

# A Parenting Model of Satisfaction-Dysfunctions to Evidence Construct Validity and Measurement Invariance of Kansas Parental Satisfaction Scale (KPSS), Greek Version

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## ABSTRACT

The purpose of this study was to examine the construct validity of the KPSS (or KPS) in a sample of 621 Greek parents of children 7-13 years. EFA was carried out to test the KPSS factor structure. Considering the restrictions inherent to KPSS ( $k \leq 3$ ), a CFA was not possible. The KPSS construct validity was cross-validated indirectly with a compound network model of parenting satisfaction-dysfunctions with KPSS and PCQ. We expected a network with three dimensions, one corresponding to parenting satisfaction (KPSS) and two tapping parenting dysfunctions (PCQ). This hypothesis was successfully confirmed with EGA-an exploratory method of clustering dimensions within the network psychometrics framework-and then with an identical compound CFA model of parenting satisfaction-dysfunctions. The KPSS items shaped a distinct cluster (latent variable), negatively correlated with parenting dysfunctions clusters (latent variables), suggesting construct validity. Full strict measurement invariance was successfully established for the compound CFA model of parenting satisfaction-Dysfunctions across child's gender. Internal consistency and split-half reliability were significant. Convergent and Discriminant Validity of KPSS was examined with six parenting scales, including APQ-9 Short and a newly developed questionnaire measuring Positive Psychology Parenting (Nicomachus-Positive Parenting or NPP). A consistent pattern of relationships emerged. Normative data were calculated to help parenting programs using KPSS as an outcome. Significant differences in parenting satisfaction scores were detected but with a small effect size.

**Keywords:** Parenting satisfaction; EFA; CFA; EGA; Measurement invariance; Network psychometrics; KPSS

## INTRODUCTION

Parenting satisfaction directly affects parenting behavior [1]. Likewise, lack of parenting satisfaction can be a problem that indirectly affects children's behavior from infancy to adulthood [2]. Parenting satisfaction is experiencing contentment from:

- the performance of daily childcare tasks [3] (e.g., as described by [4])
- actualizing one's parenting expectations [5].

Additionally, in reviewing relevant scholarship, scholars argue that through the successful performance of daily childcare tasks and actualizing one's parenting expectations [5,6] parenting satisfaction is related to parenting competence, i.e. efficacy in the successfully accomplished parenting tasks, parents perceive parental satisfaction. Parental competence in that sense is closely related to self-efficacy [7], i.e. the beliefs and personal appraisals of parents

about their competence in the parental role [8]. Indeed, parents scoring low on parental satisfaction are most likely to score low on parenting competence and self-efficacy too [9]. This could possibly partly explain how low parenting satisfaction is highly correlated with parental anxiety, and stress [9,10]. On the other hand, social support was reported to positively affect parenting satisfaction and the quality of mother-infant interactions [1,11].

Counselling psychologists, parenting programs, and mental health services for families often work with parents to increase their parenting satisfaction. Parenting satisfaction (also called parenting well-being [12]; is often an outcome in many parenting interventions [13,14]. One of the shorter measures of parenting satisfaction is the Kansas Parenting Satisfaction Scale [15,16].

### Review of the validation studies of the kansas parenting satisfaction scale

Two forms of the KPSS (or KPS) exist [17]. We will focus on the

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version proposed by James et al. [15], in which the first item reads “How satisfied are you with your children’s behavior?” with a 7-point Likert scale.

James et al. (1985) [15] tested KPSS in two samples of parents (N=84 and 187) reporting an internal consistency  $\alpha=0.84$  and  $\alpha=0.85$  (fathers) and 0.78 (mothers). Rho and Schumm (1989) [18] evaluated the internal consistency reliability of the English and Korean KPSS version in an ad hoc sample of 58 Korean mothers and American fathers. For fathers, internal consistency reliability was  $\alpha=0.85$  and 0.89 for the English and Korean versions respectively whereas internal consistency reliability for the mothers for the Korean version was reported  $\alpha=0.93$ . Jeong and Schumm (1990) [19] reported internal consistency reliability  $\alpha=0.92$  for a Korean version tested in 26 mothers. Chang, Schumm, Coulson, Bollman, and Jurich (1994) [20] studied a sample of 379 fathers and mothers reporting internal consistency reliability  $\alpha=0.85$ .

The factor structure of the KPSS was initially evaluated with Exploratory Factor Analysis (EFA) by Rho & Schumm (1989) [18]. The unidimensional structure of KPSS was established with a compound EFA model, i.e. containing the three KPSS items, three items regarding marital satisfaction (KMSS; Schumm, Nichols, Shectman & Grigsby, 1983) [16] and several items measuring satisfaction with one’s career, self, and property. The KPSS items loaded on a distinct factor with loadings ranging from .53 to .90 (fathers) and .78 to .83 (mothers). Likewise, in another study, on fathers [21], the KPSS factor structure was also validated with a compound EFA, by using items from KPSS, KMSS [16], and family of origin satisfaction. A 3-factor solution (parental/family, marital, and family of origin) emerged, supporting the dimensionality of the KPSS further. In a subsequent study, Chang et al. (1994) [20] carried out a compound EFA to the KPSS with a sample of 379 parents, selecting to collapse it with factors from the Family Adaptability and Cohesion Scales III [22], and the Marital Communication Inventory. The KPSS unidimensional structure was validated because the KPSS items loaded on one factor with loadings ranging from 0.67 to 0.89 (fathers) and 74 to 0.85 (mothers). For further details, see DeCato et al. (2003) [17].

### The present study

Given that KPSS was developed more than 35 years ago, the existing validation literature is relatively poor with United States samples and –to the best of our knowledge–inexistent with European samples. Furthermore, the three-item length of the KPSS had serious implications for its validation process [21,18]. Although it is possible to perform an EFA with a minimum of three items [23], previous studies chose to indirectly evaluate the construct validity of KPSS by carrying out only a compound EFA, i.e. by collapsing items from different scales along with the three KPSS items. KPSS items loaded on a single, discrete factor with strong loadings suggesting that KPSS had construct validity.

Moreover, another conclusion from the existing KPSS validation literature attributed to its brevity is the absence of Confirmatory Factor Analysis (CFA) studies. Actually, performing a CFA on KPSS or any three-item structure would be technically unacceptable. CFA models with three items are just identified, therefore fit measures cannot be calculated. The technical limitation to perform CFA also inhibited the evaluation of measurement invariance of the KPSS, therefore existing literature does not contain any measurement invariance evidence either. Crucially, the compound EFA framework was never extended to a compound CFA framework.

Despite the limited validation literature, parenting satisfaction measured with KPSS is a popular outcome to many parenting programs and mental health services for families [24,25,12]. Note also, that all studies on parenting use many questionnaires because parenting is a highly complex and contextual-related construct [26]. This means that reliable, short measures of parenting satisfaction like KPSS are at a premium. Therefore, to fill the gaps of the existing KPSS validation literature, and to offer more brief, reliable tools for the family consulting professionals an up-to-date validation study would need to:

- perform the classic EFA with only the KPSS items that were absent in all previous works
- cross-validate the KPSS structure using modern psychometric techniques like Exploratory Graph Analysis (EGA), within the compound EFA validation logic prevailing the KPSS validation literature
- move this cross-validation further by performing a compound CFA (never tested before)
- test the measurement invariance of the KPSS in this compound CFA framework (never tested before)

EGA is a network psychometrics technique [27]. It evaluates the number of dimensions without a priori assumptions. Moreover, EGA allocates the items to each dimension [28,29]. Crucially, the dimensions emerging from EGA are equivalent to latent variables [28-30].

In the nutshell, within compound EFA framework prevailing KPSS validation literature, the purpose of this study is:

- to evidence the construct validity of the KPSS, Greek version in a sample of parents with children aged 7-13 years with simple (non-compound) EFA
- to test the reliability of KPSS with multiple methods
- to cross-validate the construct validity of KPSS testing a network model of parenting satisfaction-dysfunctions, with EGA and CFA
- to evaluate the measurement invariance of KPSS across child’s gender based on the CFA model of parenting satisfaction-dysfunctions
- to evaluate the Convergent and Divergent validity of KPSS with other measures of parenting practices
- to provide parent consulting professionals with normative data of the KPSS scores
- to examine differences in parenting satisfaction between parent groups

## MATERIAL AND METHODS

### Participants and procedure

Inclusion criteria was to care for at least one child of 7-13 years.

The sample involved 621 Greek parents (75% of females). All the parents (72% biological mothers, 24% biological fathers, 4% other) had at least a child from 7-13 years (M=10.23, SD=2.11, 54% females). Each parent was caring for either one child (32%), two children (48%), three (15%) or more children (5%). More than one in two parents (54%) were from 41-50 years, 28% from 31-40 years, 10% from 51-60, 7% from 21-30 years and 1% were

>60 years. Fifty-nine percent of the participants had a university degree (B.A. 39% or higher 20%). About 1/3 of the parents (36%) had finished high-school, or lower (5%). The vast majority of the parents (96%) were living in the same house with their child. A variation of the network sampling method (APA, 2014) was implemented for the data collection. Specifically, about 100 psychology students during 2018-2019, voluntarily recruited at least 5 non-student, adult participants each ( $M=6.21$ ) from their social environment to participate in an online survey by sending them an e-mail invitation. Students involved in the recruitment process received extra credit in class. Participants received no inducement to participate, they participated voluntarily, and prior to participation they received information about the study goals, the anonymity, and confidentiality of their data. This sample was used before in other studies [31].

## MEASURES

### Kansas parental satisfaction scale

KPSS is a 3-item measure of parenting satisfaction. Items are rated on a 7-point Likert scale (1=extremely dissatisfied, 7=extremely satisfied, Midpoint=Mixed). Possible scores range from 3 (minimum parenting satisfaction) to 21 (maximum parenting satisfaction). Scores  $\leq 15$  suggest low perceived parental satisfaction [17].

Translation procedure. KPSS was translated into Greek with the translation-back-translation method [32]. Cross-check of the original and back-translated versions followed. This cross-check process was iterative-it was repeated 3 times-before eliminating all discrepancies of the original and back-translated versions. This was the final KPSS version, used in this study.

### Alabama parenting questionnaire-short form

APQ-9 is a shorter version of the original APQ-42 [33] containing 9 items (e.g. You praise your child if he/she behaves well) tapping three 3-item factors (Positive Parenting, Inconsistent Discipline, Poor Supervision). APQ measures parenting practices related to child disruptive behaviors. Items are rated on a 5-point scale (1=never to 5=always). Items are Elgar et al. (2007) [26] reported an internal consistency,  $\alpha=0.59-0.84$  in two validating studies. The internal consistency reliability in this study was  $\alpha=0.63$  (positive parenting),  $\alpha=0.68$  (Inconsistent Discipline),  $\alpha=0.61$  (poor supervision), see also Kyriazos and Stalikas [34].

### Nicomachus-Positive Parenting (NPP)

This is a new parenting questionnaire, measuring Positive Psychology Parenting, i.e. positive parenting practices in the context of positive psychology (based on a model proposed by Teligman, 2002). NPP contains 20 items tapping 4 factors: Nurturing Values, Strength Identification and Boosting, Parenting Context and Involvement. Items are rated on a 5-point Likert scale (from 1=Absolutely Untrue to 5=Absolutely True with a midpoint=Can't Say True or Untrue). Score is ranging from 1 (minimal Positive Psychology Parenting practices) to 5 (minimal Positive Psychology Parenting practices). Internal consistency reliability in this study was 0.93 (Total NPP), 0.92 (Nurturing Values), 0.85 (Strength Identification and Boosting), 0.80 (Parenting Context) and 0.75 (Involvement).

### Parenting behaviours and dimensions questionnaire

PBDC is a measure evaluating parental behaviors with 33 items on six factors (Emotional Warmth, Punitive Discipline, Autonomy Support, Permissive Discipline, Anxious Intrusiveness, Democratic

Discipline). All items (e.g. I try to meet my child's desires immediately) are rated on a 6-point scale, from 1 ("never") to 6 ("always"). The PBDQ developers reported an alpha coefficient ranging from 0.66 to 0.83. Internal consistency reliability in this sample was  $\alpha=0.85$  (Emotional Warmth),  $\alpha=0.82$  (punitive discipline),  $\alpha=0.77$  (anxious intrusiveness),  $\alpha=0.79$  (autonomy support),  $\alpha=0.69$  (permissive discipline),  $\alpha=0.76$  (democratic discipline), see also Kyriazos and Stalikas [34].

### Parent Behavior Inventory (PBI)

PBI is a 20-item measure of parenting behavior. Items (e.g. I threaten my child) are divided in 2 factors (supportive/engaged factor, hostile/coercive factor) and they are rated on a 5-point scale, from 1 ("not at all true" or "I do not do this") to 5 ("very true" or "I often do this"). Lovejoy et al., (1999) found an alpha coefficient of 0.83 and 0.81 for the supportive/engaged parenting and hostile/coercive parenting factor respectively. In this sample internal consistency reliability for the supportive/engaged factor was  $\alpha=0.86$ , and for the hostile/coercive factor  $\alpha=0.81$  [34].

### Parent Concerns Questionnaire (PCQ)

This is a short version of the original PCQ [34] with 10 items on 3 factors, instead of 37 items on 3 factors in the original PCQ. PCQ is a measure of parental problems [37]. Items (e.g. I am rather too critical of my children) are rated on a 3-point scale (0=not present, 1=present and 2=severe). Factor 1 (child development problems) contains items 24,25,29, Factor 2 (Parenting Capacity problems) items 34,35,36, and Factor 3 (family/environmental problems) contains items 4,10,11,12 [34]. The original PCQ internal consistency reliability was  $\alpha=0.89$  (Child Development problems), 0.79 (Parenting Capacity problems) and 0.73 (Family/Environmental problems). The alphas of this 10-item structure were 0.76 (Child Development problems), 0.71 (Parenting Capacity problems) and 0.77 (Family/Environmental problems).

### Parental Stress Scale (PSS)

This is a short, 2-factor version of the original PSS with 16 items [34] instead of 20 items in the original to measure perceived stress of the parental experience (e.g. The major source of stress in my life is my child). Items are rated on a 5-point Likert scale (from 1="strongly disagree" to 5="strongly agree"). Factor 1 (Positive Parenting Themes) contains items 1, 5, 6, 7, 8, 17, 18 and Factor 2 (Stressful Parenting Themes) contains items 3, 4, 10, 11, 12, 15, 16. The internal consistency reliability for these 2 factors was  $\alpha=0.87$  for positive parenting themes (reversed scored) and  $\alpha=0.76$  for stressful parenting themes [34]. The original PSS has an alpha coefficient of 0.83 [38].

## DATA ANALYSIS

### Data diagnostics

All the fields of the online survey were set as "required" to minimize missing values. To test the univariate normality assumption, the Kolmogorov-Smirnov, Shapiro-Wilk, Shapiro-Francia, and Anderson-Darling tests were calculated. To test for the multivariate normality assumption, Mardia's multivariate kurtosis and multivariate skewness test, Henze-Zirkler's consistent test, Doornik-Hansen omnibus test, Royston test and Energy test were calculated. Data were examined for outliers Mahalanobis distance criterion.

### Analytic strategy

An EFA followed because  $k=3$  is the minimum acceptable item

limit for EFA [23]. In contrast, the minimum acceptable item limit for CFA is  $k > 3$ , so the KPSS structure was not confirmable with a CFA because the model would be just-identified and there would be no model fit indicators [39]. As an alternative, the EFA factor structure was cross-validated indirectly with a compound Exploratory Graph Analysis [28]. EGA is based on network psychometrics. It evaluates the number of dimensions (or latent variables) tapping a [28], without a priori assumptions. Initially as summarized by Kjellström and Golino (2018) [29] EGA estimates a correlation matrix. Next, a regularized partial correlation matrix is estimated with the graphical lasso [40]. The Extended Bayesian Information Criterion (EBIC; [41] finds a regularization parameter. The EBIC improves the accuracy and interpretability of the generated network [42]. Lastly, the number of clusters are calculated (walktrap algorithm; [43]. In EGA dimensions are represented as clusters of nodes, interconnected by connectors of different weights called edges [28,30]. Edges connecting the nodes represent partial correlations [44]. Edge weights represent the strength of the relationship. Therefore, a network model of parenting satisfaction was hypothesized to generate a distinguishable KPSS cluster (i.e. a dimension equivalent to a CFA latent variable) evidencing the KPSS construct validity further [18,20].

Then, an identical compound CFA was carried out to evaluate EGA model fit and cross-validate the EGA dimensions. It is a standard practice to evaluate the EGA model fit with an identical CFA model [29,45] therefore sample splitting was not possible. Moreover, the two techniques are distinct and different and overfitting was not expected to be a problem. The CFA model was estimated with the WLSMV estimator, a robust estimator for categorical data [39]. The goodness of fit was examined with the RMSEA  $\leq 0.06$ , RMSEA 90% CI  $\leq 0.06$ , CFI  $\geq 0.95$ , TLI  $\geq 0.95$  [39] and the  $\chi^2/df$  ratio [46]. Note that SRMR was omitted because

it is a bad performer with ordinal data [47]. This compound CFA model was subsequently used to test measurement invariance across female children cared for vs. male children (Estimator=WLSMV). The invariance thresholds used were  $|\Delta CFI| \leq 0.01$  [48,49], and  $|\Delta RMSEA| \leq .015$  [49]. The EFA, CFA and measurement invariance results were reported following the guidelines proposed by Kyriazos [50].

Internal consistency reliability was evaluated with Cronbach's alpha [95% CI] [51], Guttman's  $\lambda$  coefficients [52]. Omega coefficients were not evaluated because they are model-based measures [53] and an omega from the compound CFA would not concern the KPSS factor structure. However, to overcome the irrelevancy of the omega coefficient, the greatest-lower-bound estimate of reliability was calculated [54], as an alternative to alpha. It holds that  $glb \geq \alpha$  [53]. Sijtsma (2009) suggested that Cronbach's alpha (1951) [55] does not include the factor structure into the calculation, proposing the use of  $glb$  to overcome this weakness [56].

Spearman's rho correlation coefficient was estimated to test the convergent and discriminant validity with other parenting measures.

Then, normative data were also calculated for the 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentile means. Subsequently, to track differences in parenting satisfaction Kruskal-Wallis rank sum tests with Benjamini & Hochberg correction, scrutinized by the Dunn post hoc test were conducted. The effect size for Kruskal-Wallis rank sum tests was calculated with epsilon-squared statistic with Vargha and Delaney (2000) [57] interpretations. An alpha level of 0.01 was assumed. Data were analyzed with R software (R Development Core Team, 2019) with packages psych [58], MVN [59], EGA [60], and corplot (Wei & Simko, 2017) [61]. The data diagnostics and analytic strategy rationale is summarized in Table 1.

**Table 1:** Description of the Analyses performed.

Analysis	Description	Reasoning
1	Data screening <sup>a</sup>	To Detect Outliers with Mahalanobis distance criterion
2	Univariate Normality Test with Multiple tests	To test for skewness, kurtosis and the univariate normality assumption with Kolmogorov-Smirnov, Shapiro-Wilk, Shapiro-Francia, and Anderson-Darling tests
3	Multivariate Normality Test with Multiple tests	To test for the multivariate normality assumption with Mardia's multivariate kurtosis and multivariate skewness test, Henze-Zirkler's consistent test, Doornik-Hansen omnibus test, Royston test and Energy test
4	Exploratory Factor Analysis (EFA)	To establish KPSS structure
5	Test the compound model of parenting satisfaction-disfunctions with Exploratory Graph Analysis	With $k \leq 3$ , the EFA structure was not confirmable with CFA (Brown, 2015). The EFA factor structure was cross-validated indirectly with a compound Exploratory Graph Analysis (EGA) network model [28] of the KPSS collapsed with two factors of the PCQ questionnaire.
6	Test the compound model of parenting satisfaction-disfunctions with Confirmatory Factor Analysis (CFA)	To evaluate the fit of the EGA model and cross-validate it indirectly with CFA [28]
7	Full measurement invariance of the compound CFA model of parenting satisfaction-disfunctions	To test if the compound CFA model of parenting satisfaction-disfunctions has invariant factors, factor loadings, intercepts, and error variances across parents caring for male and female children (child's gender).
8	Reliability Analysis	To evaluate Cronbach's alpha (95% CI), Guttman's $\lambda$ coefficients and the greatest lower bound estimate ( $glb$ ; Jackson & Agunwamba, 1977) [54].
9	Correlation Analysis	To test Convergent and Discriminant Validity with six parenting tests of positive and non-positive parenting practices. Spearman's rho correlation coefficient was estimated. An alpha level of .01 was assumed.

10	Differences in Parenting Satisfaction Across Groups	To test differences in parenting satisfaction among groups. Kruskal-Wallis rank sum tests with Benjamini & Hochberg correction, and the Dunn post hoc test were conducted with epsilon-squared effect size. An alpha level of .01 was assumed.
11	Normative data	To convert raw scores to percentiles.

Note: Data was analyzed with R software.

## RESULTS

As Data contained no missing values (see the Method section). There were 201 cases for each KPSS item.

### Univariate and multivariate normality and outliers

All univariate and multivariate normality tests were statistically significant,  $p < 0.001$  (Table 2). Out of 621 cases, 13 were multivariate outliers, Mahalanobis distance criterion  $> \chi^2 [3] = 16.27$ ,  $p < 0.001$ . Outliers (Figure 1) did not appear to be keyboard errors. A comparison of the results showed that outliers only marginally impaired results, therefore they were kept in the dataset, final  $N = 621$ .

### Exploratory Factor Analysis (EFA)

Kaiser-Meyer-Olkin measure of sampling adequacy [62] was 0.71, and MSA for items 1-3 was 0.69, 0.78 and 0.67 respectively. Bartlett's test of sphericity [63] was significant,  $\chi^2(3) = 687.06$ ,  $p < 0.001$ . KPSS item correlations ranged from 0.41-0.45, and the largest Squared Multiple Correlation was 0.53 (range 0.39 -0.53). The R determinant was .43 and the anti-image correlation matrix diagonals were  $> 0.50$ . EFA was carried out with all three KPSS items. A single parenting satisfaction factor was extracted, (PAF extraction, oblique rotation), accounting for 61.28% of the total variance. The parallel analysis suggested one factor, as expected. Factor loadings communalities and uniqueness are presented in Table 3. It was not possible to evaluate model fit for  $k \leq 3$ . Regarding factor determinacy [64], the correlation of the score with the factor was 0.92, with a minimum correlation of possible factor score at 0.68 and multiple  $r$  square of scores with factors at 0.84.

### A parenting satisfaction network model with Exploratory Graph Analysis (EGA) and Confirmatory Factor Analysis (CFA)

A network model within the compound framework of the KPSS validation studies would generate a distinguishable KPSS cluster (i.e. a dimension equivalent to a CFA latent variable) evidencing the KPSS construct validity further [18,20]. To test this hypothesis, a compound EGA was carried out. The PCQ items were collapsed with the KPSS items for this EGA network model. PCQ is a measure of parenting problems and lack of competence with the highest, significant negative correlation with KPSS. Additionally, PCQ has been specially developed for use with families at risk to need social work services [37]. Thus, it is a benchmark for professionals working with children and families [37], and the same is true for KPSS.

A three-cuter EGA network model was expected, with three dimensions (latent variables):

- The KPSS cluster with all 3 items (James et al., 1985) [15] indicating parental satisfaction
- Two PCQ clusters of parental and marital dysfunctions (Sheppard, 2010) [37], namely Parenting Competence problems (PCQ items 34, 35, 36) and Family/environmental problems (PCQ items 4,10,11,12).

EGA was carried out with the Glasso estimator [40]. Items were detected as ordinal. A network with three clusters (dimensions) was identified (Figure 2). As hypothesized, the first cluster contained the three KPSS items, the second cluster contained the four PCQ items in the Family/environmental problems factor and the third cluster grouped the three PCQ items in the Parenting Competence problems factor. Moreover, red edges connected

- The nodes of PCQ Parenting Competence Problems cluster with KPSS
- The nodes of the PCQ Family/Environmental problems cluster with KPSS confirming that KPSS and PCQ are negatively correlated (see Table 5)

To evaluate the generated EGA network model, an identical compound CFA model was specified with three correlated factors (Figure 3). The results showed a remarkably good fit,  $\chi^2(32) = 27.30$  ( $p = 0.704$ ),  $\chi^2/df = 0.85$ , RMSEA = 0.000 [90% CI = 0.000, 0.023], CFI = 1.000, TLI = 1.000. The factor loadings and factor intercorrelations of this model are presented in the path diagram (Figure 3).

### Full measurement invariance of the CFA model of parenting satisfaction-dysfunctions

Full measurement invariance was tested to the strict level across child's gender.

The baseline model had a good fit for female children ( $\chi^2(32) = 45.36$ , CFI = 0.950, TLI = 0.929, RMSEA = 0.035 [90% CI = 0.000, 0.057], SRMR = 0.048) and equally good for male child, ( $\chi^2(32) = 37.37$ , CFI = 0.979, TLI = 0.971, RMSEA = 0.024 [90% CI = 0.000, 0.052], SRMR = 0.039. CFI and RMSEA suggested full strict measurement invariance (Table 4).

### Reliability analysis

The internal consistency reliability [55] was  $\alpha = 0.82$  [95% CI = 0.80, 0.85] [51]. If an item was dropped reliability ranged from  $\alpha = .71$  (Item 1) to  $\alpha = .81$  (Item 2). The lower bounds for reliability (Guttman, 1945) [52] were also estimated with Guttman's  $\lambda$  coefficients. Minimum split-half reliability was  $\beta = 0.69$ , Guttman's  $\lambda_2$  and  $\lambda_3$  ( $\alpha$ ) were both 0.82, Maximum split-half reliability  $\lambda_4$  was .74 and Guttman's  $\lambda_6$  was .76. The average split-half reliability was 0.95. Finally, the greatest lower bound estimate [54] was  $glb = 0.84 > \alpha = 0.82$  [53].

### Convergent and discriminant validity

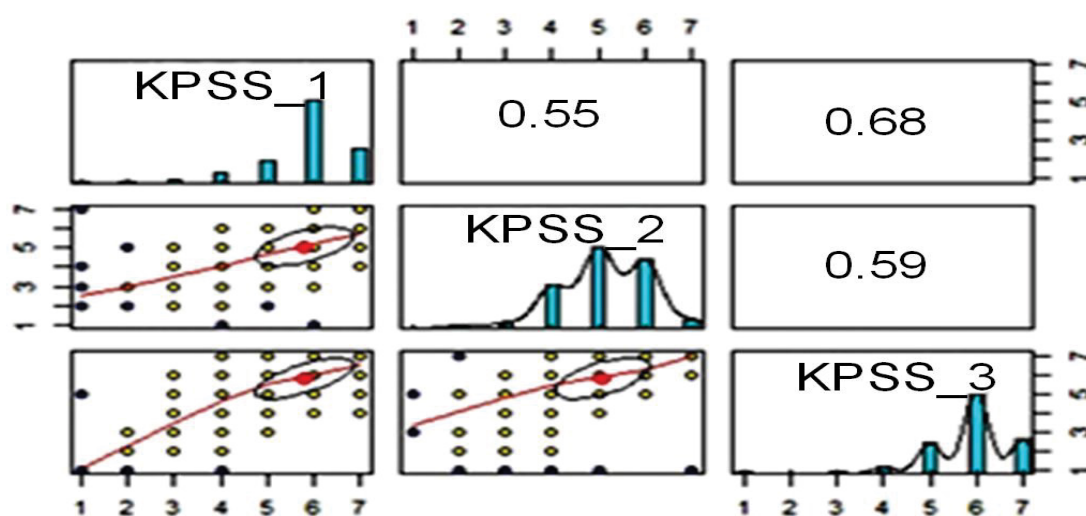
The validation measures were separated into Positive and Non-Positive Parenting Practices (Table 5). KPSS was positively correlated with all the scales in the group of Positive Parenting Practices Scales, at a magnitude from  $rS(619) = 0.14$ ,  $p < 0.001$  (NPP Involvement and PBDQ Anxious Intrusiveness) to  $rS(619) = 0.51$ ,  $p < 0.001$  (PSS Positive Parenting Themes). KPSS was negatively correlated with all the Negative Parenting Practices scales, from  $rS(619) = 0-0.39$ ,  $p < 0.001$  (PCQ Parenting Competence problems) to  $rS(619) = 0-0.15$ ,  $p < 0.001$  (APQ Inconsistent Discipline). The

**Table 2:** Descriptive statistics, univariate normality tests and multivariate normality tests for each kpss item (n=621).

ITEM	Descriptive Statistics				Univariate Normality Tests			
	M	SD	Skew	Kurtosis	KS	SW	SF	AD
ITEM 1	5.81	1.06	-1.62	3.87	0.32	0.79	0.79	48.3
ITEM 2	5.09	1.01	-0.69	0.98	0.22	0.89	0.89	29.01
ITEM 3	5.8	1.07	-1.81	5.19	0.3	0.77	0.77	44.99
Multivariate Normality Tests								
Statistic	M-Skew	M-Kurtosis	Henze-Zirkler	Doornik-Hansen (df)	E-statistic	Royston		
	595.77	36.72	16.94	219.26 (6)	26.86	327.38		

Note. KS=Kolmogorov-Smirnov (Lilliefors), SW=Shapiro-Wilk, SF=Shapiro-Francia, AD=Anderson-Darling, M-Skew=Mardia's Skew, M-Kurtosis=Mardia's Kurtosis

All tests were significant,  $p < 0.001$ .

**Figure 1.** The blue circles represent the outliers for each KPSS item.**Table 3:** EFA Factor Loadings, Communalities ( $h^2$ ) and Uniquenesses ( $u^2$ ) of the KPSS.

N=621	Loadings	$h^2$	$u^2$
ITEM 1	0.8	0.64	0.36
ITEM 2	0.69	0.48	0.52
ITEM 3	0.85	0.72	0.28

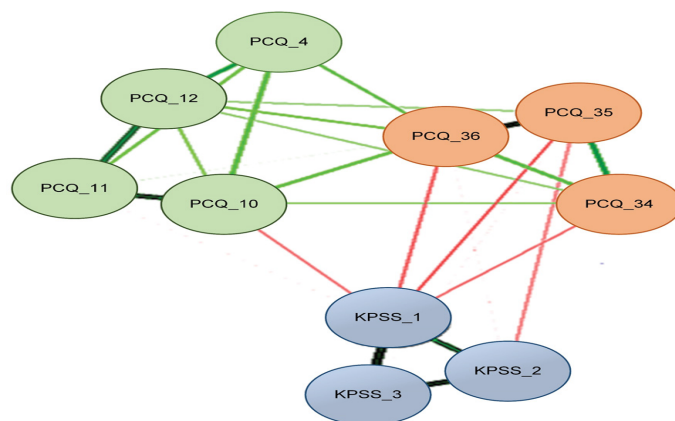
Note: Extraction=Principal Factor (fm="pa") with oblique rotation (rotate="oblimin").

Bivariate Correlations of KPSS with other parenting measures are also graphically presented in Figure 4.

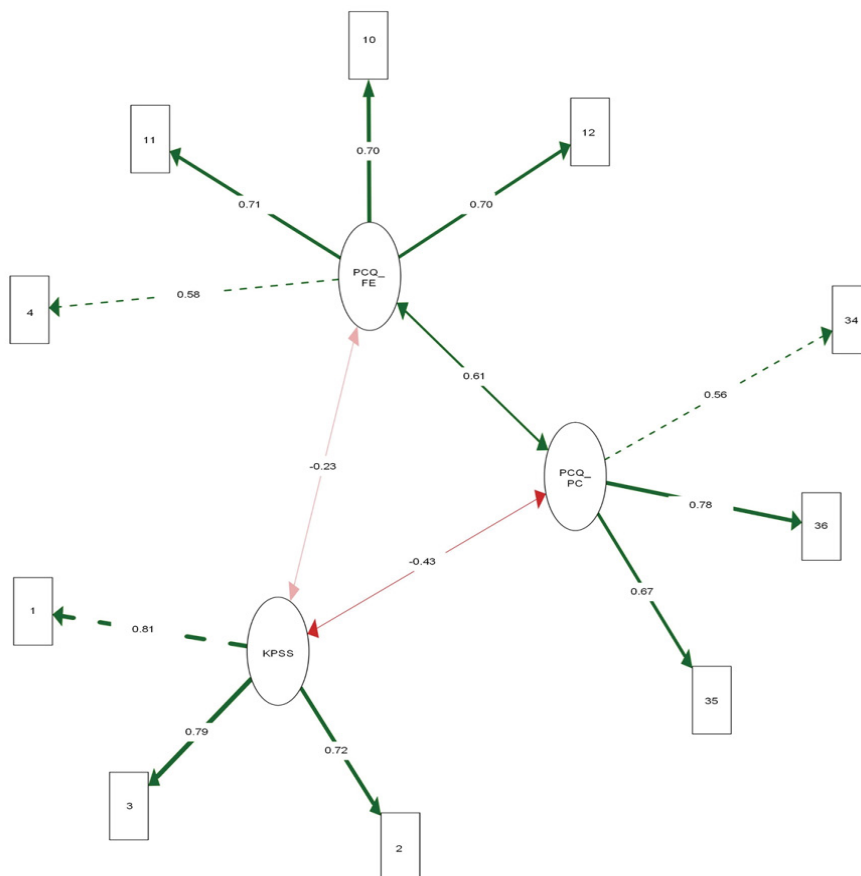
### Differences in parenting satisfaction across groups

Kruskal-Wallis rank-sum tests were calculated to study differences in parenting satisfaction scores. The normality assumption was violated (Shapiro-Wilk,  $p < 0.05$  for all variables tested).

Parenting satisfaction was significantly affected by the caregivers' role,  $\chi^2(6) = 18.99$ ,  $p = 0.004$ , with a small effect size (epsilon square = 0.031). A Dunn post hoc test, showed that non-biological caregivers (Mdn=5.33,  $n = 13$ ) perceived less parenting satisfaction than (biological) fathers (Mdn=5.67,  $n = 149$ ). Parenting satisfaction was also significantly affected by the parents' level of education,  $\chi^2(5) = 17.48$ ,  $p = 0.04$ , with a small effect size (epsilon squared=0.028). A Dunn post hoc test showed a significant difference in the parenting satisfaction of less-educated parents from more educated ones. Specifically, primary school parents (Mdn=6.50) perceived

**Figure 2:** The 3-cluster EGA network generated to cross-validate the KPSS structure. The blue cluster contained the three KPSS items, the green cluster contained the four PCQ items of the Family/environmental problems factor (4,10-12) and the orange cluster grouped the three PCQ items of the Parenting Competence problems factor (34-36). Clusters are equivalent to latent variables. Nodes (circles) in each cluster represent items. Nodes are connected with edges (connectors). The weight and the color of the edges suggest the direction and the strength of partial correlations. The 3 KPSS items (in blue) are arranged in a distinct cluster that is separate from and negatively associated with the PCQ items, suggesting construct validity.

more parenting satisfaction than high-school parents (Mdn=5.67). Junior high-school parents (Mdn=6.00) perceived more parenting satisfaction than high-school parents (Mdn=5.67). However,



**Figure 3:** Path Diagram of a 3-factor model to test the fit of the 3-cluster network generated with EGA for cross-validating the factor structure of the KPSS. PCQ\_FE=PCQ Family/environmental problems factor (4,10-12), and PCQ\_PC=PCQ Parenting Competence problems factor (34-36). Factor intercorrelations in red verify the negative correlation of the KPSS with the PCQ-10 factors.

**Table 4:** Goodness-of-Fit Measures for the 4 Nested CFA Models (1-4) of Parenting Satisfaction-Dysfunctions to Estimate Full Strict Measurement Invariance Across the Parented Child’s Gender (337 Girls and 284 Boys).

Models	$\chi^2$	Df	CFI	RMSEA	Model comparison	$\Delta$ CFI	$\Delta$ RMSEA
1 Configural Invariance	83.71	64	0.962	0.032	-	-	-
2 Full Weak Invariance	85.21	71	0.973	0.025	Model 2 vs 1	0.011	-0.007
3 Full Strong Invariance	89.14	78	0.979	0.021	Model 3 vs 2	0.006	-0.004
4 Full Strict Invariance	96.95	88	0.983	0.018	Model 4 vs 3	0.004	-0.003

Note: Estimator=WLSMV

**Table 5:** Bivariate Correlations (Spearman rho) of KPSS with other Parenting Measures (6 Questionnaires with 20 Subscales), N=621

Positive Parenting Practices	$r^s$	Non-Positive Parenting Practices	$r^s$
APQ-9 Positive Parenting	0.16**	APQ-9 Inconsistent Discipline	-0.15**
NPP Nurturing Values	0.18**	APQ-9 Poor Supervision	-0.20**
NPP Strength Identif. & Boosting	0.24**	PBDQ Punitive Discipline	-0.38**
NPP Parenting Context	0.32**	PBDQ Permissive Discipline	-0.15**
NPP Involvement	0.14**	PCQ Child Development problems	-0.26**
Total NPP	0.33**	PCQ Parenting Competence problems	-0.39**
PBDQ Emotional Warmth	0.41**	PCQ Family/Environm. problems	-0.22**
PBDQ Autonomy Support	0.27**	PBI Hostile/Coercive Parenting	-0.38**
PBDQ Democratic Discipline	0.23**	PSS Stressful Parenting Themes	-0.29**
PBI Supportive/engaged Parenting	0.34**		
PSS Positive Parenting Themes	0.51**		
PBDQ Anxious Intrusiveness	0.14**		

Note. \*\*Significant at  $p < 0.001$  level.

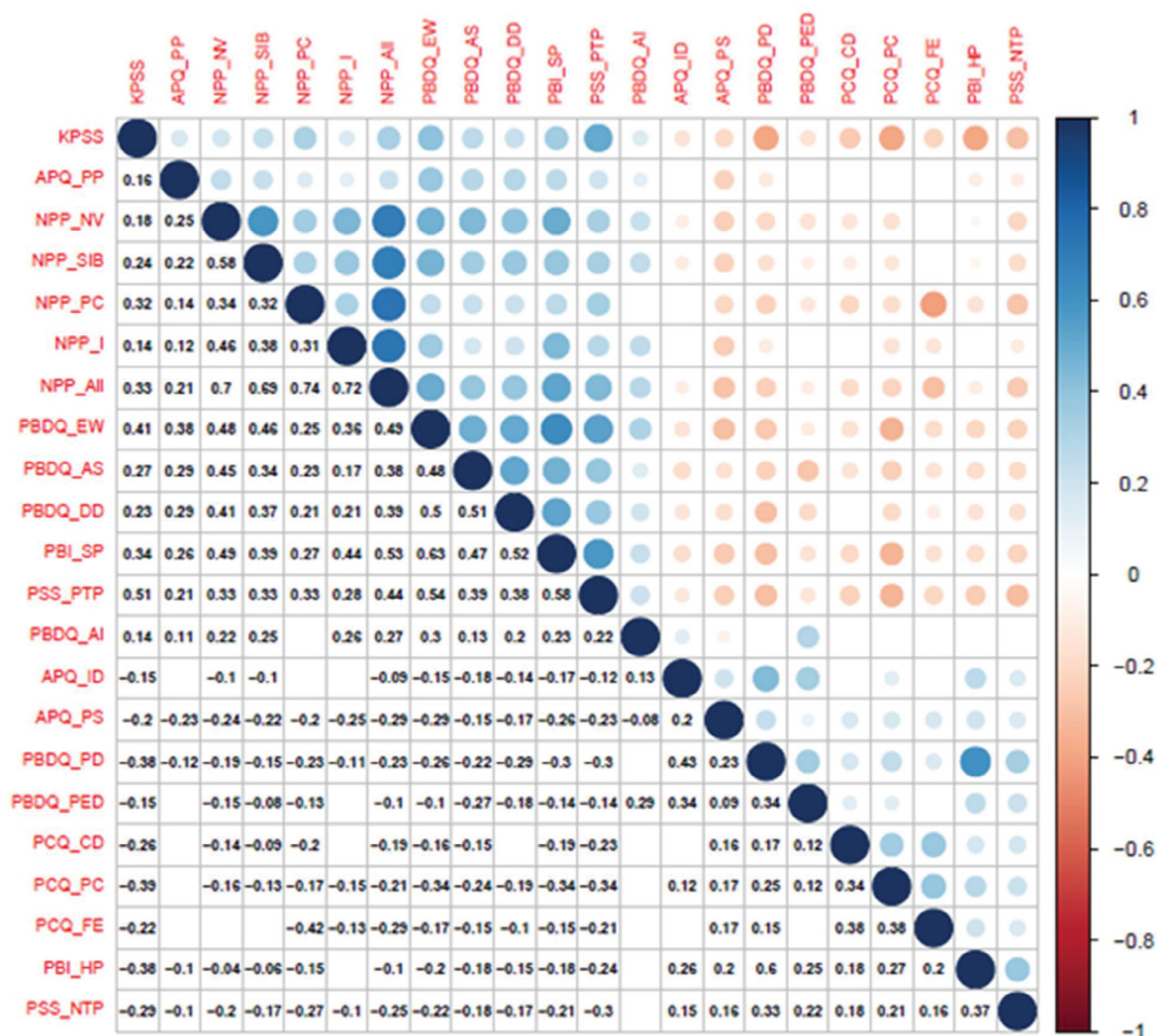


Figure 4: Above the diagonal: Correlogram of the Correlations of KPSS with 6 other parenting scales to evidence Convergent and Discriminant Validity. Positive correlations are displayed in blue and negative in red. The color intensity and the size of the colored circles are proportional to the magnitude of the correlation coefficients (Spearman rho). The color legend in the right presents the colors corresponding to the magnitude of correlation coefficients. Below the diagonal: A correlation matrix corresponding to the correlogram. Blank cells in the correlation matrix signify non-significant correlations [61].

Table 6: Percentiles of the KPSS Mean (1<sup>st</sup> Row) and Total Score (2<sup>nd</sup> Row) for Parents of Children Aged 7-13 Years (N=621).

	Percentile									
	Mdn	M	SD	Range	10 <sup>th</sup>	25 <sup>th</sup>	50 <sup>th</sup>	75 <sup>th</sup>	90 <sup>th</sup>	
Means	5.67	5.56	0.9	1.33 – 7.00	4.67	5.33	5.67	6	6.67	
Total score	17	16.7	2.7	4.00 – 21.00	14	16	17	18	20	

Note. The violation of the normality assumption renders Means unrepresentative of the central tendency of the sample.

parenting satisfaction was not significantly affected by the number of children in the family, the age or nationality of the parent.

**Normative data**

The 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentile means and scores were calculated (Table 6). KPSS mean was M=5.56. 50% of the respondents had M ≤ 5.67 and total score ≤ 17.00 which is above ≤ 15 which is the threshold of low parenting satisfaction [17], and it is comparable to the total score of 17.42 found by the test developers [15]. For each KPSS item the highest mean was observed on item 1 (M=5.81, SD =1.06) and the lowest mean was observed on item 2 (M=5.09, SD=1.01), see Table 2.

**DISCUSSION**

This study attempted to evidence the construct validity of the KPSS [15], Greek version in a sample of parents with children aged 7-13 years with simple non-compound EFA; to evaluate the reliability of KPSS with multiple methods; to cross-validate the construct validity of KPSS testing a network model of parenting satisfaction-dysfunctions, with EGA and CFA; to test the measurement invariance of KPSS across child’s gender based on the CFA model of parenting satisfaction-dysfunctions to evaluate the Convergent and Divergent validity of KPSS with other measures of parenting practices; to calculate normative data of the KPSS scores; to examine differences in parenting satisfaction between parent groups.



KPSS has only three items. Thus, a CFA could not be carried out because the specified model would be just-identified, that is fit measures would not be possible to calculate. Given the above restriction, only a classic EFA was performed to test the KPSS factor structure. A single parenting satisfaction factor explained almost two-thirds of the total variance, mean loading  $>0.70$  and mean communality  $>0.60$ . This unidimensional structure was verified many times for the KPSS [18,20], but indirectly only with a compound EFA.

To overcome the restriction of the just-identified CFA model, this indirect compound validation method, popular in KPSS literature [18,20] was implemented with new validation techniques, never tested before. Specifically, a network model of parenting satisfaction–Dysfunction was specified. This model contained the two measure parenting satisfaction along with 7 PCQ items on two factors to measure parenting competence problems (low self-efficacy) and family problems (low marital satisfaction). Thus, KPSS and PCQ represent two negatively correlated constructs. To test this network model, an EGA was carried out, followed by an identical compound CFA model to evaluate EGA model fit, as it is standard practice [28,29]. As expected, the EGA model generated a separate KPSS cluster with all KPSS items, i.e. a dimension equivalent to a CFA latent variable; [29,30] and two PCQ clusters. The KPSS cluster was negatively correlated with the two PCQ clusters, evidencing the KPSS construct validity further. A similar approach was adopted in other KPSS validation studies using EFA [18,20] with similar results. So, parents scoring low on parental satisfaction are likely to score low on perceived parenting competence [9].

Subsequently, full strict measurement invariance was successfully established for the compound CFA model of parenting satisfaction–Dysfunctions to the strict level. This level is the maximum possible measurement invariance level [65] and it is rarely achieved in practice [66]. This means that parenting satisfaction differences can be examined safely because factor loadings, intercepts, and error variances are invariant across male and female children cared for. Generally, the absence of measurement invariance studies in the KPSS validation literature makes the comparison of the present findings to existing research impossible.

The internal consistency reliability was very good [56], despite the short length of KPSS, and comparable to the findings of other studies either by the KPSS developers or others [18,20]. The lower reliability bounds were also adequate. Finally, the  $g_{lb}$  estimate was greater than Cronbach's alpha coefficient, as hypothesized suggesting robustness.

To examine the convergent and discriminant validity of the KPSS, six parenting questionnaires were used, divided into Positive and Non-Positive Parenting Practices. A clear pattern emerged with highly significant relationships. The KPSS was positively correlated with all the scales in the Positive Parenting Practices group, at a low to marginally high magnitude. Similarly, it was negatively correlated with all the scales of the Non-Positive Parenting Practices group at a low to medium magnitude. Parenting literature supports that dissatisfaction is associated with dysfunctional parenting practices, like Punitive Discipline, Parenting Competence problems, Hostile/Coercive Parenting, and Stressful Parenting [8,9,67].

For each KPSS item, the highest mean was equivalent to the Likert point anchor between “Somewhat satisfied” and “Very satisfied”. This finding is comparable to the results of the test

developers. Normative data were also calculated to help counseling psychologists working with parents and families, KPSS being an outcome measure of many parenting interventions. Differences in perceived parenting satisfaction were also examined.

### Differences in parenting satisfaction across groups

Perceived parenting satisfaction was significantly affected by caregivers' role, however, both groups had small and unbalanced. It was also affected by the parents' level of education. However, the effect size of both differences was small. More specifically, non-biological caregivers perceived less parenting satisfaction than fathers (but not mothers). Moreover, parents who received only primary education perceived more parenting satisfaction than parents who finished high-school. Similarly, parents who finished junior-high-school perceived more parenting satisfaction than parents who finished high school. Generally, parenting literature reports that less-educated parents are more likely to use non-positive parenting practices and domestic violence [68]. A comparative study of families in 30 counties, including Greece [69] suggested that in Greece most families are different from the typical western families because:

- they are supported by a wide network of relatives usually living in proximity, contributing to all family resources (budget or emotional);
- these family networks have the most frequent (everyday) communication of all countries in the study only after Cyprus (Georgas et al., 2006) [69].

These differences may buffer parenting problems and increase parenting satisfaction because social support was reported to positively affect parenting satisfaction and the quality of mother-infant interactions [70]. Within this context, a possible explanation for this finding is that less-educated parents may have (a) lower expectations from their parenting role, (b) higher involvement in family activities, perceiving more satisfaction.

For the interpretation of all the reported results, one must consider that this is a non-probability sample of volunteers similar to snowball sampling [71], and despite sample size adequacy, we do not know how representative it is. Generally, volunteer samples are prone to volunteer bias, i.e. may exhibit different effects from non-volunteers [67]. Whether results could replicate in non-volunteer parents is unknown. To make matters more complicated, in parenting cross-cultural comparisons are challenging because parenting is a highly complex, construct with many contextual, interacting factors at play. Lastly, students were involved in recruiting participants from their social milieu and the effect of this procedure (if any) is unknown. However, the large sample, and the extensive cross-validations, i.e. of the EFA with EGA and consecutively of the EGA with a CFA minimizes capitalization on chance [39], and supports the statistical validity and generalizability of the findings. This means that KPSS. The Greek version is a valid, reliable measure of parenting satisfaction with items that are free of measurement invariance independently of whether a boy or a girl is cared for.

KPSS can be valuable in parenting programs or family interventions as a brief, outcome measure with sound psychometric properties. This work builds on existing evidence that KPSS is a valid and reliable measure of parenting satisfaction to ensure valid measurement. It is also valuable for counseling psychologists, working to increase parenting satisfaction as well as to decrease parenting distress. In

fact, the normative data calculated will hopefully provide a valuable resource for mental health professionals and policy-makers to design more elaborated, targeted-oriented parenting interventions, especially taking into consideration differences found in parenting satisfaction across groups.

Additionally, the strength of this study is some new contributions to KPSS validation literature:

- the test of a compound EGA model (never tested before) which with its exploratory nature strengthens the existing compound EFA i.e. dimensions are not specified like in CFA but emerge like in EFA
- a compound CFA model
- measurement invariance of this compound model (never tested before)

One of the study limitations was the unbalanced sample regarding the gender of participants, with more mothers than fathers. Another limitation was that this sample of parents had children aged 7-13 years (preadolescents). Future research could be an attempt to extend the present findings to other parenting age groups. Similarly, further research could focus on the relationship of KPSS with well-being related constructs like meaning in life [72], flow [73], or flourishing [74] Power et al., 2009 [75-78].

## DISCUSSION

In this research we aimed to assess and compare the early maladaptive schemas and the attitude towards substance abuse in medical students of Shaheed Beheshti University of Medical Sciences, with reliance on cognitive-behavioral models and the studies conducted on early maladaptive schemas and attitude toward substance abuse. We found a significant positive correlation between total Drug Attitude Scale test (DAS) score and schemas of Emotional deprivation, Mistrust/Abuse, Social/Isolation, Defectiveness/Shame, Failure, Incompetence/Dependence, Vulnerability to harm or illness, Enmeshment/Undeveloped Self, Subjugation, self-sacrifice, Emotional Deprivation, Unrelenting standards/Hyper criticalness, Insufficient self/Discipline in medical students.

In clinical subscale, there is a significant positive correlation between the total DAS score and the schemas of Mistrust/Abuse, Social/Isolation, Defectiveness/Shame, Failure, Incompetence/Dependence, Vulnerability to harm or illness, Enmeshment/Undeveloped self, Subjugation, Emotional Deprivation and Insufficient Self /Discipline in medical students. In attitude subscale, there is a significant positive correlation between the total DAS score and the schemas of Emotional deprivation, Mistrust/Abuse, Social/Isolation, Defectiveness/shame, Failure, Incompetence/Dependence, Vulnerability to harm or illness, Enmeshment/Undeveloped self, Subjugation, Self-sacrifice and Insufficient Self/Discipline in medical students. In male medical students, there is a significant positive correlation between the total DAS score and the schemas of Emotional Deprivation, Mistrust/Abuse, Social/Isolation, Defectiveness/shame, Failure, Incompetence/Dependence, Vulnerability to harm or illness, Enmeshment/Undeveloped Self, Subjugation, Self-sacrifice, Entitlement/Grandiosity and Insufficient Self/Discipline.

Moreover, among female medical students, there is a significant positive correlation between the total DAS score and the schemas of Social/Isolation, Defectiveness/Shame, Failure, Incompetence/Dependence, Vulnerability to harm or illness, Unrelenting standards/Hyper criticalness and Insufficient Self/Discipline.

We used the sequential regression test in order to investigate the relationship between sub-scales of the attitude toward substance abuse and the early maladaptive schemas in addition to predict the sub-scales of the DAS test through the early maladaptive schemas.

After analyzing the data, results showed that regression model is a suitable model. Among the early maladaptive schemas, the two Unrelenting standards/Hyper criticalness schema and the Mistrust/Abuse have been able to anticipate the attitude toward addiction. In other words, those who have more of the Unrelenting standards/Hyper criticalness schema and the Mistrust/Abuse schema have more attitudes toward substance abuse.

The results of this study are similar to the results of Dale et al., Brummet et al., Petrocelli et al., Bamber et al., Volubren et al., And Kirsch [38-45]. Schema therapy also seems to be an appropriate approach for treatment of substance abuser patients. For example a high score in Yang's early maladaptive schemas test is related to substance abuse in both clinical and non-clinical samples [48-53]. Substance abusers are suffering from some early maladaptive schemas which can cause tendency to substance abuse [54]. Some studies have defined a correlation between early maladaptive schemas and addiction to addictive substance [55,56].

According to the schema therapy approach a theoretical explanation for this relationship is that one who has early maladaptive schemas chooses a maladaptive response style to prevent experiencing an intense and desperate emotion. Hence, by adopting an avoidant coping style, avoids schema provocative situations such as intimate relationships or job challenges and conducts harmful behaviours [22].

Also, according to the meaning assignment structure theory/schema [23,57-59], which considers cognition and schemas as the origin of processing, and according to the opinion of Moore Winowist and Rector, Segal, and Gamar explaining that individuals sufficiently process the information which is compatible to themselves, but they process the information incompatible with themselves less or worse [26,60].

Therefore, it is concluded that those who have more attitude toward substance abuse, similar to depressed people, eliminate the positive self-referral information from their information processing system so they remember the negative information related to themselves better and more, and this bias is based on the individual's early maladaptive schemas. In the schema therapy approach, there are two approaches about the relationship between schemas and disorders. The first approach is that according to the cognitive pathology model in an emotional disorder status the activation of all early maladaptive schemas is possible [22].

The second approach believes that the nonspecific activation of all schemas does not so much help to predict the type of the emotional disorder. Based on the content specificity hypothesis, anxiety-related cognition is related to the risk and threat evaluation, while the depression-related cognition is related to failure and loss. Anger-related cognition is associated with injustice evaluation and emotional-related cognition is related to achieving benefits evaluation [61-63].

On the other hand, researches have also suggested that the early maladaptive schemas are the maladaptive mechanisms that directly or indirectly lead to psychological disorders [37]. So it can be concluded that the early maladaptive schemas can explain psychological disorders, including the tendency to use substances. Also, according to a cognitive view, it is believed that a large

number of studies, theories, and patterns of cognitive pathology have focused on the explanation of emotional disorders based on the cognitive processing of emotional information [64-66]. It can be concluded that the effect of the early maladaptive schemas on our knowledge leads us to not having an appropriate processing of events, and as a result of this inappropriate processing; individuals tend to psychological disorders and substance abuse.

## CONCLUSION

There is a relationship between early maladaptive schemas and attitude toward substance abuse. This study is a basis for further investigation in the cognitive content of attitude toward substance abuse and addiction this area needs to be more investigated in order to illustrate and draw a picture of the early maladaptive schemas which influence the attitudes toward substance abuse and addiction to clarify etiology and tendency to substance abuse and addiction, which has significant effects on prevention, rehabilitation, and treatment of addiction.

## Implications, Strengths and Limitations

KPSS can be valuable in parenting programs or family interventions as a brief, outcome measure with sound psychometric properties. This work builds on existing evidence that KPSS is a valid and reliable measure of parenting satisfaction to ensure valid measurement. It is also valuable for counseling psychologists, working to increase parenting satisfaction as well as to decrease parenting distress. In fact, the normative data calculated will hopefully provide a valuable resource for mental health professionals and policy-makers to design more elaborated, targeted-oriented parenting interventions, especially taking into consideration differences found in parenting satisfaction across groups.

Additionally, the strength of this study is some new contributions to KPSS validation literature:

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- a compound CFA model;
- measurement invariance of this compound model (never tested before). One of the study limitations was the unbalanced sample regarding the gender of participants, with more mothers than fathers. Another limitation was that this sample of parents had children aged 7-13 years (preadolescents). Future research could be an attempt to extend the present findings to other parenting age groups. Similarly, further research could focus on the relationship of KPSS with well-being related constructs like meaning in life (see Stalikas, Kyriazos, Yiotsidi & Prassa, 2018[72]), flow (e.g. Kyriazos, Stalikas, Prassa, Galanakis, Flora, Chatzilia, 2018)[73], or flourishing (see Kyriazos, Stalikas, Prassa, Yotsidi, Galanakis, Pezirkianidis, 2018)[73].

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