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Karitane Parenting Confidence Scale: measuring parenting self-efficacy in Portuguese mothers during the first year postpartum

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ABSTRACT

Background: The Karitane Parenting Confidence Scale (KPCS) was designed to assess parenting self-efficacy in parents of infants during the first year.

Objective: The aim of this study was to analyse the psychometric characteristics of the KPCS in Portuguese mothers during the first-year postpartum.

Methods: A sample of 383 mothers were recruited at two public outpatient units in Northern Portugal. Mothers completed the KPCS, a sociodemographic questionnaire, and measures of depressive and anxiety symptoms at least one time between two weeks, three, six and 12 months postpartum.

Results: Good fit was found for a factor model with three subscales: parenting, support and child development. The KPCS presented good internal consistency. Regarding the criterion validity of the KPCS, significant effects of mother's age were found on the development subscale and significant associations were found between mother's depressive and anxiety symptoms and the KPCS total scale and subscales. Optimal clinical cut-offs were suggested.

Conclusion: Findings provided evidence on the psychometric characteristics of the KPCS which can be used to assess parenting self-efficacy in Portuguese mothers during the first-year postpartum, possibly identifying mothers with low parenting self-efficacy.

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KEYWORDS
Karitane Parenting Confidence Scale; parenting self-efficacy; mothers; postpartum period; psychometric characteristics; anxiety symptoms

Background

Parenting self-efficacy is defined as the parent's belief about his/her own competence to perform parenting tasks with the infant (e.g. feed, soothe and play with infant) (Bandura, 1997; de Montigny & Lacharité, 2005; Jones & Prinz, 2005; Črnčec et al., 2008). It is an emerging process influenced by individual factors, changing tasks and situational demands (Bandura, 1989).

Parenting self-efficacy is highly related to parenting quality and child development (Sanders & Woolley, 2005; Wittkowski et al., 2017). Higher parenting self-efficacy is related

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to positive parenting, namely higher ability to provide a stimulating, adaptive childcare atmosphere which in turn promotes child psychological and social well-being (Jones & Prinz, 2005). Nonetheless, a bidirectional association between parenting self-efficacy and effective parenting has also been proposed in previous studies. Mothers or fathers who perceive themselves as more able to perform parenting tasks are more likely to be more successful in their parenting. In turn, mothers or fathers who are more successful in their parenting tend to perceive themselves as more able to perform parenting tasks (Kleinman & Reizer, 2017; Vance & Brandon, 2017).

Parenting self-efficacy is a process that is influenced by psychological issues (Bandura, 1997). According to the social cognitive theory (SCT; Bandura, 1997), and reinforced by theories applied to parenting self-efficacy (de Montigny & Lacharité, 2005) four dimensions influence parenting self-efficacy development: enactive mastery experiences (e.g. parity), vicarious experiences (e.g. see others performing parenting tasks), verbal persuasion (e.g. perceived support from the partner and/or others) and physiological and affective mood (e.g. depression and anxiety symptoms). Mothers or fathers with higher depressive and/or anxiety symptoms can experience lack of control and stressful cognitions, which can lead to negative judgements about their own ability to perform parenting tasks (Bandura, 1997). Several studies have linked postpartum depressive and anxiety symptoms with low parenting self-efficacy in mothers (Gross & Marcussen, 2017; O'Neil et al., 2009; Reck et al., 2012). In addition to negative affective mood, SCT (Bandura, 1997) also emphasises that parents' previous experiences of childcare influence parenting self-efficacy. Mother's obstetric and sociodemographic characteristics, such as parity, age and education level, were related to mother's parenting self-efficacy (Pereira et al., 2018; Salonen et al., 2009; Shrestha et al., 2016). Multiparous mothers (Salonen et al., 2009; Shrestha et al., 2016), as well as older mothers or with more years of education reported higher parenting self-efficacy (Pereira et al., 2018; Shrestha et al., 2016).

Given the importance of parenting self-efficacy to both parenting quality and child development (Sanders & Woolley, 2005; Wittkowski et al., 2017), several measures have been developed to assess parenting self-efficacy (Abidin, 1997; Johnston & Mash, 1989), namely the Karitane Parenting Confidence Scale (KPCS; Črnčec et al., 2008), the Parenting Stress Index – Competence Subscale (Abidin, 1997), and the Parenting Sense of Competence Scale – Efficacy Subscale (Johnston & Mash, 1989). The KPCS is the only measure specifically designed to assess parenting self-efficacy in parenting tasks during infancy (Črnčec et al., 2008). This 15-item self-report measure is designed to assess parenting self-efficacy in mothers and fathers of infants aged between 0 and 12 months.

The KPCS was originally developed and psychometrically tested in Australian mothers, and three subscales were identified: parenting, support, and child development (Črnčec et al., 2008). The original version has overall good psychometric characteristics. Moreover, a cut-off score of 39 or lower was suggested to detect mothers with clinically significant low parenting self-efficacy (Črnčec et al., 2008). The psychometric characteristics of the KPCS were tested in Nepalese (Shrestha et al., 2016), Brazilian (Pereira et al., 2018), Danish (Pontoppidan et al., 2019) and in Japanese mothers (Usui et al., 2020). These studies provided evidence of overall good psychometric characteristics in different contexts (Pereira et al., 2018; Pontoppidan et al., 2019; Shrestha et al., 2016; Usui et al., 2020). Nevertheless, most of these studies did not provide evidence regarding the factor structure, the internal consistency of each subscale or the clinical validity of the KPCS. Evidence of

clinical validity was only provided in the Danish study. Nevertheless, a cut-off score was not proposed to screen mothers with low parenting self-efficacy (Pontoppidan et al., 2019).

The aim of this study was to analyse the psychometric characteristics of the KPCS in Portuguese mothers during the first-year postpartum. The KPCS may be a useful tool for both practice and research to assess mother's parenting self-efficacy and to identify mothers with clinically low parenting self-efficacy early in the postpartum period.

Method

Participants and procedures

The sample comprised 383 Portuguese mothers derived from a larger longitudinal study. The study received approval from the Ethical Commissions of the involved institutions: [blinded for peer review]. Women were recruited at the third trimester of pregnancy in the outpatient units of two public hospitals in Northern Portugal, using a systematic random approach. Women were approached by a team researcher while waiting for an antenatal appointment. They were informed about the aims and procedures of the study and invited to participate. Inclusion criteria were being able to read or write Portuguese, singular pregnancy, and without gestational complications. A total of 485 women (90.5%) met the inclusion criteria, agreed to participate and signed an informed consent. Participants completed, in an online platform, a sociodemographic questionnaire at the third trimester of pregnancy (1st assessment wave) and at two weeks postpartum (2nd wave), and the KPCS and measures of depressive and anxiety (state and trait) symptoms at two weeks (2nd wave), three (3rd wave), six (4th wave) and 12 months (5th wave) postpartum. From the 485 participants who completed the first assessment wave, 383 (79.0%) completed the KPCS at least one time between 2 weeks and 12 months postpartum and were included in the study analysis. From these, 317 (82.8%) completed the KPCS at two-week postpartum ($M = 3.80$ weeks, $SD = 2.27$), 315 (82.2%) completed the KPCS at three-month postpartum ($M = 14.44$ weeks, SD = 2.30), 248 (64.8%) completed the KPCS at six-month postpartum ($M = 27.93$ weeks, $SD = 3.06$), and 115 (30.0%) completed the KPCS at 12 months postpartum ($M = 62.78$ weeks, $SD = 14.41$). No differences were noted between the participants that completed the KPCS at all the assessment waves and those who did not, regarding the KPCS scores, as well as mother's and infant's sociodemographic characteristics and mother's depressive and anxiety symptoms. For the test–retest analysis, 115 mothers that completed all the assessment waives were included. For all the remaining analysis, whenever participants responded to more than one KPCS ($n = 317$; 82.7%), only one questionnaire per participant was selected randomly in the SPSS Version 26.0 (SPSS Inc., U.S.A). Since it is expected that parenting self-efficacy would change across the postpartum period, equivalence was ensured in the proportion of responses rate across assessment waves.

Measures

The KPCS. The KPCS (Črnčec et al., 2008) comprises 15 items, scored on a four-point Likert-type scale, ranging from zero (No, hardly ever) to three (Yes, most of the time). KPCS is comprised of three subscales: (1) parenting (sum of eight items), (2) support (sum of five

items), and (3) child development (sum of two items). The overall scale score (sum of 15 items) of the KPCS ranges between zero and 45 and higher scores indicate higher parenting perception of self-efficacy. One item is reverse scored for both the total score and the subscale. After authorisation of the authors of the KPCS, the KPCS items were translated to Portuguese by two researchers, procedures of cultural verification and adaptation for comprehensibility and meaning, and pilot testing were performed with potential end-users, and then the items were back translated to English by another researcher (native English speaker).

KPCS criterion validity. Following SCT (Bandura, 1997) and previous empirical evidence (Pereira et al., 2018; Salonen et al., 2009; Shrestha et al., 2016), mother's and infant's sociodemographic characteristics and mother's depressive and anxiety symptoms were used as indicators of criterion validity. Sociodemographic information was collected using a Sociodemographic Questionnaire. The Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) was used to assess mother's depressive symptoms. It is a 10-item self-report measure scored on a four-point Likert-type scale, that assesses depressive symptoms within the previous seven days. The EPDS Portuguese version presented good internal consistency in mothers (Figueiredo et al., 2018). A Cronbach's alpha of .85 was found in the present study. The State-Trait Anxiety Inventory (STAI-S/T; Spielberger et al., 1983) was used to assess mother's anxiety (state and trait) symptoms. The STAI-S/T is a self-report measure that comprises two 20-item subscales, the state and the trait anxiety, scored on a four-point Likert-type scale. The STAI-S/T Portuguese version presented good internal consistency in mothers (Figueiredo et al., 2018). A Cronbach's alpha of .94 for the STAI-S and .92 for the STAI-T was found in the present study.

KPCS clinical validity. Following the SCT (Bandura, 1997) and the procedures of the validation of the original version of the KPCS (Črnčec et al., 2008), mothers' depressive and anxiety symptoms were used to define the non-clinical and clinical groups – the EPDS (Cox et al., 1987) and the STAI-S/T (Spielberger et al., 1983), using the proposed clinical cut-off scores validated for Portuguese women (EPDS ≥10 and STAI-S/T ≥ 45) with a gold standard interview (Areias et al., 1996; Biaggio et al., 1976).

Analytical strategy

We performed analyses of (1) factor structure, (2) internal consistency, (3) criterion validity, and (4) clinical validity to analyse the psychometric characteristics of the KPCS. The (1) KPCS factor structure was examined using exploratory (varimax rotation, forced to three factors) and confirmatory factor analyses. The chi-square statistic, the comparative fit index (CFI), the root-mean square error of approximation (RMSEA), and the Akaike information criterion (AIC) were analysed to evaluate model goodness of fit (Kline, 2015). Pearson correlations were performed to examine the KPCS subscales intercorrelations. The (2) KPCS (total scale and subscales) internal consistency was examined using Cronbach's alpha coefficient, item – total correlation, mean – item correlation, and test–retest reliability (Pearson correlations). The (3) KPCS criterion validity was examined by testing (1) the effect of mother's and infant's characteristics (all variables displayed in Table 1) on the KPCS (total and subscales) using multivariate and univariate analysis of variance and (2) associations between mother's depressive and anxiety (state and trait) symptoms and the KPCS (total and subscales) using Pearson correlations. The (4) KPCS clinical validity was examined using three

Table 1. Mother's and infant's characteristics.

			Total *N* = 383	
			N	%
Mother	Age	18-25	49	13.1
		26-34	245	65.7
		35-44	79	21.2
	Socioeconomic level	High	220	66.1
		Medium	58	16.2
		Low	73	17.7
	Marital status	Married/cohabiting	307	82.5
		Single/divorced/widow	65	17.5
	Occupational status	Employed	285	76.8
		Unemployed/Household/student	86	23.2
	Years of education	<9	21	5.7
		[9-12]	127	34.2
		>12	223	60.1
	Gestational weeks at birth	<37	13	3.5
		≥37	356	96.5
	Parity	Primiparous	316	83.4
		Multiparous	63	16.6
	Type of birth	Vaginal	242	65.8
		Caesarean	126	34.2
Infant	Sex	Female	195	47.0
		Male	173	53.0
	Birth weight	<2500 g	7	1.9
		≥2500 g	362	98.1
	Birth length	<48 cm	83	22.5
		≥48 cm	286	77.5

Totals do not sum 383 due to missing values in the socio-demographic characteristics.

Receiver Operating Curve analyses: one with EPDS, one with STAI-S, and another with STAI-T. The screening performance of the KPCS to detect mothers with and without clinically significant low parenting self-efficacy during the first-year postpartum was tested considering both the EPDS and the STAI-S/T cut-offs to define the non-clinical (EPDS <10/STAI-S/T < 45) and clinical (EPDS ≥10/STAI-S/T ≥ 45) groups of mothers. Values of sensitivity, specificity, positive predictive (PPV) and negative predictive (NPV) were calculated for the KPCS cut-off scores.

Significance was considered at $p < .05$. The significance threshold was corrected using Benjamini – Hochberg's method (Benjamini & Hochberg, 1995). The analyses of factor structure, internal consistency, criterion validity, and clinical validity were conducted with the combined data of the sample that completed the KPCS at least one time ($N = 383$). The test-retest analyses were conducted in the sample that repeatedly completed the KPCS across four assessment waves ($n = 115$). Post-hoc power calculations using G*Power (Faul et al., 2007) indicated that both the sample sizes are adequate to detect small-to-medium size effects on the statistical analyses (power range =.95–.99). SPSS and SPSS Amos Version 26.0 (SPSS Inc., U.S.A) were used to conduct the statistical analyses.

Results

Participant's characteristics

The sample is representative of Portuguese mothers (National Institute of Statistics, 2016). Most were white (91.3%), married/cohabiting (82.5%), employed (76.8%), delivered with 37 or more weeks of gestation (96.5%), and primiparous (83.4%). More than 50% were aged between 25 and 34 years (65.7%; $M = 30.34$, $SD = 4.99$), were from a high socio-economic level (66.1%), with more than 12 years of education (60.1%) and had a vaginal birth (65.8%). Most the infants did not require resuscitation at birth (91.1%), had normal birth weight (≥2500 g; 98.1%), and length (≥48 cm; 77.5%). The proportion of male and female infants was similar (see Table 1).

KPCS factor structure

The Bartlett's test of sphericity suggested that data are adequate for principal component analysis, $\chi^2(105) = 1241.56$, $p < .001$ (Kaiser–Meyer–Olkin = .82). Three factors were generated, different from the original version, accounting for 45% of the total variance (see Table 2). The first factor explained 28.1% of the total variance with loadings from five items (two, three, four, five and six) measuring child development; the second factor explained 8.7% of the total variance and with loadings from eight items (1, 7, 8, 10, 11, 12, 13 and 14) measuring parenting; the third factor explained 8.3% of the total variance with loadings from two items measuring support (nine and 15; see Table 2).

Considering the differences found in the three-factor structure of the KPCS derived from the exploratory factorial analysis (EFA) when compared with the original structure of

Table 2. Internal consistency of the Karitane Parenting Confidence Scale – Portuguese version: Cronbach's alpha, mean – item correlation, item – total correlation, Cronbach's alpha if item deleted, and descriptive statistics.

Item	MIC	ITC	α IID	*M*	*SD*
Child development (α = .78)	.567			13.66	1.74
2. I can settle my baby[1]		.535	.75	2.88	0.35
3. I am confident about helping my baby to establish a good sleep routine[1]		.441	.79	2.64	0.58
4. I know what to do when my baby cries[1]		.641	.71	2.73	0.49
5. I understand what my baby is trying to tell me[1]		.599	.72	2.64	0.51
6. I can soothe my baby when he/she is distressed[1]		.620	.72	2.78	0.43
Parenting (α = .65)	.384			22.03	2.06
1. I am confident about feeding my baby[3]		.336	.62	2.90	0.36
7. I am confident about playing with my baby[1]		.416	.61	2.91	0.31
8. If my baby has a common cold or slight fever, I am confident about handling this[1]		.397	.61	2.52	0.60
10. I am confident that my baby is doing well[3]		.407	.61	2.86	0.40
11. I can make decisions about the care of my baby[1]		.398	.62	2.92	0.27
12. Being a mother/father is very stressful for me[2]		.324	.68	2.25	0.85
13. I feel I am doing a good job as mother[2]		.466	.60	2.83	0.38
14. Other people think I am doing a good job as mother[2]		.325	.63	2.84	0.39
Support (α = .36)	.220			5.58	0.81
9. I feel sure that my partner will be there for me when I need support[2]		.220	—	2.81	0.53
15. I feel sure that people will be there for me when I need support[2]		.220	—	2.77	0.51
Karitane Parenting Confidence Scale – Portuguese version (α = .77)				41.28	3.55

MIC = mean – item correlation; ITC = Item-total correlation; α = Cronbach's alpha; IID = if item deleted; *M* = Mean; *SD* = Standard Deviation; [1]items comprising the parenting subscale in the original version of the KPCS; [2]items comprising the support subscale in the original version of the KPCS; [3]items comprising the child development subscale in the original version of the KPCS.

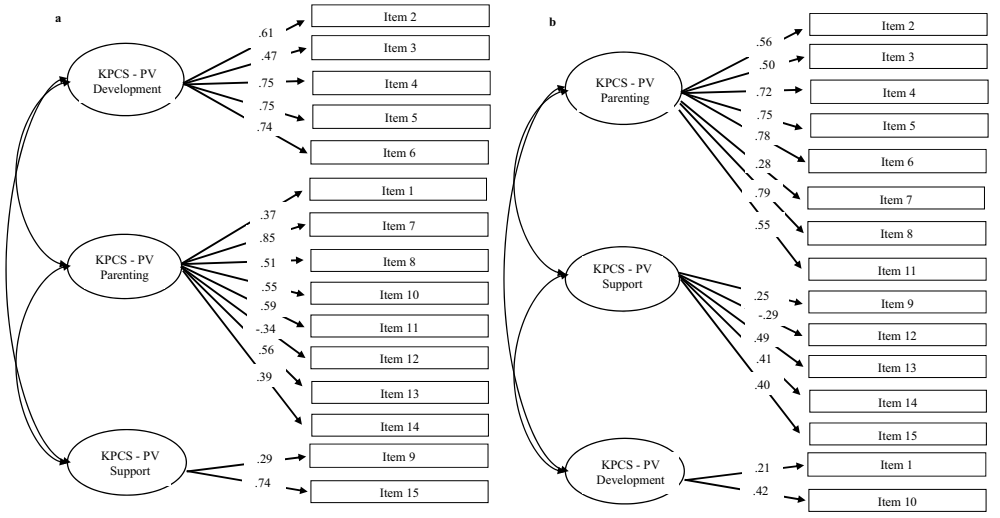


Figure 1. Confirmatory factor analysis of the Karitane Parenting Confidence Scale: (A) model structure extracted from the exploratory factor analysis, $\chi^2(73) = 75.58$, $p = .395$, CFI =.998, RMSEA =.010; (B) model structure of the original version, $\chi2(68) = 80.93$, $p = .135$, CFI =.989, RMSEA =.022.

the KPCS, these two models were tested using confirmatory factorial analysis. Both models revealed good fit indices (model of the original structure, $\chi^2(68) = 80.93$, $p = .135$, CFI =.989, RMSEA =.022, AIC = 214.93; model of the structure derived from the EFA, $\chi^2(68) = 75.58$, $p = .395$, CFI =.998, RMSEA =.010, AIC = 169.58). However, the model of the structure extracted from the EFA revealed better fit indices and an AIC more than 5-point lower. In this model, all items, except item nine, loaded above .30 on the latent factors (KPCS subscales; see Figure 1A), while in the model with the original structure, four items had loadings under .30 in the latent factors (see Figure 1B).

Results revealed significant medium-to-large correlations between the three subscales and the total scale of the KPCS at two weeks, three, six, and 12 months postpartum, r range =.43–.91, all $ps < .001$. Likewise, significant small-to-medium intercorrelations were also found among the three KPCS subscales at all assessment waves, r range =.24–.64, all $ps < .05$ (see Table 3).

KPCS internal consistency

The Cronbach's alpha for the KPCS total scale was .77. Cronbach's alphas for the subscales were higher for child development (α = .78) and parenting (α = .65), than for support (α = .36). Most of the items (93.4%) had an item-total correlation >.30, and the mean item correlation of subscales was >.15 (see Table 2).

Regarding the test–retest reliability of the KPCS, medium size correlations were found between the KPCS total scale scores at two weeks postpartum and the KPCS total scale at three, six, and 12 months postpartum, r range =.51–.62, all $p < .05$. Likewise, small-to-medium size correlations were found between each KPCS subscale at two weeks postpartum and the same KPCS subscale at three, six and 12 months postpartum, r range

Table 3. Correlations between the subscales and total scale of the Karitane Parenting Confidence Scale – Portuguese Version from 2 weeks to 12 months postpartum.

		2 weeks				3 months				6 months				12 months			
Postpartum		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2 weeks	1. child development	1															
	2. parenting	.64***	1														
	3. support	.27***	.34***	1													
	4. KPCS – PV total	.87***	.91***	.49***	1												
3 months	5. child development	.50***	.39***	.27***	.49***	1											
	6. parenting	.45***	.61***	.25***	.59***	.53***	1										
	7. support	.14**	.212**	.67***	.30***	.36***	.29***	1									
	8. KPCS – PV total	.51***	.57***	.42***	.62***	.83***	.87***	.56***	1								
6 months	9. child development	.53***	.47***	.23**	.54***	.48***	.40***	.19	.48***	1							
	10. parenting	.41***	.56***	.24**	.54***	.34***	.53***	.20*	.49***	.55***	1						
	11. support	.26***	.27***	.56***	.36***	.23**	.28***	.68***	.42***	.28***	.39***	1					
	12. KPCS – PV total	.52***	.59***	.36***	.62***	.45***	.54***	.35***	.58***	.82***	.90***	.58***	1				
12 months	13. child development	.32**	.37***	.16	.38***	.46***	.27	.20**	.40***	.50***	.49***	.18	.55***	1			
	14. parenting	.38***	.55***	.04	.48***	.40***	.55***	.05	.51***	.50***	.75***	.07	.68***	.49***	1		
	15. support	.01	.16	.55***	.17	.16	.21*	.75***	.36***	.04	.11	.70***	.20	.24*	.07	1	
	16. KPCS – PV total	.40***	.54***	.20*	.51***	.49***	.51***	.33**	.59***	.52***	.71***	.32**	.72***	.82***	.84***	.43***	1

KPCS – PV = Karitane Parenting Confidence Scale – Portuguese Version.
*$p < .05$; **$p < .01$; ***$p < .001$.

Table 4. Karitane Parenting Confidence Scale – Portuguese Version criterion validity: correlations with mother's depression and anxiety symptoms.

Psychopathological symptoms	KPCS-PV	Child development	Parenting	Support
Depression	−.46***	−.48***	−.25***	−.25***
State anxiety	−.51***	−.52***	−.31***	−.23***
Trait anxiety	−.45***	−.47***	−.24***	−.21***

KPCS-PV = Karitane Parenting Confidence Scale – Portuguese Version.
*p < .05.

=.32–.67, all *ps* < .001. In addition, medium size correlations were found between the KPCS subscales over time (see Table 3).

KPCS criterion validity

Multivariate effects of mother's age were found on the KPCS subscales, *Wilk's Lambda* = 0.93, $F(6,452) = 2.74$, $p = .013$, $p\eta^2 = 0.13$. Specifically, univariate effects of mother's age were found on the KPCS child development subscale, $F(2,228) = 3.29$, $p = .039$, $p\eta^2 = 0.03$. Mothers aged between 26 and 34 years ($M = 14.40$, $SD = 1.10$) presented higher scores in the KPCS child development subscale than mothers aged between 18 and 25 years old ($M = 13.52$, $SD = 1.78$, $p = .042$). No significant effects of other mother's and infant's characteristics were found on the KPCS total scale and subscales.

Small to large correlations were found between mother's depressive and anxiety (state and trait) symptoms and the KPCS subscales, *r* range =.21–.52, all *ps* < .001. Likewise, medium-to-large correlations were found between mother's depressive and anxiety (state and trait) symptoms and the KPCS total scale, *r* range =.45–.51, all *ps* < .001 (see Table 4).

KPCS clinical validity

Regarding the EPDS, the AUC for the KPCS total score was .76, 95% CI [.70, .83], $p < .001$. The optimal balance between sensitivity and specificity was found at cut-off ≤41 (sensitivity = 72.5%; specificity = 67.2%). At this cut-off, 68.1% of mothers were correctly identified as mothers with or without clinically low parenting self-efficacy. Regarding the STAI-S, the AUC for the KPCS total score was .77, 95% CI [.70, .85], $p < .001$. The optimal balance between sensitivity and specificity was found at cut-off ≤41 (sensitivity = 71.5%; specificity = 70.2%). At this cut-off, 70.4% of mothers were correctly identified as mothers with or without clinically low parenting self-efficacy. Regarding the STAI-T, the AUC for the KPCS total score was .77, 95% CI [.70, .86], $p < .001$. The optimal balance between sensitivity and specificity was found at cut-off ≤41 (sensitivity = 70.5% and specificity = 69.2%). At this cut-off, 69.4% of mothers were correctly identified as mothers with or without clinically low parenting self-efficacy (see Table 5 and Figure 2).

Discussion

The results of this study provided evidence on the psychometric characteristics of the KPCS in assessing parenting self-efficacy in Portuguese mothers during the first-year postpartum. A good fit for a three-factor model was found for the KPCS, as proposed in

Table 5. Screening performance of the Karitane Parenting Confidence Scale – Portuguese Version to detect mothers with and without clinically low parenting self-efficacy during the first-year postpartum (%).

	EPDS[a]					STAI-S[b]					STAI-T[c]				
KPCS - PV threshold	Sensitivity	Specificity	PPV	NPV	Accuracy	Sensitivity	Specificity	PPV	NPV	Accuracy	Sensitivity	Specificity	PPV	NPV	Accuracy
37.5	90.4	39.3	22.5	95.5	47.6	89.9	44.7	19.0	96.8	50.4	88.8	42.6	18.1	95.4	49.3
38.5	86.9	47.5	24.4	94.9	53.9	85.9	48.9	19.5	96.0	53.6	84.7	47.5	18.5	95.1	52.5
39.5	83.1	55.7	26.8	94.4	60.2	82.5	61.7	23.7	96.1	64.3	81.4	60.8	22.8	94.3	65.4
40.5	**72.5**	**67.2**	**30.1**	**92.6**	**68.1**	**71.5**	**70.2**	**25.7**	**94.5**	**70.4**	**70.5**	**69.2**	**24.7**	**93.5**	**69.4**
41.5	64.2	73.8	32.3	91.4	72.2	62.9	74.5	26.2	93.3	73.0	61.7	73.7	25.4	92.3	72.0
42.5	54.0	85.2	41.6	90.5	80.1	52.5	85.1	33.7	92.6	81.0	51.7	84.0	32.8	91.5	80.1
43.5	38.0	90.2	43.0	88.2	81.7	36.8	89.4	33.4	90.8	82.8	35.6	88.4	32.3	89.5	81.6

KPCS – PV = Karitane Parenting Confidence Scale – Portuguese version; EPDS = Edinburgh Postnatal Depression Scale; STAI-S = State and Trait Anxiety Inventory – state anxiety scale; STAI-T = State and Trait Anxiety Inventory – trait anxiety scale; PPV = Positive predictive value; NPV = Negative predictive value; [a]EPDS <10 = mothers in the non-clinical group ($n = 313$) and EPDS ≥10 = mothers in the clinical group ($n = 61$); [b]STAI-S < 45 = mothers in the non-clinical group ($n = 326$) and STAI-S ≥ 45 = mothers in the clinical group ($n = 47$); [c]STAI-T < 45 = mothers in the non-clinical group ($n = 316$) and STAI-S ≥ 45 = mothers in the clinical group ($n = 57$); Values in bold represent the most adequate balance between sensitivity and specificity.

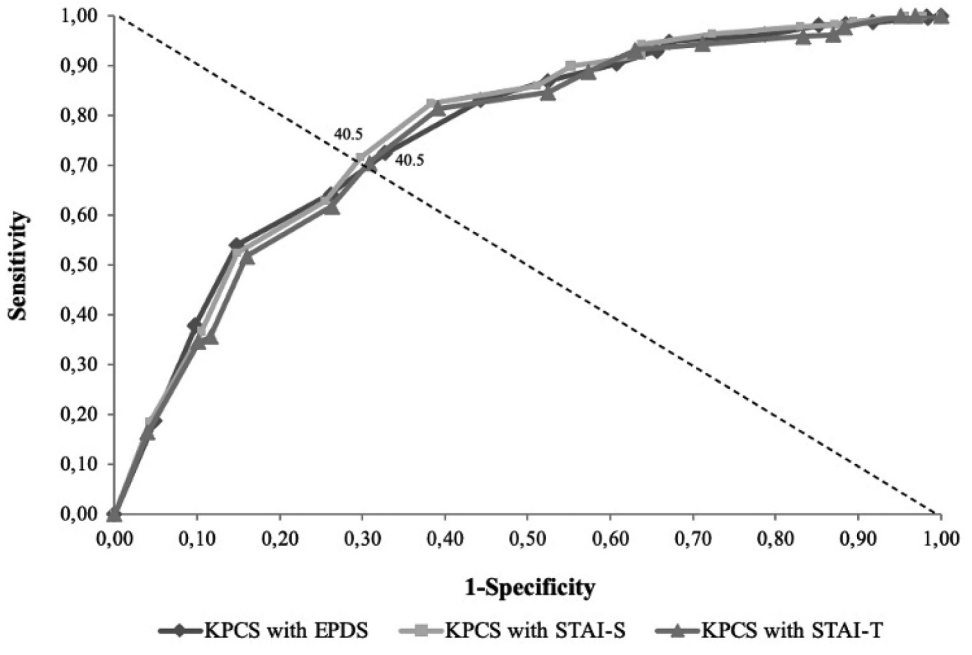


Figure 2. Screening performance of the Karitane Parenting Confidence Scale – Portuguese Version: ROC curve for mothers in the non-clinical group (EPDS <10/STAI-S/T < 45) and mothers in the clinical group (EPDS ≥10/STAI-S/T ≥ 45).

the original version of the KPCS (Črnčec et al., 2008). However, this three-factor model structure is different from the original structure, as 10 items of the KPCS loaded in different subscales. Although different, the KPCS included all the dimensions comprised by the original version of the KPCS. It is important to highlight that the structure model proposed in the original version of the KPCS also presented good fit to our data. Nevertheless, we decided to present and retain this new three-factor structure due to a better fit to our data but also due to its adequacy in relation to the theoretical model. In fact, the item loadings in the new support subscale exclusively assess specific aspects related to social support, whereas in the original structure other items more related to self-perception of parenting and not as well related to social support were included in this subscale (e.g. *other people believe I am doing a good job as mother*). These later items are now included in the parenting subscale, which is conceptually more suitable (Bandura, 1997). This difference may also be explained by sociodemographic differences between the sample in our study and the sample used to develop the original version of the KPCS – e.g. the proportion of mothers with university education is higher in the sample of the original version of the KPCS (Črnčec et al., 2008). On the other hand, language or culture-specific parenting practices may also explain some of these differences. There might be some cultural variability in the parenting styles, practices and norms or even in the cultural expectations of parenting behaviour (Bornstein, 2012). In Portugal, there is a high family involvement and support within the postpartum period, which may influence mother's parenting self-efficacy. Additionally, parenting self-efficacy may be more dependent on the families' beliefs regarding her role as a mother, than in countries with

different family roles in the postpartum period (Bornstein, 2012). The main implication of these differences in the factor structure of the KPCS concerns the cross-country/continent generalisation and comparability of its parenting self-efficacy dimensions. This is the first study examining and comparing the factor structure of the KPCS in a country other than Australia. Studies in other countries could clarify if this is a country/continent-specific issue or a cultural issue.

Regarding the KPCS internal consistency, Cronbach's alpha higher than .70 (α = .77), mean-item correlation higher than .15, and item-total correlation higher than .30 were observed in more than 90% of the cases. The child development subscale presented a Cronbach's alpha value higher than .70 (α = .78) and the parenting subscale presented a value closer to .70. Contrarily, the support subscale presented a Cronbach's alpha value lower than .70 (α = .36). This may be explained by the low number of items comprising this subscale, as a shorter subscale length affects the value of Cronbach's alpha (Field, 2013). As a result, in our study, as in other studies analysing the psychometric characteristics of the KPCS, low values for the internal consistency were found for the shorter subscales (Pereira et al., 2018; Pontoppidan et al., 2019; Črnčec et al., 2008). The social support construct may be underrepresented in the KPCS as a result of the low number of items. Considering that perceived support is a subconstruct of parenting self-efficacy (Bandura, 1997), future studies should explore the possibility of adding items to this subscale. This could improve the assessment of the support construct and thus the internal psychometric quality of the KCPS. The values of internal consistency obtained in this study for the KPCS total scale and subscales are similar to the ones obtained in the original version of the KPCS (Črnčec et al., 2008). Likewise, the values of internal consistency found in the total scale of the KPCS are similar to the ones obtained with Brazilian (Pereira et al., 2018) and in Danish mothers (Pontoppidan et al., 2019), although lower than the ones obtained with Nepalese (Shrestha et al., 2016) and Japanese mothers (Usui et al., 2020).

The KPCS has good test–retest validity. Positive associations were found between the KPCS total score and subscales at two weeks postpartum and the total scores at three, six and 12 months postpartum. The results of test-retest validity are also similar to the results obtained in the original and in the Danish version of the KPCS (Pontoppidan et al., 2019; Črnčec et al., 2008).

Regarding the criterion validity of the KPCS, differences were found on the development subscale of the KPCS according to the mother's age. Mothers aged between 18 and 25 years presented higher scores in the child development subscale of the KPCS than mothers aged between 26 and 34 years old. This result is congruent with the results of the Brazilian version of the KPCS (Pereira et al., 2018), and, according to SCT (Bandura, 1997) may reflect differences in the degree of life experiences, namely vicarious experiences of parenting tasks. Additionally, associations were found between mother's depressive and anxiety (state and trait) symptoms and the KPCS total scale and subscales. These findings are similar to those in other studies that have found an association between postpartum depressive and anxiety symptoms and lower parenting self-efficacy in mothers (Gross & Marcussen, 2017; O'Neil et al., 2009; Reck et al., 2012), and support SCT (Bandura, 1997) regarding the impact of affective mood on parenting self-efficacy.

Regarding the clinical validity, results suggested acceptable classification accuracy for the KPCS (Hosmer & Lemeshow, 2000). The KPCS appeared to perform well in identifying mothers

with and without clinically significant low parenting self-efficacy during the first-year postpartum. Results suggested 41 as the optimal clinical cut-off score of the KPCS to screen Portuguese mothers with low parenting self-efficacy, which is similar to the cut-off proposed in the KPCS original version (cut-off of 39; Črnčec et al., 2008). At the cut-off of 41, acceptable sensitivity and specificity and high negative predictive values were found for the KPCS (Bland, 2000). However, results suggested lower positive predictive values. Positive predictive values may have been influenced by ceiling effects in the KPCS scores, as most Portuguese mothers tend to score high values on the KPCS. Ceiling effects were also reported in the Danish version of the KPCS (Pontoppidan et al., 2019). As reported in the Danish version (Pontoppidan et al., 2019), the KPCS items may not fully capture all the variance of parenting self-efficacy, contributing to increasing ceiling effects.

Limitations and strengths

Although anxiety and depression are theoretically and empirically related to parenting self-efficacy, no gold-standard measures of self-efficacy were used to assess the clinical validity analysis of the KPCS. Different informants should be used in future studies to address the common-method bias (Johnson et al., 2011). Although sample selection was performed using a systematic random procedure, the larger longitudinal cohort had dropout rates, which could have led to selection bias. However, no differences were noted between the participants who completed the KPCS at all the assessment waves and those who did not, regarding the studied variables. On the other hand, this study on the psychometric characteristics of the KPCS has also strengths, as to our knowledge, it is the validation study conducted with the second largest sample (Pontoppidan et al., 2019), and has included the largest range of ages within the first year of life.

Implications for clinical practice and research

The use of the KPCS can benefit perinatal practice and research, as it may allow practitioners and researchers to assess mother and father's parenting self-efficacy over the first year of infant's life. The good clinical validity may potentially provide clinical practitioners with a cost-effective and valid strategy for screening mothers with low parenting self-efficacy as part of routine postnatal care appointments in order to identify Portuguese mothers who may need psychological support during the postpartum period.

For research, the KPCS may be a useful measure to use in studies in the field of parenting self-efficacy in Portuguese mothers during the first-year postpartum. Further studies could explore the possibility of adding items to the support subscale. This could improve the psychometric characteristics of the KCPS. An antenatal version could be designed and tested. Further research Studies can also test the psychometric properties of the KPCS in use with fathers (Pinto et al., 2016).

Conclusion

Findings provided evidence on the psychometric characteristics of the KPCS in assessing parenting self-efficacy in Portuguese mothers during the first-year postpartum, which may be used to identify mothers with low parenting self-efficacy.

Disclosure statement

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