differences were small but 95% confidence intervals around the mean scores did not usually overlap.

We explored reliability for the English-, Spanish-, and Hebrew-speaking groups from both samples using Cronbach's α . As shown in Table 4, the subscales demonstrated adequate to excellent reliability across all groups in both samples, with the exception of the managing finances subscale ($\alpha = .66$ for the Hebrew-speaking group in Sample A and $\alpha = .64$ for the Spanish-speaking group in Sample B).

Spearman correlations were calculated between mothers' problem intensity scores for each PPSI subscale, the total PPSI intensity score, and measures of maternal distress. As displayed in Table 5, there were significant positive correlations between all subscales and each measure of distress, with the majority being moderate to large.

Finally, we examined associations between PPSI scores and specific maternal and child characteristics, including marital status (categorized as single, partnered, or separated), maternal education (categorized as less than high school or high school and greater), maternal age, number of children living in the home (dichotomized as the sick child only [one] or the sick child plus at least one additional child [two or more children]), age of the child with cancer, sex of the child with cancer, and weeks since diagnosis). Results of the MANOVA indicated no significant differences in PPSI scores based on maternal age, child age, or child sex in either sample. Marital status was not significant in Sample A but there were significant differences based on marital status in Sample B, $F(8, 770) = 1.98, p = .046$. Follow-up ANOVAs indicated that mothers who were separated reported greater difficulties in managing finances than those who were partnered (by .54 points) and mothers who were single also reported greater difficulties in managing finances than those who were partnered (by .15 points). There were significant differences based on maternal education in Sample A, $F(4, 406) = 6.59, p < .0001$, and in Sample B, $F(4, 385) = 7.88, p < .0001$. In Sample A, follow-up ANOVAs indicated that mothers with less than a high school education reported more difficulties managing the ill child's needs (by 0.55 points), emotional & physical problems (by 0.26 points), and managing family life (by 0.27 points). In Sample B, mothers with less than a high school education reported more problems in managing the ill child's needs (by 0.24 points) and managing family life (by 0.21 points). Additionally, those with a high school education or greater reported more difficulty managing finances (by 0.34 points). There were also significant differences based on number of children in the home in Sample A, $F(4, 406) = 6.60, p < .0001$, and in Sample B, $F(4, 385) = 8.72, p < .0001$. Follow-up ANOVAs indicated that mothers with two or more children at home reported more difficulty managing family life in both samples (by 0.48 points in Sample A and by 0.30 points in Sample B) but less difficulty managing the ill child's needs in Sample B (by 0.26 points). Finally, the number of weeks since diagnosis was a significant predictor in

Sample B but not A, $F(4, 385) = 4.93, p < .05$, with less time since diagnosis associated with more difficulty in managing the ill child's needs and managing family life.

Discussion

This paper provides initial psychometric data on the Pediatric Parenting Stress Inventory (PPSI) from two large samples of mothers of children newly diagnosed with cancer. Exploratory factor analysis resulted in a 35-item measure with a stable four-factor solution. The four corresponding subscales were named 1) managing the ill child's needs, 2) emotional and physical problems, 3) managing finances, and 4) managing family life. Confirmatory factor analysis indicated that the four-factor solution is invariant across the two samples. Adequate internal consistency was demonstrated for each subscale, suggesting that the items within each were relatively homogeneous and measured the same construct. Adequate internal consistency was also demonstrated among the language subgroups in both samples, with the exception of two groups (i.e., Hebrew-speaking in Sample A and Spanish-speaking in Sample B) showing slightly lower internal consistency for the managing finances subscale.

There were small mean differences between samples A and B that might be explained by differences in the composition of the samples – mothers in Sample B were generally fewer weeks from diagnosis, older, had slightly older children, and more likely to be of non-Caucasian race and Hispanic ethnicity, which may contribute to higher scores across domains. Additionally, the two samples had different distributions of cancer diagnoses.

Initial construct validity was also established. Spearman correlations with measures of maternal distress indicated moderate to strong positive relationships between subscales of the PPSI and total scores from the POMS, BDI-II, and IES-R. As expected, the strongest correlations were between the emotional and physical problems subscale of the PPSI and mothers' reports of mood disturbance, depression, and posttraumatic stress symptoms. Interestingly, these correlations were of similar magnitude to the correlations among the measures of distress. In a busy clinic setting where it may not be possible to administer multiple validated measures of parenting distress and problems, the PPSI could be a useful tool for gathering information regarding both constructs.

PPSI scores differed across specific demographic groupings in a manner supportive of the face validity of the measure. In both samples, mothers with less than a high school education reported more difficulties managing the ill child's needs and managing family life. Mothers from lower educational backgrounds may have fewer resources to deal with problems. Additionally, in both samples, mothers who had two or more children living at home reported more difficulties managing family life. This is expected, as several of the items in this subscale relate specifically to caring for siblings. Further, shorter time since diagnosis was associated with more difficulties in managing the child's and family's needs in Sample B, which would be expected as it takes time to adjust to the emotional, social, and logistical implications of a cancer diagnosis. Thus, the PPSI appears to distinguish among some subgroups, but differences based on most demographic factors (i.e., marital status, age, child age, child gender) were not noted.

The final items in the PPSI reflect various levels of the social-ecological model; the mothers in both samples reported problems managing the physical and social needs of the ill child, managing household tasks, meeting the needs of other family members, and dealing with job pressure and medical bills. These results indicate that parental distress in response to a child's illness is multifaceted and measurement needs to account for the various important domains. Further, our results fit with the abundant literature documenting distress in parents of recently diagnosed cancer patients (Lindahl Norberg & Boman, 2008; Pai et al., 2007; Vrijmoet-Wiersma et al., 2008) and lend additional empirical support to documentation of issues faced by families following diagnosis and during treatment (Alderfer & Kazak, 2006; Rodriguez et al., 2012). This study also adds to the literature on pediatric illness-related parenting stress by providing a psychometrically sound instrument with factor-analytically-derived subscales, with initial evidence of reliability for multiple languages.

Our results are generally consistent with results of other studies examining measures of pediatric parenting stress (PIP; Streisand et al., 2001) and patient and caregiver distress (Distress Thermometer; Patel et al., 2011). The PPSI distinguishes itself from the PIP because it was developed using social-ecological theory to identify a range of relevant issues, focuses only on degree of distress rather than the more complicated combination of degree of distress plus frequency, and subscales have been derived using factor analysis. In contrast to the Distress Thermometer (Patel et al., 2011), a single item scale meant for rapid screening of overall distress, the PPSI quantifies distress within specific domains. The Distress Thermometer provides a checklist of potential problems in the domains of emotional, practical, family, spiritual, or physical problems, but does not quantify the extent to which the issues have been difficult. Importantly, the PPSI distinguishes itself from other measures due to the large sample sizes used for validation, which are necessary for factor analysis and rigorous testing of psychometric properties.

Clinically, the PPSI can be used to identify specific problem areas that may be amenable to treatment. The PPSI can be used within the context of an intervention as a trigger to initiate identification of the individual's problems, thus identifying targets for treatment, as we have done in our problem-solving skills training (PSST) intervention (Sahler et al., 2005; Sahler et al., 2002). In addition to providing some quantification about the number and types of problems a parent is experiencing, the PPSI provides examples of the types of problems that can be addressed using PSST (i.e., both logistics-based problems and emotion-based problems). It may also contribute to optimism within the context of PSST by demonstrating that parents' problems are not so unique that they have not been confronted and solved before. Of note, PSST is a well-established intervention based on Chambless criteria (Chambless & Hollon, 1998). Routine administration of the PPSI with a follow up offer of PSST would be a solid evidence-based practice approach.

There are several limitations to consider. First, only mothers were surveyed; it is unclear whether the factor structure would hold for fathers. In general, fathers are understudied (Phares, Lopez, Fields, Kamboukos, & Duhig, 2005; Wolff, Pak, Meeske, Worden, & Katz, 2010), and it would be important to include fathers in future projects using this measure. Second, we relied solely on self-report data from mothers, and therefore common method variance could bias our correlational results (Holmbeck & Devine, 2009). Finally, we did

not address several aspects of measurement development, such as test-retest reliability, measurement invariance across language groups, the development of normative data, and sensitivity to diagnostic decisions or treatment response (Holmbeck & Devine, 2009). These aspects should be examined in future work. For example, test-retest reliability is important because some items may be time-sensitive while others may be long-standing. In addition, larger samples of individuals who speak Spanish or other non-English languages are required to test measurement invariance across language groups. The development of normative data would allow identification of parents experiencing significantly elevated levels of distress. Given that we found consistently higher scores across domains in our sample that had a shorter time from diagnosis, time since diagnosis should be considered in future studies. The PPSI may be particularly useful close to the time of diagnosis when families experience increased adjustment needs. Conversely, high scores from caregivers whose child is further from diagnosis may indicate more serious and long-standing difficulties.

In conclusion, the Pediatric Parenting Stress Inventory has demonstrated sound psychometric properties for assessing problems and distress experienced by mothers of children recently diagnosed with cancer. Future studies should evaluate its clinical utility, sensitivity to change following intervention, and usefulness for fathers. Given evidence of dissimilarities in coping strategies between mothers and fathers (Goldbeck, 2001), the PPSI might be useful in identifying whether differences exist in the types and intensity of problems reported by mothers and fathers. Perhaps differences in the problems experienced may explain some of the differences in adjustment of mothers and fathers (Pai et al., 2007). Finally, although we evaluated the properties of the PPSI in mothers of children with cancer, we believe that the items are sufficiently generic to be applicable to a wide range of pediatric conditions and encourage clinicians and researchers to evaluate its utility in other illness groups.

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Table 1

Demographic Information

	Sample A (<i>n</i> = 449) % or <i>M</i> ± <i>SD</i>	Sample B (<i>n</i> = 399) % or <i>M</i> ± <i>SD</i>
Primary Language ^a		
English	68.2%	71.4%
Spanish	19.4%	28.6%
Hebrew	12.5%	—
Ethnicity **		
Hispanic	26.1%	41.1%
Non-Hispanic	73.0%	58.9%
Mother's Race ^{b*}		
Caucasian	50.8%	58.9%
African American	6.5%	7.3%
Asian	1.3%	3.0%
Other	40.6%	30.9%
Mother's Marital Status		
Single	13.4%	17.0%
Partnered	81.3%	75.4%
Separated	4.7%	7.5%
Mother's Education		
Less than High School	24.5%	27.1%
High School or Greater	73.9%	72.9%
Mother's Age **	35.4 ± 7.6	37.3 ± 8.4
Child's Age *	7.8 ± 5.4	8.7 ± 5.8
Child's Gender		
Male	51.8%	53.6%
Female	46.3%	46.4%
Child's Diagnosis **		
Leukemia	43.2%	44.1%
Solid Tumor	29.8%	15.8%
Brain Tumor	14.5%	12.5%
Non-Hodgkin's Lymphoma	8.0%	7.0%
Hodgkin's Disease	4.0%	4.3%
Other	0.2%	16.3%
Weeks Since Diagnosis **	9.4 ± 5.58	6.5 ± 4.46
Number of Children in Home	2.5 ± 1.3	2.5 ± 1.2

Note. Chi-square or t-test analyses were conducted to examine differences in demographic factors between Sample A and Sample B.

^a Language was categorized as "English" or "Other" for chi-square analyses.

^b Race categorized as "Caucasian" or "Other" for chi-square analyses.

*
 $p < .05$;

**
 $p < .01$

Table 2

Standardized Factor Loadings from CFA in Samples A and B.

Item	Factor 1 Managing Ill Child's Needs		Factor 2 Emotional & Physical Problems		Factor 3 Managing Finances		Factor 4 Managing Family Life	
	A	B	A	B	A	B	A	B
1. Managing the child's physical needs	.79	.73						
2. Providing emotional support [to ill child]	.82	.75						
3. Meeting school, social, recreational needs [of ill child]	.73	.57						
4. Being overprotective [of ill child]	.63	.76						
5. Learning more about the child's disease, treatment, side effects, prognosis	.84	.73						
6. Communicating with health care professionals	.84	.76						
20. Exhaustion			.79	.69				
21. Sleep difficulties			.67	.56				
23. Gaining or losing weight			.60	.49				
24. Aches and pains			.62	.63				
29. Anxiety			.75	.78				
30. Anger			.76	.72				
31. Grief			.79	.74				
32. Sadness/depression			.85	.81				
33. Hopelessness			.74	.72				
34. Guilt or self-doubt			.74	.68				
35. Worry			.80	.83				
36. Being stressed			.81	.86				
37. Feeling helpless			.82	.79				
38. Poor attention and concentration			.75	.69				
39. Questioning faith and beliefs			.67	.62				
40. Frequent ups and downs			.80	.69				
11. Medical bills					.67	.59		
12. Non-medical bills					.75	.69		
13. Insurance problems					.72	.62		

	Factor 1		Factor 2		Factor 3		Factor 4	
	Managing Ill Child's Needs		Emotional & Physical Problems		Managing Finances		Managing Family Life	
	A	B	A	B	A	B	A	B
14. Job pressure					.76	.60		
15. Reduction in income (job loss, going part-time)					.77	.72		
7. Providing supervision and making arrangements for the other children							.76	.77
8. Meeting emotional needs of my spouse/the other children							.79	.73
9. Communication between family members							.72	.69
41. Transportation							.61	.63
42. Child care							.65	.77
43. Household management (e.g., food, cleaning, laundry)							.82	.80
44. Time management							.85	.81
45. Making decisions							.78	.68

Note. Instructions for completion were: "Below is a list of problems faced by many parents of children with cancer. Please review each item and indicate how much of a problem it has been for you during the last week." Excluded items were: (10) Conflicts with my spouse, (16) Communicating with friends/associates, (17) Isolation from family and friends, (18) Participating in social activities, (19) Conflict with friends, (22) Using drugs or alcohol, (25) Sexual functioning, (26) Dizziness/faintness, (27) Hot or cold spells, and (28) Heart pounding.

Table 3

Reliability and descriptive statistics for revised 4-subscale PPSI in Samples A and B.

Subscale	Sample	α	Range	$M \pm SD$	[95% CI]
Managing the Ill Child's Needs	A	.86	0-4	1.45 $\pm$.99	[1.36, 1.54]
	B	.83	0-4	1.70 $\pm$.98	[1.60, 1.80]
Emotional & Physical Problems	A	.94	0-4	1.34 $\pm$.87	[1.26, 1.42]
	B	.94	0-4	1.69 $\pm$.92	[1.60, 1.78]
Managing Finances	A	.78	0-4	1.09 $\pm$.95	[1.00, 1.18]
	B	.72	0-4	1.17 $\pm$.95	[1.08, 1.26]
Managing Family Life	A	.88	0-3.88	1.32 $\pm$.91	[1.24, 1.40]
	B	.87	0-4	1.58 $\pm$.93	[1.49, 1.67]
Total Problem Intensity (35 items)	A	.94	0-3.49	1.32 $\pm$.72	[1.25, 1.39]
	B	.94	.06-3.6	1.59 $\pm$.75	[1.52, 1.66]

Table 4

Cronbach’s alpha for subsamples of English-, Spanish-, and Hebrew-speaking mothers in Samples A and B.

Subscale	Sample A			Sample B	
	English (n = 306)	Spanish (n = 87)	Hebrew (n = 56)	English (n = 285)	Spanish (n = 114)
Managing the Ill Child’s Needs	.81	.88	.85	.80	.85
Emotional & Physical Problems	.95	.93	.91	.94	.93
Managing Finances	.81	.71	.66	.75	.64
Managing Family Life	.90	.81	.81	.87	.85
Total Problem Intensity	.95	.93	.91	.95	.93

Note. There were no Hebrew-speaking mothers in Sample B

Table 5

Spearman correlations between PPSI intensity scales and measures of maternal distress in Samples A (above diagonal) and B (below diagonal)

	1	2	3	4	5	6	7	8
1. Managing the Ill Child's Needs	--	.41**	.28**	.58**	.68**	.36**	.38**	.41**
2. Emotional & Physical Problems	.49**	--	.44**	.58**	.88**	.79**	.80**	.71**
3. Managing Finances	.34**	.39**	--	.46**	.61**	.31**	.34**	.32**
4. Managing Family Life	.61**	.55**	.45**	--	.83**	.48**	.52**	.42**
5. Total Problem Intensity	.72**	.89**	.59**	.81**	--	.71**	.73**	.67**
6. POMS_TMD	.39**	.78**	.34**	.46**	.71**	--	.71**	.65**
7. BDI-II Total ^a	.37**	.76**	.30**	.42**	.67**	.77**	--	.66**
8. IES-R Total	.38**	.64**	.21**	.35**	.58**	.66**	.70**	--

Note. Correlations within the triangles are PPSI inter-subscale correlations within each sample. ^aSquare root transformation was used due to positive skew; triangles indicate within scale comparisons; POMS TMD = Profile of Mood States, Total Mood Disturbance; BDI-II = Beck Depression Inventory II (total score); IES-R = Impact of Event Scales-Revised (total score).

* $p < .05$; ** $p < .01$