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ORIGINAL PAPER

Validity and Reliability of the Parenting Stress Index Short Form (PSI-SF) Applied to a Chilean Sample

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Abstract The Parenting Stress Index was developed in response to the need for a measure to assess the parent-child system. Its abbreviated version, the Parenting Stress Index Short Form, is an instrument with multiple clinical applications and is useful for research and intervention purposes. The Parenting Stress Index Short Form was standardized for use with parents of children ranging from 1 month to 12 years old. Several validation studies are available, most of them not supporting the original structure of three factors. No validation studies for this instrument currently exist in Latin America for a socially vulnerable population. The purpose of this study was to evaluate both the validity and internal consistency of Parenting Stress Index Short Form in a Chilean sample including 336 dyads (mean age of mothers 21.4 years; SD = 7.38; and mean age of children 84.8 days; SD = 78.0), demonstrating risk for negative health outcomes and who attend public primary health care. An exploratory factor analysis showed a three-factor structure that was compatible with the original version and explained 41.45 % of the variance. Internal consistency was high both for the total scale (Cronbach's $\alpha = 0.92$) and the three subscales (0.81: Parenting Distress; 0.89: Parent–Child Dysfunctional Interaction and 0.88: Difficult Child). The Goldberg General Health Questionnaire was used to assess external criterion related validity and a positive and statistically significant correlation was found (0.86). The evidence suggests that the Parenting Stress Index Short Form can be used as an instrument to measure the relationship between parenting and stress. Due to its psychometric characteristics, it can be applied to a vulnerable Chilean population. The contribution of this study is the validation of this instrument in a Spanish speaking population with characteristics of social vulnerability.

Keywords Parenting · Reliability · Validity · Primary care · Parenting stress

Introduction

The relationship between stress and the demands of parenting has been widely studied in the past two decades, with evidence showing its negative consequences on child development, family dynamics and parenting satisfaction (Cappa et al. 2011; Deater-Deckard 1998). Research has also shown an important relationship between parenting experiences and children's physical and mental health during early childhood (Federico de Almeida et al. 2012). In addition to this, high levels of stress in parents have been associated with lower quality of life in children and adolescents (Frontini et al. 2016). For this reason, it is important to identify elements of parenting and families that are an obstacle for the promotion of children's healthy development in order to prevent future problems. Reliable and valid instruments are necessary in order to measure these elements in an effective way, with the goal of improving decision making and the optimization of resources in the primary health care system in favor of children and families.

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From this perspective, the Parental Stress Index (PSI) (Abidin 1990, 1995) provides a measure of parents' stress levels associated with the demands of parenting and identifies dysfunctional parenting (Abidin 1995).

The Parenting Stress Index Short Form (PSI-SF) is an abbreviated version of the PSI. Multiple clinical applications of this instrument are supported by studies showing how the PSI-SF results can be negatively associated to parenting self-efficacy and positively correlated to several risk factors (Raikes and Thompson 2005). In addition to this, mothers' scores have shown a significant correlation to higher risks of insecure attachment in a sample comprising premature children (Laganiére et al. 2003; Abergel and Blicharski 2013).

The PSI-SF has a high potential for clinical practice, and has been used across different family contexts (Timmer et al. 2004; Schaeffer et al. 2005; Jiménez and Zavala 2011). Some of these include the presence of variables such as child sexual abuse (Silovsky and Niec 2002), childhood developmental disorders (Davis and Carter 2007; Tervo 2012; Byars et al. 2011), and post-partum depression (Brougha et al. 2011), among others. It has also been successfully used to assess intervention results as a follow up instrument (Cowen 1998; Wolfe and Hirsch 2003; DePanfilis and Dubowitz 2005; Gómez et al. 2011).

The National Child Traumatic Stress Network reports that the PSI-SF has been translated into 14 languages, with more than 87 published studies and 31 non-published studies, and more than 42 publications between 2006 and 2012 (Ippen et al. 2005). As for reliability and validity studies, 11 studies have been reported. Among these total of 11 studies, seven were carried out in the United States of America (Abidin 1995; Deater-Deckard and Scarr 1996; Reitman et al. 2002; Ahern 2004; Haskett et al. 2006; Whiteside-Mansell et al. 2007; McKelvey et al. 2009), one in Canada (Zaidman-Zait et al. 2010), one in Turkey (Mert et al. 2008), and two in Spain (Díaz-Herrero et al. 2010; Díaz-Herrero et al. 2011).

Abidin (1990) proposed a three-factor model in the original PSI-SF version: Parenting Distress (PD), Parent–Child Dysfunctional Interaction (PCDI) and Difficult Child (DC). Studies have reported on both the reliability and validity of the PSI-SF. Reliability was assessed in a sample including 270 cases, with test-retest indicators ranging from 0.68 to 0.85 and internal reliability in a sample including 800 cases ranging from 0.80 to 0.91 (Cronbach's α) (Abidin 1995). Roggman et al. (1994) reported 0.78–0.90 reliability scores (Cronbach's α) in a sample of 103 parents. Concurrent validity was established with the full PSI version, obtaining correlations ranging from 0.73 to 0.95 with gross scores for this instrument's three subscales as well as the total scale (Abidin 1995).

Reitman et al. (2002) and Díaz-Herrero et al. (2011) are among the researchers who found evidence for the three-factor model. The study by Reitman et al. (2002) included a sample of 196 children ages three to five and their mothers. The families' incomes were classified as low, with 81 % of the mothers being single, widowed or divorced. Their analysis found that the three, two and one factor models explained almost the same amount of variance, and decided to support the three-factor model due to its clinical utility. Díaz-Herrero et al. (2011) also supported the three-factor model with some variations in the items contained in each one of the original factors. Deater-Deckard and Scarr (1996) and Haskett et al. (2006) carried out a Confirmatory Factor Analysis (CFA) analysis and found a significant three-factor model, but with low values or important changes in each factor's items. Later, they were able to find better alternative models through a new CFA analysis carried out with different samples.

Most research does not support the proposed three-factor model in the original scale and some even highlight its unidimensionality or propose other alternative models for the data. Haskett et al. (2006) used a sample comprising 185 abusive and non-abusive mothers and fathers from different socioeconomic and ethnic environments, and a CFA analysis supported a two-factor model as the best alternative. However, before this solution was found, these researchers did carry out a confirmatory analysis in order to test a three-factor model. Whiteside-Mansell et al. (2007) analyzed the reliability and validity of two of the PSI-SF's subscales: parenting distress (PD-SF) and dysfunctional interactions between parents and children (PCDI-SF), in a sample of 1122 mothers of preschool children (between 20 and 39 months old) from multiethnic families with low incomes. The average years of formal education were 12 (in 60 % of participants), 39 % of mothers were under 20 years old, and 26 % were married. This study confirmed through a CFA the structure of both factors and proposed a five-factor model with a greater theoretical adjustment.

A study by McKelvey et al. (2009), examined the psychometric properties of two PSI-SF subscales in a sample of 696 low income and ethnically diverse parents. The researchers used the CFA method and found evidence that supported the two-factor model, but found a better fit in the five-factor model proposed by Whiteside-Mansell et al. (2007). This model approached the multiple dimensions of parenting stress, including: general distress, anxiety associated with the challenges of parenting, problematic interactions between parent and child, parents' perceptions about children, as well as their own perceptions about parenting. Díaz-Herrero et al. (2010) carried out a validation study in a Spanish population (using a translation developed by these same authors) including 129 married, middle class mothers, from a non-clinical population and the EFA supported the

two-factor model. A second study from the same authors was conducted on a sample of 115 middle class married fathers with a mean age of 33.69 years, using EFA. Their results supported the original three-factor model. Even though both studies focused on Spanish speaking populations, cultural differences and limitations described by the authors regarding sample size and characteristics of the participants (Díaz-Herrero et al. 2010, 2011) support the pertinence of carrying out this study in a Chilean population living under conditions of psychosocial risk.

Research on the psychometric properties of the PSI-SF shows a tendency to use confirmatory analysis in order to test Abidin (1995) three-factor model, carrying out exploratory analysis when results have not been as expected. In these cases, researchers have carried out exploratory analysis of different models, with a number of factors ranging from one to five (e.g., Reitman et al. 2002, three factors; Whiteside-Mansell et al. 2007, two factors). Different theoretical explanations have been provided for these new models. Some attempt to explain the lack of fit in the three-factor model is based on the composition of the sample in each study (consisting of only women, men, or both), socioeconomic level, small sample size, and the use of clinical vs. non-clinical samples (e.g., Bhavnagri 1999; Briggs-Gowan et al. 2000 quoted by Reitman et al. 2002). One of the most frequent explanations in the literature for the two or three-factor models is the difference between how fathers and mothers establish a relationship with their child. Some researchers hypothesize that factors would vary according to gender because men and women would establish a different type of relationship with their child (Díaz-Herrero et al. 2010, 2011).

Despite the lack of validation studies for the PSI-SF in Latin America, this instrument is widely used in Chile as evidenced by its application in studies with low income populations (Farkas and Corthorn 2012; Olhaberry and Farkas 2012), foster care families (Jiménez and Zavala 2011) and the staff at day-care centers (Santelices 2014). The PSI-SF is used by the Sistema Nacional de Protección Integral a la Infancia Chile Crece Contigo (National System for the Integrated Protection of Childhood Chile Grows with You). This is a nationwide program with the mission of accompanying, protecting and supporting children and their families, and has supported the pertinence of performing PSI-SF validation studies in the Chilean population in order to contribute to research as well as interventions and evaluations of children and their families (Bedregal et al. 2013). Therefore, this study focused on assessing both the internal consistency and validity of the PSI-SF's Spanish translation developed by its authors (Abidin 1995) in a sample of Chilean mothers entering the national primary health care system.

Method

Participants

The sample consisted of 336 low income mother–child dyads from 24 health care centers in Santiago, Chile. The mean age of mothers was 21.9 years old (SD = 7.38) and the mean age of children was 84.8 days (SD = 78.0). Of the children, 89.6 % were younger than 4 months old and 9.9 % had premature births.

As for educational level, 9.2 % of mothers had a technical or professional degree; 42.6 % had completed secondary education while 30.4 %, had not. Of the participating mothers, 61 % were single and 27.1 % were living with their partners. As for their affiliation to the health care system, 58.6 % of participants received no income of their own or were not formally employed, and therefore received a state subsidy as well as free access to health care services for pregnant women with children up to six years old.

Procedure

This study was funded by the Fondo Nacional de Ciencia y Tecnología (National Science and Technology Fund, or FONDECYT, in Spanish) program for science in Chile. FONDECYT and all the involved health care centers granted ethical approval for this study. Informed consent was obtained from all individual participants. The validation of the PSI-SF was carried out in the context of a wider study that had the objective of carrying out a cost-effectiveness analysis of home visiting services provided to pregnant women in the Chilean primary health care system.

The sample was selected through two stages: the first stage consisted of selecting the municipalities with the highest birth rates in Santiago (36.6 %) (Vital Statistics Yearbook 2011). Once the municipalities were chosen, five of them were randomly selected to participate in this study. Later, group condition was assigned by randomly selecting municipalities to join either the experimental or control groups, which meant that all of the 24 selected health centers would belong to the same group as the others participating within their municipality. Health care centers were then contacted and their written consent to participate in this study was obtained. Cases from their databases were randomly selected according to inclusion and exclusion criteria.

The inclusion criteria for this study were: (a) presence of at least one moderate psychosocial risk factor according to the Chilean Ministry of Health's Abbreviated Psychosocial Assessment—EPsA (according to its abbreviation in Spanish). The possible risk factors were: delayed entry into

the health care system (after 20 weeks of pregnancy); educational level under 6 years of schooling; teenage pregnancy; conflicts with motherhood; and poor social support (Government of Chile, Ministry of Health 2008), (b) 30 years old or younger, and (c) voluntary participation in this study. Exclusion criteria included: (a) major depressive episode, (b) drug abuse and (c) domestic violence (physical or psychological violence from partner or spouse). Finally, contact was established with potential participants, who were invited to the study from their 20th week of pregnancy. The application of measuring instruments was performed at their homes by specially trained people.

Measures

PSI-SF

The present study used the original version of the PSI-SF, which was developed and translated to Spanish by its original authors (Abidin 1995). The PSI-SF is a 36-item measure, and takes approximately 15 min to complete. Participants answer according to a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree) (Abidin 1995; Ippen et al. 2005). Scores are presented in one full scale and three subscales (with 12 items each): PD, PCDI, and DC (Abidin 1995). The PD subscale measures anxiety due to personal factors related to parenting; the PCDI subscale assesses how parents perceive their interactions with their children (including positive and negative statements), and the DC subscale measures the characteristics of child behavior and how difficult it can be to deal with such behavior. The total PSI-SF score is an indicator of the overall experience of parenting stress (Abidin 1995).

Goldberg General Health Questionnaire (GHQ-12)

This instrument is widely used to assess general mental health and detect mental disorders of neurotic origin, as well as some personality or psychophysiological disorders (not including those from psychotic origin or organic-brain origin); mostly anxiety, hypochondria, social inadequacy and depression (Garmendia 2007; Goldberg 1972; Trucco et al. 1979). It works under the assumption that a disorder detected will fluctuate along a continuum, and therefore allows the assessment of each symptom's severity. This study used the abbreviated version of the questionnaire (validated in Chile) containing 12 questions (Araya et al. 1992). Answers are scored according to a Likert scale ranging from zero to three points, with high scores indicating a higher severity of symptoms. The total score is obtained from the sum of all items with a minimum value of 0 (presence of mental health) and a maximum value of 36 (absence of mental health) (Garmendia 2007). A study by Araya et al. (1992) evaluated the validity of this criterion, obtaining a sensitivity of 76 % and a specificity of 73 %. Also, Garmendia (2007) carried out a validation study that analyzed the psychometric properties of this instrument, obtaining high internal reliability results (Cronbach's $\alpha =$ 0.90).

Data Analyses

Construct Validity of the PSI-SF

Exploratory factor analysis was used to assess the construct validity using maximum likelihood as an extraction method (Lloret-Segura et al. 2014). Before carrying out this factor analysis, missing data was imputed using a mean and compliance method with normality conditions assessed in all items. The results of this test showed that an important percentage of the items did not show a normal behavior, therefore, a polychoric matrix was used for this factor analysis. Also, Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) index were used to assess the pertinence of using factor analysis.

The number of factors in the scale was then estimated considering three criteria: (1) Kaiser-Guttman or latent root criterion, (2) falling contrast criterion; the most frequently used for this purpose (Hair et al. 2005; Martínez et al. 2006), and (3) Horn's Parallel Analysis (Buja and Eyuboglu 1993; Martínez et al. 2006). Oblimin was used as a rotation method and all analyses were performed using the R Studio statistics application.

External Criterion Validity Analysis using the Goldberg General Health Questionnaire

The external criterion validity of the instrument was evaluated by using the Goldberg General Health Questionnaire for mental health validated in Chile (Garmendia 2007). Cronbach's α for this study's sample was 0.86.

High scores in the Goldberg General Health Questionnaire indicate lower levels of mental health, therefore, we expected the three dimensions of parenting stress to correlate significantly and positively with the scores obtained for this instrument.

This measure was selected for this study considering that Reitman et al. (2002) found, across different validation studies that stress had a stronger relationship with the emotional state of parents than with other variables.

Internal Consistency

Cronbach's α was used to evaluate internal consistency, also including the analysis of item discrimination capacity

through the correlation of each reactive with the instrument as a whole. Assuming that the factor structure of the PSI-SF would not be fully replicated, this team calculated the three subscales in order to carry out the rest of their analyses.

Results

Construct Validity

Regarding the adequacy of exploratory factor analysis, an item by item analysis was conducted. Results showed that no items behaved normally. In addition to this, 18 out of the 36 items showed asymmetry coefficients lower than −1 or higher than 1; therefore, the exploratory factor analysis could not be performed with a Pearson correlation matrix (Lloret-Segura et al. 2014). Considering the above, factor analysis was performed on a polychoric matrix.

The KMO indicator obtained was 0.931 which indicated the resulting polychoric matrix fitted the proposed analysis. Bartlett's sphericity test was also significant ($p < 0.05$), stating that the polychoric correlations matrix does not correspond to an identity matrix. All these results confirmed the reasonable fit of the statistical technique used.

As for the ideal quantity of factors according to the Kaiser-Guttman criterion and the falling contrast criterion, it was observed that a three-factor model would be ideal for factors with values higher than 1. As for the Horn parallel analysis, a three-factor model with eigenvalues proved to be more adequate than using eigenvalues obtained from random samples; a result that was consistent with the falling contrast and Kaiser-Guttman criteria. For this reason, we decided to use a three-factor solution that explained 41.45 % of the variance.

As for the loading of each item on different factors, we obtained the following results ordered following the number of items (see Table 1).

Table 1 Factor loadings for all items, according to a structured matrix, rotated with oblimin (only loadings higher than 0.3 are displayed)

No.	Factor 1 loading	Factor 2 loading	Factor 3 loading
1	0.49	–	–
2	0.36	–	–
3	0.66	–	–
4	0.66	–	–
5	0.83	–	–
6	0.36	–	–
7	0.57	–	–
8	0.45	–	–
9	0.5	–	–
10	–	0.37	–
11	0.56	–	–
12	0.7	–	–
13	–	0.71	–
14	–	0.67	–
15	–	0.87	–
16	–	0.61	–
17	–	0.9	–
18	–	0.88	–
19	–	0.93	–
20	–	0.78	–
21	–	0.58	–
23	–	0.41	–
24	–	–	0.6
25	–	–	0.75
26	–	–	0.8
27	–	–	0.81
28	–	–	0.63
29	–	–	0.8
30	–	–	0.82
31	–	–	0.75
32	–	–	0.52
34	–	–	0.67
35	–	0.48	0.39
36	–	–	0.7

External Validity Criterion Using the Goldberg General Health Questionnaire

In order to assess criterion validity, we observed the relationship between parenting stress scores and results obtained by the Goldberg General Health Questionnaire. As previously mentioned, this is an instrument used to assess the general mental health of subjects and detect mental disorders of neurotic origin and some personality or psychophysiological disorders. We hypothesized that results would show a positive correlation between the scores of both instruments. This was confirmed by the discovery that the three dimensions of parenting stress had a positive and statistically significant correlation with the Goldberg General Health Questionnaire (Cronbach's $\alpha = 0.866$). Also, factor 1 was observed to have the strongest correlation with scores in the Goldberg General Health Questionnaire (see Table 2).

We can state that this instrument for assessing parenting stress behaves as expected, with the Goldberg General Health Questionnaire evidencing its validity as an external criterion.

Internal Consistency Analysis

Although the PSI-SF's items did not behave normally, Cronbach's α coefficient was used to assess internal

Table 2 Correlation among PSI-SF three factors and GHQ

PSI-SF factor	GHQ score
Factor 1 (PD)	
Pearson correlation	0.568
Sig. (two-tailed)	<0.01
Factor 2 (PCDI)	
Pearson correlation	0.232
Sig. (two-tailed)	<0.01
Factor 3 (DC)	
Pearson correlation	0.300
Sig. (two-tailed)	<0.01

Table 3 Total items correlation

	Correlation item-total corrected
P2_2_1	0.42
P2_2_2	0.20
P2_2_3	0.5
P2_2_4	0.41
P2_2_5	0.44
P2_2_6	0.34
P2_2_7	0.42
P2_2_8	0.40
P2_2_9	0.41
P2_2_10	0.43
P2_2_11	0.44
P2_2_12	0.49
P2_2_13	0.55
P2_2_14	0.65
P2_2_15	0.56
P2_2_16	0.57
P2_2_17	0.60
P2_2_18	0.55
P2_2_19	0.58
P2_2_20	0.52
P2_2_21	0.56
P2_2_23	0.61
P2_2_24	0.66
P2_2_25	0.60
P2_2_26	0.61
P2_2_27	0.61
P2_2_28	0.68
P2_2_29	0.56
P2_2_30	0.65
P2_2_31	0.52
P2_2_32	0.44
P2_2_34	0.62
P2_2_35	0.67
P2_2_36	0.55

consistency considering the robustness of this indicator (Christmann and Van Aelst 2002; Zimmerman et al. 1993). In this study, the PSI-SF showed a strong internal structure reflected in the high correlation observed among its items (see Table 3). The three factors and the PSI-SF as a whole showed an optimal level of internal consistency according to the criterion used (Cronbach's α over 0.8 was considered a satisfactory value). In specific terms, both the internal consistency of the total scale (Cronbach's $\alpha = 0.925$) and the subscales were high (factor 1 = 0.821; factor 2 = 0.903, and factor 3 = 0.902).

In summary, EFA showed a three-factor structure that was compatible with the original version and explained 41.45 % of the variance. Internal consistency was high for the total scale (0.92) and the three subscales (0.81: PD; 0.89: PCDI, and 0.88: DC).

The Goldberg General Health Questionnaire was used to assess external criterion related validity and a positive and statistically significant correlation was found (0.866).

It may be concluded that results suggest that the PSI-SF is an effective instrument to measure parenting stress and that due to its psychometric characteristics, can be applied to a vulnerable Chilean population.

Discussion

The reviewed literature demonstrates the wide and varied applications of the PSI-SF in clinical contexts with diverse populations and purposes. Therefore, it can fulfill a very important role in the detection of risk factors related to parenting, care and attachment, among others. Also, the use of the PSI-SF in research contexts indicates its usefulness as an instrument for accompanying diagnosis as well as the design and evaluation of interventions focused on understanding and improving children's family environment.

It is important to remember the assumptions that guided the development of the PSI-SF by Abidin (1995). First, the instrument would be built according to the existing knowledge base. Second, the PSI-SF would integrate the existing knowledge base with clinical issues of identification and diagnosis of individual parent–child systems under stress. The third assumption was that stressors or sources of stress have additive effects. The fourth assumption was that stressors were multidimensional regarding their source and nature. This assumption led to the identification of three major sources of stressors (Abidin 1995). The PSI-SF was based on these assumptions and developed through a series of replication factor analyses that resulted in a three-factor model. The first sample consisted of 530 mothers who brought their children for a one-year well-child check-up.

The lack of validity studies for this instrument in the Latin American population and its wide use in Chile suggest the relevance and contribution of this study, which focused on examining the psychometric properties of the PSI-SF in a sample of Chilean mothers living in contexts of psychosocial vulnerability. Exploratory factor analysis confirmed the original structure proposed by Abidin (1995) and showed reliability levels that are adequate for our population. Our results supported the three factors of the original scale: parenting stress, dysfunctional interactions and DC and a high internal consistency of the instrument. Also, it is necessary to highlight that 32 out of the 36 items showed loadings over 0.40 in their original factor.

Assuming the dimensions proposed by Abidin (1995) in the original three-factor model and considering that the samples in his study included variables related to health and depression, it is possible to understand why the PSI-SF showed strong correlations with the Goldberg General Health Questionnaire. These significant correlations suggest a reciprocal relationship between mothers' mental health and their perceptions about parenting and their child's behavioral problems. Parenting stress can cause a decrease in mothers' mental health and general well-being (Deater-Deckard 1998; Reitman et al. 2002). As for coherence, factor 1 in the PSI-SF focuses on parenting stress and is related to mothers' subjective perceptions and feelings of depression, anger and discontent that were highly correlated to the Goldberg General Health Questionnaire's results. As Abidin stated in 1995, the construction of the PSI-SF was based on the ideas of scientists such as Ainsworth et al. (1978, in Abidin 1995). These researchers have encouraged the examination of human behavior within its context and acknowledged the reciprocal relationship between parents and their children.

Some studies show that stress in parents can generate negative emotional reactions that can have a direct effect on health. This, in turn, can increase the deterioration of people's quality of life (Guilfoyle et al. 2010; Janicke et al. 2007; Frontini et al. 2016). Studies by Hawley et al. (2003), Ong et al. (2011), Kirk (2003), and Pérez-Padilla et al. (2015) included the PSI-SF and the GHQ-12.

Other studies have found significant correlations between the PSI-SF and other instruments similar to the Goldberg General Health Questionnaire. For example, Haskett et al. (2006) assessed the mental health of parents using the SCL-90-R (Derogatis 1983 in Haskett et al. 2006), a self-questionnaire that measures recent mental health symptoms experienced by adults. Also, McKelvey et al. (2009) and Whiteside-Mansell et al. (2007) used the depression scale in epidemiologic studies.

In order to understand the differences found between different studies of the PSI-SF, it is necessary to check for the presence of variables associated with the samples used in each study. Some examples of these variables are socioeconomic level, children's age, marital status, education, gender and psychosocial risk. These must be considered in order to understand how each study adjusts to the validation study carried out by Abidin (1990, 1995).

By comparing the characteristics of our sample with the ones used by other studies that obtained different results, we observed important differences that could be relevant. An in-depth analysis of psychometric studies (11) on the PSI-SF showed that among those studied that only recruited female participants, 60 % recommended a three-factor model, meanwhile only 25 % of studies that included both mothers and fathers proposed a three-factor model. We observed a tendency for those studies that include men and women to present two-factor models, meanwhile studies that focus only on mothers tend to present a three-factor model. In this sense, our study used the same type of sample as the original one carried out by Abidin (1995).

From a theoretical point of view, this tendency is supported by evidence on the father domain presented by Abidin (1995) that showed how attachment can have two different sources of dysfunction. The first is for fathers not to feel a strong connection to their child, reflected in a colder and more distant father–child relationship and, the second, when fathers have a real or perceived lack of capacity to accurately observe and understand their child's feelings and needs (Abidin 1990, 1995). It is important to consider that these aspects may be present in cultural contexts where children are mainly under the care of their mothers, making mothers more sensitive to respond in a differentiated way to each one of the dimensions associated with upbringing, interaction and the child. Thus, it is possible that fathers do not carry out this differentiation in an efficient way, mixing some of the assessed dimensions, and therefore changing the dimensionality proposed by the original instrument.

The above was observed in a study carried out by Deater-Deckard and Scarr (1996). The authors found significant differences between how mothers and fathers predict their child's behavior. While mothers tended to base their predictions on dysfunctional interactions, fathers did it according to the DC subscale. Regarding gender differences, we must highlight that research is not solid enough and presents mixed results (Deater-Deckard and Scarr 1996).

Regarding mothers' age, in our study, the mean was 21.9 years old (approximately 50 % of the sample was between 15 and 20 years old). Our results evidenced that adolescent mothers experienced higher levels of stress related to parenting and can present higher levels of detachment or rejection (López 2011; Passino et al. 1993). The mean age in our sample is different from other validation studies such as Díaz-Herrero et al. (2010), which had an average age of

31.48 years, and Haskett et al. (2006) with a mean age of 34.4 years.

Children's age can also affect the results of parenting stress evaluations. Younger children being more demanding and generating higher levels of anxiety and stress in parents (Reitman et al 2002). Our sample's mean age for children was 5.42 months, in comparison to other samples in studies such as Reitman et al. (2002) with children between 36 and 60 months old, Díaz-Herrero et al. (2011) with children between 10 and 39 months old, and Deater-Deckard and Scarr (1996), with mothers of children between 10 and 39 months old.

As for marital status, single mothers can experience higher levels of stress than married ones or those who are in a stable relationship (Olhaberry and Farkas 2012). The studies carried out by Deater-Deckard and Scarr (1996) and Díaz-Herrero et al. (2010) used samples consisting entirely of married women, and in the study by Haskett et al. (2006) 45 % of participants were married.

Educational and family income levels also influence parenting stress (Farkas and Valdés 2010; Macías et al. 2006). The Deater-Deckard and Scarr (1996) study had a sample with an average annual income of US$60,000. All adult participants were employed and had an average of 15.75 years of formal education; in Haskett et al. (2006) 36 % of the sample belonged to the upper socioeconomic levels, 23 % of them had a college degree, and 18 % did not finish school. Finally, in Díaz-Herrero et al. (2010), 25 % of the sample attended college, 44.5 % finished high school, and 30.5 % finished elementary school and were middle class.

Another variable that must be taken into consideration is the level of psychosocial risk present in the samples of validation studies. Content validity may fail if we consider that Abidin (1995) sample was taken from populations not living under conditions of psychosocial risk. Zaidman-Zait et al. (2010) questioned the content validity of the scales that showed poor results and suggested that Abidin (1995) based their assumptions on non-risk populations, without considering other contexts.

From this perspective, our sample showed psychosocial risk levels similar to those in the original study, since it presented moderate psychosocial risk indicators.

When comparing our sample with the revised studies we concluded that one of the main aspects to be considered is that our sample was recruited in a public health care center. In contrast, the study carried out by Díaz-Herrero et al. (2011), recruited its sample from the University of Murcia's Service for the Prevention and Promotion of Child Development and Early Treatment (SEPRODIAT, in the Spanish abbreviation). Also, Haskett et al. (2006) worked with a sample that was part of a study about social adaptation within child protection services carried out by the North Carolina State University.

Our sample differs in many aspects from the samples in other studies, with no differences that could explain the differences in results.

Finally, a revision of previous studies showed that most of them (eight studies) began their analyses with CFA, and once they found no supporting evidence for Abidin's (1995) original model, shifted to a two, four of five-factor model, and carried out exploratory analyses in order to confirm their results. Our study did not follow such a pattern. Instead, it began with an exploratory analysis, thus allowing the validation of the original three-factor model.

In an item to item analysis, asymmetry was found in the majority of studies. Our team searched for explanations for why some items did not show loadings in the factors originally proposed by Abidin (1995). Item ten states "being a mother makes me feel satisfied and happy", corresponding to factor 1 of parenting stress according to the original authors. However, in our study, results showed a 0.37 factor loading and this item was located in factor 2 because we considered that its content is more closely related to "interactions with the other person", reflecting how participants feel about being a mother and their subjective evaluations of the relationship with their child.

Item 22 was not included in our analysis because we consider its construction inadequate and not corresponding to the evaluated construct. The same situation occurred with item 33 that showed additional typing problems in its original format and therefore was excluded from the analysis. It is worth mentioning that items 22 and 33 are the same ones that Díaz-Herrero et al. (2011) described as needing rephrasing in order to achieve a higher correspondence with the total scale, because both showed reliability values below 0.25.

It is important to highlight that in the study carried out by Haskett et al. (2006) items 8 and 31 showed loading below .40 in a two-factor model. In Díaz-Herrero et al. (2011), the three-factor model proposed explained 47.48 % of the variance. However, items 22 and 31 showed loading lower than 0.30 for all factors, and eight items (6, 13, 14, 24, 25, 32, 33, and 35) loaded on a factor that was different from Abidin's (1995) original structure.

Even though the amount of the variance explained by our three-factor model is not ideal, it is coherent with other studies, where the variance explained by three-factor models ranges between 41 and 47.48 % (Haskett et al. 2006; Díaz-Herrero et al. 2011). Other studies were able to explain a slightly larger percentage of the variance, but using two-factor models (Whiteside-Mansell et al. 2007; McKelvey et al. 2009).

Anothers relevant aspect are the differences between the PSI-SF version used by our team in this study from the one used by Díaz-Herrero et al. (2010, 2011). The latter used their own version, adapted to their use of this language in

Spain. Instead, we used the original Spanish translation developed by Abidin (1995).

Finally, our study has limitations we need to consider. First of all, we have focused on evaluating the stress of mothers without including fathers. Also, our sample focused on mothers with children up to approximately four months old. Considering that this instrument was developed for children up to 12 years old and the dynamic associated to parenting stress changes across childhood, we recommend a replication of this study with mothers and fathers of children of different ages.

Despite this, the data obtained suggest that the PSI-SF can be an appropriate instrument for research on early childhood interventions in Chile and other Latin American countries. In addition to this, it constitutes a potentially useful instrument for primary health care professionals that work with families in the prevention of problems caused by high levels of parenting stress. It is also a beneficial instrument for responsible researchers and politicians who seek to improve prevention and intervention programs in Chile and Latin America.

It is also important to highlight that our results offer a new validation of the PSI-SF's Spanish version for its use with at-risk populations with characteristics that are similar to our sample.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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