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Psychometric Properties of the Parental Stress Scale in Swedish Parents of Children with and without Neurodevelopmental Conditions

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Abstract

Background: Parents of children with neurodevelopmental conditions (NDC) are at risk of experiencing elevated levels of parental stress. Access to robust instruments to assess parental stress is important in both clinical and research contexts. Objective: We aimed to evaluate the psychometric properties of a Swedish version of the Parental Stress Scale (PSS), completed by parents of 3- to 17-year-old children, with and without NDCs.
Method: Main analyses were conducted on data from three independent samples: a community sample (n=1018), a treatment-seeking sample of parents of children with various disabilities (n=653), and a sample of parents of children with Attention-Deficit/Hyperactivity Disorder (ADHD) who themselves reported varying ADHD symptom severities (n=562). Additional analyses were enabled by the use of data from a complementary test-retest sample (n=337).
Results: The internal consistency of the PSS was good (Cronbach's alpha, α=.87) and its test-retest reliability moderate (ICC=.66). The scale correlated in the expected direction with related constructs (r=.50–.56 in the community sample). An exploratory factor analysis found its internal structure to reflect two aspects of parental stress: Lack of Parental Rewards and Role Satisfaction (factor 1, α=.90) and Parental Stressors and Distress (factor 2, α=.85). The treatment-seeking parents of children with disabilities reported higher parental stress than community reference parents (p<.001; Cohen's d=1.17). Moreover, we found that parents with high ADHD symptom severity reported higher parental stress than parents with low ADHD symptom severity (p<.001; d=0.39).
Conclusion: In summary, we found evidence in support of the reliability and validity of the PSS, which overall was judged to be useful as a measure of parental stress in a Swedish context. In addition, our results underline the importance of considering parental stress and related needs in assessments and intervention planning involving families of children with NDCs.

Keywords: Parental stress, assessment, caregiver burden, neurodevelopmental condition, parental ADHD

Introduction

Parental stress is defined as a stress reaction arising from a perceived imbalance between the demands of being a parent and the (internal or external) resources available to meet these demands (1). Although this description is consistent with established conceptualizations of general and work-related stress (2-5), it has been argued that the role-specific construct of parental stress adds additional value when it comes to studying and understanding both family and treatment outcomes (1).

Most parents experience some stress associated with the accumulation of day-to-day stressors and parenting hassles (6, 7). The likelihood of experiencing elevated parental stress is greater in families of children with neurodevelopmental conditions (NDCs; (8, 9)) and even more so in multiplex families where both child and parent(s) have NDC symptoms (10). Robust, accessible, and easily administered measures of parental stress are essential for the further development of knowledge and interventions.

Parental stress and NDCs

Numerous studies have documented elevated stress in parents of children with NDCs such as Attention-Deficit/Hyperactivity Disorder (ADHD; (9, 11)), autism (8, 12) and intellectual disability (ID; (13)). Children's ADHD and autism symptomatology have been associated with increased parental stress even at

subclinical symptom levels (14, 15). However, in many families, it is not only the core NDC symptoms that may impose additional caregiving tasks and concerns, but the accumulation of needs related to both functional impairment and concurrent psychiatric conditions (16, 17). Herein, co-existing externalizing behaviors appear to be one of the most prominent risk factors for parental stress (9, 18, 19). Accordingly, researchers have underlined the importance of being attuned to the needs of parents – and to consider their levels of stress – when assessing and intervening with children's NDCs and co-occurring difficulties (9, 17).

Given the familial aggregation of NDCs such as ADHD and autism (20-22), it is important to consider the additional challenges that many multiplex families face. Indeed, studies suggest that 20–40% of children with ADHD have at least one parent with ADHD symptoms (23, 24). The associations and potential interactions between family factors such as parental stress, child ADHD, and parental ADHD are not well understood. However, adult ADHD symptomatology has been linked not only to more life stressors and general perceived stress (25, 26), but also to higher *parental* stress (10, 27-29) and a number of factors increasing the risk of parental stress (e.g., depression (30, 31), lower parenting efficacy (32, 33), and low social support (34, 35)). Therefore, research should be extended beyond the well-established links between children's ADHD and parental stress to also involve associations with parent-level factors such as parental ADHD symptomatology (9).

Measures of parental stress

Psychometrically sound measures of parental stress are needed to increase knowledge of its typology, its levels before and after support services and interventions (36), and its potential to influence treatment participation or outcomes (37).

One of the most widely used scales is the Parenting Stress Index (PSI), for parents of children under the age of 13 (38, 39). However, while some have raised concerns regarding the validity of certain PSI subscales (18, 19, 36), others have emphasized the need for a scale that is suitable for parents of children of all ages, with as well as without clinical needs. Acknowledging the need for a brief measure pertaining to the perception of stress among most parents, Berry and Jones (40) introduced the Parental Stress Scale (PSS).

The PSS (40) is a self-report scale designed to measure individual differences in parental stress. Based on a conceptualization of parenthood as a potential source of both satisfaction (e.g., emotional benefits and affection) and strain (e.g., demands on resources such as time, energy, and finances), the authors developed a set of items to capture not only the demands, but also the presence, absence or loss of resources and rewards commonly associated with the parenting role. The scale's psychometric properties have been confirmed across a variety of languages and samples, including parents of children of varying ages, with and without clinical needs (41-53). To the best of our knowledge, there is no comparable instrument that is both brief and freely available in Swedish.

Internationally, the PSS has been used across a variety of parental populations, to study parental stress in relation to various family factors and to measure clinical trial outcomes (54). Psychometrically, however, only a few evaluations have involved parents of children with NDCs – and none have related parental stress measured with the PSS to parental ADHD symptomatology.

Aims

The objective of the current study was to evaluate the psychometric properties of the Swedish version of the PSS, completed by parents of children with and without NDCs. It was hypothesized that the PSS would have good psychometric properties also in Swedish. Among other things, this was expected to be reflected in that treatment-seeking parents of children with disabilities who themselves had a positive interview-based screening for parental stress, anxiety, or depression would score higher on the PSS than community parents. Moreover, we sought to examine the levels of parental stress, as measured by the PSS, in multiplex families where both child and parent have ADHD symptoms. Here, the hypothesis was that parents who themselves reported high ADHD symptom severity would report higher stress levels than parents with low ADHD symptom severity.

Method
Participants and Procedure

The main analyses were conducted on data collected from a community sample and two clinical convenience samples, recruited for two clinical intervention studies (55,56). One of the clinical samples included treatment-seeking parents of children with various disabilities who themselves had a positive screening for parental stress, anxiety, or depression (hereafter referred to as the "distressed parent sample"). The other clinical sample included parents of children with ADHD who themselves reported varying levels of parental ADHD symptom severity (referred to as the "ADHD sample"). These main samples included a total of $N = 2,233$ parents with at least one child aged 3 to 17 years. Their background and demographic data are summarized in Table 1, information on their first born or target

child in Table 2. In the clinical samples, the children's disability diagnoses were confirmed in accordance with the clinical routines of the clinical site where their family was enrolled.

The community sample was recruited for an anonymously completed online survey examining the experience of being a parent. In 2018, invitation e-mails were sent to adults who had volunteered for participation in web surveys via a survey company (PFM Research i Sverige AB). Stratifications were undertaken to ensure representation of mothers and fathers, with children of various ages, living in urban and rural areas of Sweden. Of the $n = 1018$ participants, 109 (10.7%) had at least one child with a disability (e.g., a NDC or a severe sensory or motor impairment; Table 2).

The distressed parent sample was recruited for a clinical trial of a group intervention targeting stress and distress in parents of children with NDCs and other disabilities (55). Recruitment took place between 2016 and 2020 at publicly-funded outpatient habilitation/disability service clinics in 15 (out of 20) Swedish regions. Formal inclusion was preceded by a structured screening interview. Only parents who reported symptoms of stress, anxiety, or depression associated with their parenting were considered eligible. Of the $n = 690$ parents included, we used baseline (pre-treatment) data for the $n = 653$ who had a complete PSS and a target child aged 3 to 17 years ($n = 20$ [2.9%] missed PSS, $n = 17$ [2.5%] had a target child < 3 or > 17).

The ADHD sample was recruited for a trial evaluating psychoeducation for parents of children with ADHD (56). Recruitment took place between 2017 and 2019 at a publicly-funded outpatient habilitation ADHD center in Stockholm, Sweden. Of the $n = 585$ parents included, we used baseline (pre-treatment) data for the $n = 562$ who had a complete PSS ($n = 23$ [3.9%] missed PSS).

Complementary analyses were conducted on data from an additional sample of parents with at least one child aged 3 to 17 years, allowing for test-retest analyses (referred to as "the test-retest-sample"). This test-retest sample was recruited from the community via social media to anonymously complete two parenting-related measures on two occasions, approximately two weeks apart. Here, we included data from the $n = 337$ parents (96.4% mothers, 85.8% with university education) who completed the PSS two times, that is, had both test (Time 1) and retest (Time 2) data. Prior to analyses, test and retest ratings were matched using a set of control questions.

TABLE 1. Characteristics of the Study Participants in the Main Samples

	Community sample (n = 1018)			Distressed parent sample (n = 653)			ADHD sample (n = 562)		
	M	SD	min-max	M	SD	min-max	M	SD	min-max
Age	40.96	8.34	19-63	43.43	6.54	24-68	43.24	6.66	26-73
Number of children < 18 years of age	1.78	0.80	1-6	2.05	0.80	1-6			
	n	%		n	%		n	%	
Female gender	554	54.42		555	84.99		339	60.32	
Working	825	81.04		509	77.95		483	85.94	
Highest education									
Elementary	42	4.13		21	3.22		13	2.31	
Upper secondary	491	48.23		177	21.77		231	41.10	
University	485	47.64		344	52.68		274	48.75	
Other				110	16.85		25	4.45	
ADHD	29	2.85		29	4.44		20	3.56	
Autism w/wo ADHD	18	1.77		24	3.68		n/a [a]	n/a [a]	
HADS-Anx									
normal (≤ 7)	587	57.66		77	11.79				
mild (8-10)	197	19.35		141	21.59				
≥ moderate (≥ 11)	234	22.99		431	66.00				
HADS-Dep									
normal (≤ 7)	775	76.13		258	39.51				
mild (8-10)	170	16.7		191	29.25				
≥ moderate (≥ 11)	73	7.17		199	30.47				

Note. For each of the main samples separately, percentages were calculated as proportion of the total sample. In the community sample, parental age was missing for $n = 9$ [0.9 %]; in the distressed parent sample, values were missing for $n = 0$ to 5 [0-0.8%]; in the ADHD sample, values were missing for $n = 0$ to 19 [0-3.4%]). ADHD = Attention-Deficit/Hyperactivity Disorder; HADS-Anx = Hospital Anxiety and Depression Scale Anxiety; HADS-Dep = HADS Depression; w/wo = with or without.
[a] Not reported for the sake of participant integrity ($n < 5$)

TABLE 2. Characteristics of the Study Participants' Children[a]

	Community sample (n = 1018)			Distressed parent sample (n = 653)			ADHD sample (n = 562)		
	M	*SD*	min-max	*M*	*SD*	min-max	*M*	*SD*	min-max
Age	10.59	4.55	3-17	10.12	3.88	3-17	10.42	2.86	3-17
	n	%		*n*	%		*n*	%	
Female gender	496	48.72		211	32.31		164	29.18	
NDC									
ADHD	35	3.44		76	11.64		547	97.33	
Autism	21	2.06		218	33.38		0	0.00	
ADHD and autism	14	1.38		173	26.49		12	2.14	
ID w/wo autism or ADHD	n/a[b]	n/a[b]		138	21.13		n/a[b]	n/a[b]	
Other disability[c]	15	1.47		48	7.35				
Any disability	87	8.55		653	100		562	100	

Note. For each of the main samples separately, percentages were calculated as proportion of the total sample. In the distressed parent sample, values were missing for *n* = 0 to 7 [0-1.1%]; in the ADHD sample, values were missing for *n* = 0 to 19 [0-3.4%]). ADHD = Attention-Deficit/Hyperactivity Disorder; ID = Intellectual Disorder; NDC = Neurodevelopmental Condition; w/wo = with or without.

[a] For the community sample, figures are shown for the participants' first-born child. For the two clinical samples, figures apply to the child for whom the parents had enrolled in the intervention study they participated in.

[b] Not reported for the sake of participant integrity (*n* < 5)

[c] Including for example motor impairment and other disabilities that may give children access to habilitation services

Measures

The Parental Stress Scale

The PSS is a self-report scale designed to measure parental stress (40). It consists of 18 items (e.g., *I feel overwhelmed by the responsibility of being a parent*) rated on a 5-point Likert-type scale from 1 (*strongly disagree*) to 5 (*strongly agree*). After reverse-coding scores on the eight positively phrased items, responses are summed to yield a total score between 18 and 90. Higher scores indicate higher levels of parental stress.

In the original study, Berry and Jones (40) assessed the scale's psychometric properties in several steps, using data from six samples (total *N* = 1,276) representing parents of children of different ages (0 to 18 years), with and without clinical needs related to, for example, emotional difficulties, behavioral symptoms, or disabilities such as ID or cerebral palsy. The reliability of the PSS was found to be good, with an internal consistency (Cronbach's alpha, α) of $\alpha = .83$ and a six-weeks test-retest correlation of $r = .81$. The authors also found evidence in support of the scale's construct validity. For example, scores on the PSS were seen to vary in the expected direction with concurrent ratings of parental stress (as measured by the PSI, $r = .75$), general perceived stress ($r = .50$), and anxiety ($r = .46$; (40)).

In applying Youngstrom et al.'s (57) scale evaluation criteria on subsequent evaluations of the PSS in other languages and populations (41-46, 48-53), we found further evidence in support of the reliability and validity of the scale (Supplementary Table 1). Previous studies have, for example, reported good internal consistency (with α between .74 - .85) and observed positive correlations with related constructs such as general perceived stress, anxiety,

and depression (43-44, 49-50, 53). Conclusions about the dimensionality of the PSS do however tend to vary, with few studies confirming the original four-factor structure. Rather, most researchers have identified two factors, reflecting the rewarding and the demanding or resource-taxing aspects of parenting, respectively (42-44, 48-50, 52).

Before use, the PSS was translated into Swedish using a standard translation-backtranslation procedure. Item wordings were evaluated and, when needed, modified by a group of researchers and psychologists with extensive knowledge within the field.

The Perceived Stress Scale four-item version

The Perceived Stress Scale is a global measure of general perceived stress (58). The brief four-item version (PSS-4) used in the current study consists of four items (e.g., "*In the last month, how often have you felt that you were unable to control important things in life*") rated on a 5-point Likert-type scale from 0 (*never*) to 4 (*very often*). Responses are summed to yield a score between 0 and 16. Higher scores indicate higher stress levels. In the current study, the PSS-4 was completed by parents in the community sample ($\alpha = .75$).

The Hospital Anxiety and Depression Scale

The Hospital Anxiety and Depression Scale contains two seven-item subscales, one that measures anxiety (HADS-Anx; e.g., "*I feel tense or 'wound up'*") and one that measures depression (HADS-Dep; e.g., "*I still enjoy the things I used to enjoy*"; (59)). Responses are given on a 4-point Likert-type scale from 0 to 3. For each subscale, responses are summed separately to yield a score between 0 and 21. Higher scores

indicate higher levels of anxiety or depression. In the current study, the HADS-Anx and the HADS-Dep were completed by the community sample (α = .85 and α = .82) and the distressed parent sample (α = .78 and α = .77).

The Adult ADHD Self-Report Scale Screener
The Adult ADHD Self-Report Scale (ASRS) is a self-report measure of adult ADHD (60). The six-item ASRS Screener used in the current study has been found to outperform the full ASRS when it comes to distinguishing between clinical and non-clinical ADHD cases (60). Respondents are asked to state how often a particular ADHD symptom has occurred during the past six months (e.g., *"How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?"*) on a 5-point Likert-type scale from 0 (*never*) to 4 (*very often*). Responses are then dichotomized, yielding a score between 0 and 6. In the current study, the ASRS Screener was completed by the ADHD sample (α = .81). To enable group comparisons, scores were collapsed into three strata representing participants with low (scores 0–1), middle (scores 2–3) or high (scores 4–6) ADHD symptom severity (60).

Statistical Analyses
An item analysis was performed by calculating item variances, difficulties, validities, and part-in-whole corrected item-total correlations. The reliability of the PSS was assessed in terms of its internal consistency as estimated by Cronbach's alpha (α) in the community sample. In addition, we examined its test-retest reliability (stability) by calculating an intraclass correlation coefficient (ICC) between the two PSS ratings submitted by the test-retest sample at test (Time 1) and retest (Time 1), using an absolute-agreement, two-way mixed-effects ICC model (61).

The scale's construct validity was evaluated based on evidence regarding its internal structure, its ability to reflect differences between groups expected to report different levels of parental stress, and its associations with theoretically related constructs (62). First, the internal structure of the PSS was assessed in an exploratory factor analysis (EFA) of data from the community sample, using the Maximum Likelihood method of factor extraction and Promax (oblique) rotation (63, 64). In addition, we conducted a Confirmatory Factor Analysis (CFA) to test whether the factor structure identified in the EFA was consistent with responses in another sample, using Time 1 data from the test-retest sample. Second, we conducted a discriminant analysis, a receiver operating characteristics (ROC) analysis and a one-way ANOVA with Welch's procedure and Tukey's post hoc tests. In all these analyses, the 909

community parents (89.3%) that did not have a child with a disability (hereafter referred to as "reference parents") were contrasted with parents from one or both clinical samples. Third, we examined if scores on the PSS correlated in the expected direction (positively) with measures of general perceived stress (PSS-4), anxiety, or depression (HADS-Anx or HADS-Dep).

Finally, we examined whether parents in the ADHD sample who scored in the high ADHD stratum (i.e., reported high ADHD symptom severity) would score higher on the PSS than parents in the low ADHD stratum. After dummy-coding the ADHD variable, we performed linear regressions using the low ADHD stratum as reference.

The amount of missing data was small overall (< 5%). Pairwise exclusion was used for missing demographic data and multiple item scales missing > 10% of items. Results in terms of Cronbach's alpha, ICC, CFA fit indices (including Comparative Fit Index [CFI], Root Mean Square Error of Approximation [RMSEA], and Standardized Root Mean Square Residual [SRMR]), area under the ROC curve (AUC) values, and Cohen's *d* were interpreted in line with recommendations (61, 65-68). The main statistical analyses were performed in IBM SPSS Statistics, version 26. Cohen's *d* was calculated and the CFA was conducted in RStudio, version 2023.06.0+421, using for example the 'lavaan' package (69).

Results
Sum scores, item characteristics, and internal consistency
PSS sum scores for the main samples are reported in Table 3. Details on item means, item variances, corrected item-total correlations, item difficulties and item validities are presented in Table 4. The item difficulties (used to indicate the proportion of parents endorsing a given item at a high level) were higher in the distressed parent sample than in the community sample, with two exceptions (items 2 and 11). Similarly, calculations of item validities (indicative of the discriminant power of each item) revealed that the distressed parent sample scored higher than the community sample on all but two items (items 2 and 11; all *p* < .05; Table 4). Item 2 deviated from all other items in that it showed low item-variance and low item-difficulty across all samples.

In the community sample, the Cronbach's alpha of the PSS was α = .87 and the average inter-item correlation was *r* = .28 (Table 3). In the test-retest sample, the correlation between the test (Time 1: *M* = 38.1, SD = 10.1) and the retest PSS ratings (Time 2: *M* = 37.9, SD = 10.4) was estimated at ICC = 0.66 (95% CI = 0.59 – 0.71).

TABLE 3. PSS Sum Scores and Internal Consistency Estimates

PSS sum scores												
	Community sample (*n* = 1018)				Distressed parent sample (*n* = 653)				ADHD sample (*n* = 562)			
	n	*M*	*SD*	min-max	*n*	*M*	*SD*	min-max	*n*	*M*	*SD*	min-max
Total sample	1018	37.57	10.61	18-73	653	48.81	9.73	27-78	562	41.00	9.60	21-76
Mother ratings	554	36.85	10.41	18-73	555	48.79	9.53	27-78	339	41.62	9.95	22-76
Father ratings	464	38.43	10.79	18-72	97	49.01	10.86	29-73	206	39.80	8.94	21-66
Parent w/o NDC [a]	971	37.25	10.53	18-73	596	48.66	9.71	27-78	521	40.83	9.61	21-76
Parent w/ NDC [a]	47	44.13	10.36	26-61	53	50.51	9.91	31-71	22	42.50	9.23	27-64
Child: daughter	496	37.19	10.90	18-69	211	48.38	10.06	27-76	164	41.23	9.38	21-66
Child: son	521	37.91	10.33	18-73	435	49.00	9.56	28-78	381	40.90	9.71	22-76
PSS internal consistency												
	Community sample (*n* = 1018)				Distressed parent sample (*n* = 653)				ADHD sample (*n* = 562)			
Cronbach's alpha	.87				.82				.83			
Average inter-item correlation (min, max)	.28 (-.21, .71)				.20 (-.13, .63)				.22 (-.16, .62)			

Note. NDC = Neurodevelopmental condition; PSS = Parental Stress Scale; w/ = with; w/o = without
[a] Refers to reports of a parental Attention-Deficit/Hyperactivity Disorder diagnosis and/or an autism spectrum disorder diagnosis

Construct validity

In an EFA of community sample data, we found the internal structure of the PSS to encompass two interpretable factors (Table 5). The factorability of R was good. The final model was identified based on the use of the Kaiser criterion as well as inspections of scree plots and post-rotation item loading tables from multiple test runs (60, 61). It covered 17 of the 18 PSS items and explained 48.8% of the total variance pre-rotation. The only complex (cross-loading) item, number 14, did not load sufficiently on any factor to be included in the model (> .32 but < .45; (70)). The eight-item Factor 1 Lack of Parental Rewards and Role Satisfaction included all reverse-scored (positively phrased) items. It had an Eigenvalue of 5.7 and a Cronbach's alpha of α = .90. The nine-item Factor 2 Parental Stressors and Distress had an Eigenvalue of 3.5 and a Cronbach's alpha of α = .85. The results of a complementary CFA of the EFA-identified two-factor model on test (Time 1) data from the test-retest sample (Model Chi-Square = 366.3, df = 118, p = .000; Supplementary Figure 1) included the following fit indices: CFI = 0.874, RMSEA = 0.079 (90% CI = 0.070-0.088; for H0 ≤ .05 p < .0001, for H0 ≥ .08 p = .449), and SRMS = 0.066.

TABLE 4. PSS Item Characteristics, Including Item Means, Variances (s^2), Difficulties (diffic.), Corrected Item-Total Correlations (r_{it}), and Validities

	Community sample (*n* = 1018)				Distressed parent sample (*n* = 653)				ADHD sample (*n* = 562)				Item validities (Kruskal-Wallis H tests between samples, N = 2,233)	
Items	*M*	s^2	diffic.	r_{it}	*M*	s^2	diffic.	r_{it}	*M*	s^2	diffic.	r_{it}	Test statistic (*df*)	Dunn's post hoc tests
1 (r)	1.59	0.84	0.32	.55	2.34	1.37	0.47	.64	1.85	0.92	0.37	.65	221.01 (2) **	distressed > adhd > community **
2 (r)	1.30	0.52	0.26	.42	1.18	0.22	0.24	.20	1.14	0.17	0.23	.15	15.51 (2) **	community > distressed = adhd *
3	3.50	1.56	0.70	.34	4.74	0.33	0.95	.22	4.17	1.06	0.83	.39	580.82 (2) **	distressed > adhd > community **
4	3.66	1.43	0.73	.22	4.45	1.01	0.89	.07	4.28	0.87	0.86	.22	303.70 (2) **	distressed > adhd > community **
5 (r)	1.39	0.64	0.28	.46	1.49	0.65	0.30	.31	1.48	0.54	0.30	.40	20.42 (2) **	adhd = distressed > community **
6 (r)	1.41	0.63	0.28	.53	1.81	0.84	0.36	.59	1.49	0.54	0.30	.57	133.51 (2) **	distressed > adhd > community **
7 (r)	1.49	0.68	0.30	.39	1.76	1.09	0.35	.37	1.69	0.89	0.34	.30	33.31 (2) **	distressed = adhd > community **
8 (r)	2.00	1.09	0.40	.32	2.76	1.41	0.55	.44	2.21	1.19	0.44	.33	177.57 (2) **	distressed > adhd > community **
9	2.42	1.53	0.48	.58	3.75	1.25	0.75	.35	2.98	1.72	0.60	.52	394.87 (2) **	distressed > adhd > community **
10	2.77	1.59	0.55	.56	3.45	1.61	0.69	.47	2.64	1.61	0.53	.51	142.57 (2) **	distressed > adhd = community **
11	2.42	1.64	0.48	.47	2.08	1.60	0.42	.28	2.20	1.53	0.44	.31	32.10 (2) **	community > distressed = adhd *
12	2.57	1.53	0.51	.60	3.53	1.39	0.71	.44	2.83	1.46	0.57	.51	227.03 (2) **	distressed > adhd > community **
13	1.85	1.31	0.37	.61	3.13	1.74	0.63	.39	2.62	1.52	0.52	.45	405.68 (2) **	distressed > adhd > community **
14	1.50	1.11	0.30	.60	1.70	1.23	0.34	.44	1.31	0.63	0.26	.45	52.18 (2) **	distressed > community > adhd *
15	2.50	1.74	0.50	.39	3.02	1.73	0.60	.39	2.35	1.75	0.47	.37	90.14 (2) **	distressed > community = adhd **
16	2.14	1.41	0.43	.67	2.73	1.69	0.55	.58	1.95	1.13	0.39	.54	129.09 (2) **	distressed > community > adhd *
17 (r)	1.68	0.72	0.34	.56	2.98	1.30	0.60	.57	2.19	1.21	0.44	.60	516.61 (2) **	distressed > adhd > community **
18 (r)	1.38	0.50	0.28	.55	1.91	1.09	0.38	.46	1.61	0.77	0.32	.49	147.35 (2) **	distressed > adhd > community **
Min	1.30	0.50	0.26	0.22	1.18	0.22	0.24	0.07	1.14	0.17	0.23	0.15		
Max	3.66	1.74	0.73	0.67	4.74	1.74	0.95	0.64	4.28	1.75	0.86	0.65		
Median	1.92	1.21	0.38	0.54	2.75	1.28	0.55	0.41	2.19	1.10	0.44	0.45		

Note. Reverse-scored items are denoted with an (r). PSS = Parental Stress Scale.
* = Statistically significant at the p < .05 level (with post hoc tests adjusted for multiple tests), ** = Statistically significant at the p ≤ .001 level (with post hoc tests adjusted for multiple tests)

TABLE 5. Factor Loadings (Item-Factor Associations), Communalities and Eigenvalues for the Two Factors Identified in an Exploratory Factor Analysis of Community Sample data (n = 1018)

	F1	F2	h^2
Factor 1 Lack of Parental Rewards and Role Satisfaction			
5. I feel close to my child(ren) (r)	0.86*	-0.09	0.71
6. I enjoy spending time with my child(ren) (r)	0.86*	-0.01	0.73
2. There is little or nothing I wouldn't do for my child(ren) if it was necessary (r)	0.81*	-0.11	0.62
18. I find my child(ren) enjoyable (r)	0.80*	0.04	0.66
7. My child(ren) is an important source of affection for me (r)	0.77*	-0.12	0.55
1. I am happy in my role as a parent (r)	0.69*	0.13	0.53
17. I am satisfied as a parent (r)	0.60*	0.20	0.46
8. Having child(ren) gives me a more certain and optimistic view for the future (r)	0.50*	-0.01	0.25
Factor 2 Parental Stressors and Distress			
10. Having child(ren) leaves little time and flexibility in my life	-0.03	0.75*	0.55
12. It is difficult to balance different responsibilities because of my child(ren)	0.01	0.74*	0.56
16. Having child(ren) has meant having too few choices and too little control over my life	0.16	0.70*	0.57
9. The major source of stress in my life is my child(ren)	0.06	0.68*	0.48
3. Caring for my child(ren) sometimes takes more time and energy than I have to give	-0.22	0.63*	0.38
11. Having child(ren) has been a financial burden	0.05	0.55*	0.32
4. I sometimes worry whether I am doing enough for my child(ren)	-0.29	0.53*	0.29
13. The behavior of my child(ren) is often embarrassing or stressful to me.	0.28	0.51*	0.41
15. I feel overwhelmed by the responsibility of being a parent	0.03	0.48*	0.23
Item not included in factor interpretation			
14. If I had it to do over again, I might decide not to have child(ren)			
% of Variance	30.65	18.17	
Correlation between factors: r		.25	

Note. Reverse-scored items are denoted with (r). *Coefficients ≥ 0.45. h^2 = extraction communalities; F1 = Factor 1; F2 = Factor 2.

TABLE 6. Correlations[a] Between Scores on the PSS and Related Constructs (General perceived stress, Anxiety, and Depression)

	M	SD	PSS	PSS Factor 1	PSS Factor 2	HADS-Anx	HADS-Dep	PSS-4
Community sample (n = 1018)								
PSS	37.57	10.61	1.00	.69 **	.86 **	.55 **	.56 **	.50 **
PSS Factor 1	12.23	5.10		1.00	.23 **	.32 **	.43 **	.29 **
PSS Factor 2	23.83	7.44			1.00	.52 **	.45 **	.47 **
HADS-Anx	7.08	4.38				1.00	.71 **	.71 **
HADS-Dep	4.84	3.63					1.00	.67 **
PSS-4	5.59	2.94						1.00
Distressed parent sample (n = 653)								
	M	SD	PSS	PSS Factor 1	PSS Factor 2	HADS-Anx	HADS-Dep	
PSS	48.81	9.73	1.00	.82 **	.84 **	.22 **	.30 **	
PSS Factor 1	16.23	5.23		1.00	.39 **	.09*	.24 **	
PSS Factor 2	30.88	5.79			1.00	.30 **	.26 **	
HADS-Anx	12.29	3.87				1.00	.49 **	
HADS-Dep	8.75	3.61					1.00	

Note. HADS-Anx = Hospital Anxiety and Depression Scale Anxiety; HADS-Dep = HADS Depression; PSS = Parental Stress Scale; PSS Factor 1 = PSS Factor 1 Lack of Parental Rewards and Role Satisfaction; PSS Factor 2 = PSS Factor 2 Parental Stressors and Distress; PSS-4 = Perceived Stress Scale four-item version. * statistically significant at the $p < .05$ level (2-tailed), ** statistically significant at the $p < .001$ level (2-tailed). [a] For the sake of consequence, we report Pearson's correlation coefficients for all measures. For parents in the community sample, Spearman rank correlation was run on the positively skewed HADS-D, with similar results.

Next, the ability of the PSS to differentiate between parents expected to report different levels of parental stress was examined. A discriminant analysis using the PSS as predictor yielded an overall classification accuracy of 71.4%, with 62.6% of the distressed parent sample correctly classified as 'cases' and 77.8% of reference parents (i.e., community parents that did not have a child with a disability) correctly classified as 'controls' (Wilks' Λ = 0.75, Chi-Square = 447.8, $p < .001$). The positive predictive value was 66.9% and the negative predictive value was 74.3%. A ROC analysis using the PSS as the predictor and a
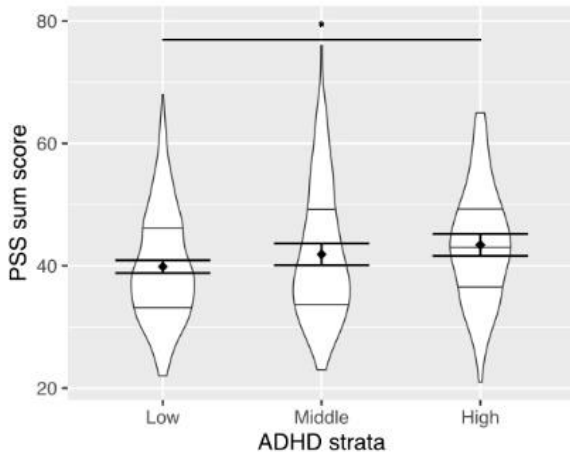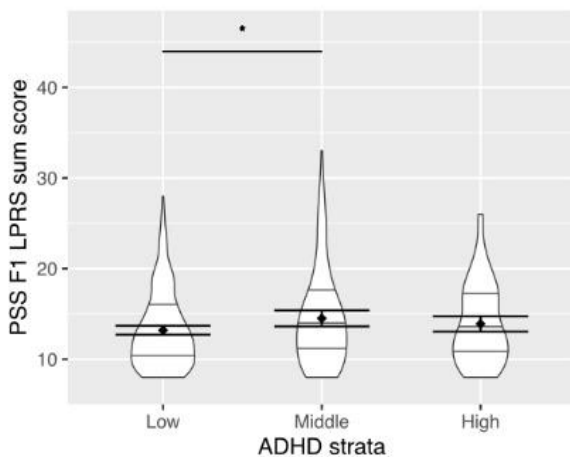
Fig. 1a

Fig. 1b

Fig. 1c

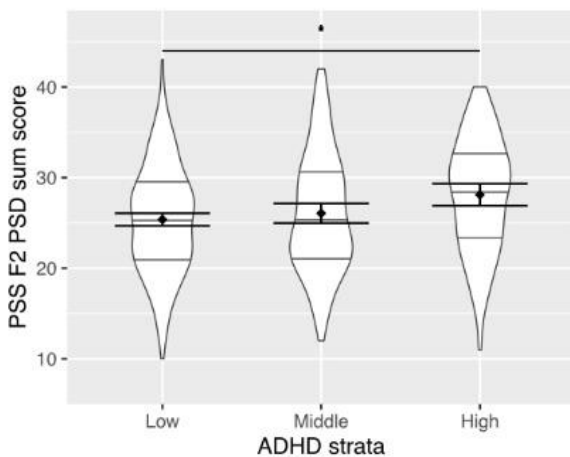FIGURE 1a-1c. PSS Scores for Parents in the Low (n = 294), Middle (n = 144), and High (n = 105) ADHD Strata. *Note. Mean scores are depicted as rombs, surrounded by 95% confidence intervals shown as error bars. Violin plots show the overall spread of scores, with quantiles marked. ADHD = Attention Deficit/Hyperactivity Disorder; PSS = Parental Stress Scale; PSS F1 LPRS = PSS Factor 1 Lack of parental rewards and role satisfaction; PSS F2 PSD = PSS Factor 2 Parental stressors and distress. *p < .05, i.e., significant difference as indicated by linear regression analyses, using the low ADHD strata as reference.*

'case'/'control' categorization as the state variable resulted in an AUC value (summarizing the scale's overall discriminative ability) of .79 (95 % confidence intervals, CI = .77, .82, $p < .001$). A PSS score of 40.5 had a sensitivity of 79.2% and a specificity of 65.9 %, a score of 42.5 had a sensitivity of 72.4 % and a specificity of 71.6 %, and a score of 44.5 had a sensitivity of 65.4 % and a specificity of 76.1 %. A rerun of these analyses using the two PSS factors as predictors did not improve the results (data not shown). A one-way ANOVA (Welch's $F(2, 1319.45)$ = 268.97, $p < .001$) with post hoc tests showed that the distressed parent sample scored higher on the PSS than community reference parents ($d = 1.17$ [95 % CI = 1.06, 1.28], $p < .001$). More specifically, the distressed parent sample scored higher than the ADHD sample ($d = 0.81$ [95 % CI = 0.69, 0.93], $p < .001$) which, in turn, scored higher than reference parents ($d = 0.40$ [95 % CI = 0.29, 0.51], $p < .001$). This pattern of between-sample differences held true also for the two PSS factors ($p < .001$), although the differences were generally smaller, with d varying between 0.35 and 0.84 for Factor 1 Lack of Parental Rewards and Role Satisfaction and between 0.36 and 1.09 for Factor 2 Parental Stressors and Distress.

Then, the association between scores on the PSS and related constructs was examined. In the community sample, the PSS and its two factors were positively correlated with concurrent ratings of general perceived stress (PSS-4), anxiety (HADS-Anx), and depression (HADS-Dep; Table 6). The PSS was also positively associated with ratings of anxiety and depression in the distressed parent sample, although these correlations were consistently less strong (Table 6).

Finally, we examined whether (higher) parental ADHD symptom severity was associated with (higher) stress levels, as measured by the PSS. Of the 543 (96.6%) parents in the ADHD sample who had a complete ASRS screener ($M = 1.72$, $SD = 1.73$), 294 (54.1%) scored in the low ADHD stratum, 144 (26.5%) scored in the middle ADHD stratum and 105 (19.3%) scored in the high ADHD stratum (i.e., at a level equivalent to a positive ADHD screening). A regression analysis revealed that parents in the high ADHD stratum scored higher on the PSS than parents in the low ADHD stratum ($F(2, 540) = 6.00$, $R^2 = 0.02$, $p = .003$), with the average difference in PSS raw scores being 3.56 ($B = 3.56$ [95% CI = 1.42, 5.70], $p < .001$; $d = 0.39$ [95% CI = 0.16, 0.62]; Figure 1a). The same pattern held true for the PSS Factor 2 Parental Stressors and Distress ($F(2, 540) = 7.54$, $R^2 = 0.03$, $B = 2.74$ [95% CI = 1.36, 4.13], $p \leq .001$; $d = 0.45$ [95% CI = 0.23, 0.68]; Figure 1c). For the PSS Factor 1 Lack of Parental Rewards and Role Satisfaction, however, the only statistically significant result was that parents in the middle ADHD stratum

scored slightly higher than parents in the low ADHD stratum ($F(2, 540) = 4.04$, $R^2 = 0.02$, $p = .005$, $B = 1.31$ [95% CI = 0.39, 2.23]; $d = 0.16$ [95% CI = 0.06, 0.39]; Figure 1b). These results did not change when we statistically controlled for parental gender and age, as well as for child gender and age ($p \leq .001$; Supplementary Table 2).

Discussion

In the current study, we evaluated the psychometric properties of the PSS in Swedish, completed by parents of children with and without NDCs. Overall, we found evidence in support of the reliability and the construct validity of the PSS, based on data collected from both community and clinical samples, representing mothers and fathers of children of different ages. Treatment-seeking parents of children with NDCs and other disabilities did, as expected, report higher parental stress than community parents, as measured with the PSS. Moreover, we found that parents who themselves reported high ADHD symptom severity scored higher on the PSS than parents with low ADHD symptom severity. The observed differences were small, but nevertheless provide further support for calls to take parent-level factors such as parental stress and parental ADHD symptomatology into account when assessing the needs of families of children with ADHD/NDCs and related difficulties (9, 17).

The psychometric properties of the PSS

In line with expectations based on previous evaluations of the PSS (e.g., 40, 41, 48, 49), we found that it may indeed serve to reflect variations in parental stress also in a Swedish context. The internal consistency of the PSS was judged to be good, its test-retest reliability was assessed as moderate, and we found plenty of support for its construct validity. Specifically, we observed a pattern of associations where scores on the PSS varied in the expected direction not only with measures of related constructs, but also between groups presumed to experience different levels of parental stress (62). For example, like previous studies, we found significant correlations between the levels of parental stress measured with the PSS and concurrent ratings of general stress, anxiety, and depression (43-46, 49-51, 53). In addition, we found that parents who had a child with a disability and a positive screening for parental stress, anxiety, or depression (i.e., the distressed parent sample) reported higher parental stress than community reference parents who did not have a child with a disability (large effect size). A similar pattern was found at the item-level, where the distressed parent sample endorsed all but two of the 18 PSS items on a higher level than the community sample. These latter results are consistent with

findings within the broader area of parental stress research (8, 9, 13) and thus add to the support for the scale's ability to differentiate between groups of parents with different levels of parental stress. Relatedly, we observed a slightly better classification accuracy than the original study (40) and judged the scale's overall discriminative ability to be adequate. Nevertheless, in observing a risk of missing every fifth parent who had reported parental distress, the results do not warrant the use of the PSS as a screening tool to be used on its own. Rather, our view is that the PSS can serve as a valuable complement in clinical and research assessments.

Using an exploratory approach, we found the internal structure of the PSS to encompass two distinct factors, reflecting two different aspects of parental stress: the perception of Parental Stressors and Distress (Factor 2) and (the presence or) Lack of Parental Rewards and Role Satisfaction (Factor 1). When the two-factor model was tested in an additional sample, the results were mixed but overall judged to indicate a moderate to good fit (with one fit index indicating poor fit, one indicating close fit, one indicating approximate fit by failing both good and poor fit; (65)). Indeed, the model largely resembles the two-factor structures identified in most previous studies (e.g., (45, 48, 49)), reflecting the rewarding as well as the demanding or resource-taxing aspects of being a parent. In doing so, it fits well with the original scale developers' conceptualization of parenthood as a complex experience including sources of both pleasure and strain (40), while also aligning with well-established models linking stress to an imbalance between demands and resources or rewards (2-5).

Since few researchers have defined the PSS as unidimensional, it has been suggested that the scale should be regarded as consisting of two, albeit correlated, subscales (45, 48, 49). However, in our study, the total scale was more strongly correlated with related constructs and had a better classification/discriminative ability than the two factors used separately. Thus, for the time being, we believe that it can be informative to use the total scale together with its two factors; using the total scale to reflect the overall perception of stress and its subscales to provide a more detailed picture of clinically important variations in different aspects of parental stress.

Parental stress in multiplex families

Moreover, we found that parents who screened positively for ADHD did, on average, report higher parental stress than parents with no or few ADHD symptoms. The observed differences were small both in terms of effect size and actual PSS scores. However, the association was found even though the

sample's average ADHD symptom severity was well below the clinical range, and although no more than 4% of the parents had an ADHD diagnosis of their own. In addition, the association was observed despite the fact that *all* parents in the sample were more likely to already report elevated stress levels by virtue of having a child with ADHD (9). Thus, our results lend support to the notion that parental ADHD symptomatology may be associated with increases in stress over and above elevations explained by family factors such as the child's ADHD status (10, 28). This makes sense in light of studies of the cumulative effects of multiple life and parenting stressors (6, 71) and the fact that adults with clinical-level ADHD symptomatology tend to face many co-occurring practical, psychosocial, psychiatric, and parental challenges (31, 32, 72). Future studies into the levels of stress in multiplex families should seek to involve more parents with diagnosed ADHD, experiencing clinically significant levels of functional impairment.

Limitations

Of the main samples, only one (the community sample) was recruited specifically for psychometric evaluation purposes. Our view is, however, that the use of baseline data from clinical samples, representing groups of parents for which the measurement of stress is of direct clinical relevance, has increased the quality of the validation process. In addition, this is an approach that has been successfully used by others (e.g., (48)).

Of note, there are psychometric properties which we did not assess, including the scale's correlation with other measures of the same construct (i.e., parental stress) and responsivity to change. Regarding the first aspect, reference can be made to the original study (40) which reported satisfactory correlations with the PSI. Regarding the second aspect, further evaluations are needed.

In addition, as is often the case in clinical studies on child- and family-related topics (73), the proportion of fathers was considerably smaller in the distressed parent sample (15%) than in the community sample (46%), for which the recruitment was stratified to reach an even gender distribution. This underrepresentation of fathers was even greater in the complementary test-retest sample (3%), whose representativeness is also challenged by the high proportion of parents with university education (85%).

Clinical significance

First, the Swedish version of the PSS was found to have satisfactory psychometric properties and can be useful for assessing parental stress in both clinical and research contexts including families of children

with and without NDCs. Recognizing the impact that high stress can have on both individual and family functioning, we hope that free access to a scale such as the PSS can facilitate efforts to increase knowledge about the complexity of parental stress in NDC families and help identify needs for support to reduce parental stress or mitigate its potential consequences. A better understanding of stress-related needs could, in turn, support interventions to both manage external stressors and strengthen the resources needed to address them - whether through access to additional services or social support (external resource), development of knowledge, coping strategies, or skills (internal resource) or otherwise (1, 4, 18). Future studies will show how the Swedish PSS performs when used as an outcome measure to assess treatment effects - and may help shed more light on the potential of parental stress to influence treatment outcomes (37).

Second, the results support calls to take parent-level factors such as parental stress, ADHD symptomatology, and related needs into account in assessments, intervention planning processes, and research involving families of children with NDCs (9, 12, 17, 18). This is important not least because many NDC interventions are parent-mediated, assuming that parents will succeed in mobilizing the time, energy and effort required to implement recommended training, while simultaneously dealing with their child's needs and possible own challenges.

Conclusions

The PSS is a short, freely accessible, and easily administered self-rating scale that has proven useful for measuring the perception of parental stress in a Swedish context, involving parents of children with as well as without NDCs. By covering both the rewarding and the demanding aspects of being a parent (40), it reflects the common perception of parenthood as presenting both joys and challenges (1). When administering the scale in a sample of parents of children with ADHD, we also found an association between parental ADHD symptom severity and parental stress. To achieve a better understanding of parental stress in multiplex families, future studies should strive to include a larger proportion of parents with clinically significant NDCs than that of the current study.

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