



Interpersonal Mindfulness in Parenting Scale: Testing the Psychometric Properties of a Korean Version

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Abstract

Mindful parenting is the extension of intra-personal mindfulness to inter-personal processes by developing and fostering mindfulness during interactions with a child when acting in the role of a parent. While some empirical evidence points to various benefits of mindful parenting both for the parent and the child, suitable measurement tools for mindful parenting are still being developed, especially for use in non-Western countries such as Korea. The present study involved development of a Korean version of the Interpersonal Mindfulness in Parenting (IM-P) scale using a large sample of Korean parents ($n = 554$) recruited online and a second, replication sample of Korean parents with children attending kindergarten ($n = 283$). Using an iterative approach of exploratory and confirmatory factor analysis guided by conceptual criteria, an 18-item Korean version of the instrument (IM-P-K) met psychometric criteria of classical test theory. Rasch analysis confirmed internal validity of this solution and also produced algorithms to convert the total ordinal-level summary scores to interval-level data. While the reliability of the six individual three-item subscales was only marginally acceptable, the reliability of the total interval-transformed score was excellent. The IM-P-K total scores correlated in expected directions with various other psychological constructs known to be associated with mindfulness, such as self-compassion, depression, psychological well-being, and perceived stress. This 18-item IM-P-K thus offers a suitable self-report instrument to investigate mindful parenting in Korean samples.

Keywords Mindful parenting · Interpersonal mindfulness in parenting scale · Psychometrics · Classical test theory · Rasch analysis · Korean

Introduction

With mindfulness-based interventions (MBIs) having found a place in mainstream psychology (Shapiro 2009), applications of mindfulness are starting to include an increasingly wider scope. While so-called first-generation MBIs have established

a strong evidence base for the utility of mindfulness practice in clinical settings when dealing with psychological distress and maladaptive thoughts, second-generation MBIs focus more on mindfulness techniques for actively participating in various life situations (Van Gordon et al. 2015). One of these areas of application is in MBIs for family therapy (Harnett and Dawe 2012), and studies have explored a variety of potential benefits of developing mindfulness in parenting, such as links with reduced parenting effort (Bluth and Wahler 2011), reduced stress and anxiety (Corthorn and Milicic 2016), or improved parent-child communication (Lippold et al. 2015).

Kabat-Zinn and Kabat-Zinn (1997) described mindful parenting as intentionally bringing nonjudgmental present-moment attention to one's parenting, which then leads to a deeper understanding of one's children and one's self. Mindful parenting is therefore an extension of mindfulness from intra-personal processes to the inter-personal interactions in parent-child relationships (Duncan et al. 2009). It has been described as a fundamental parenting skill or practice that

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fosters everyday mindfulness in the context of parenting (Dumas 2005). Recent empirical research has demonstrated that parents' mindfulness is not only linked to reduced psychological distress in parents (Bögels et al. 2013; Corthorn and Milicic 2016) but also associated with improved parent-child relationship quality (Duncan et al. 2015; Gouveia et al. 2016). Improvements have also been reported for youth internalizing problems such as feelings of sadness and worthlessness (Parent et al. 2016), depression and anxiety (Geurtzen et al. 2015), and youth externalizing problems such as disobedient behaviors, tantrums (Parent et al. 2016), substance use, and risky sex behaviors (Turpyn and Chaplin 2016). Parents with high levels of mindful parenting were rated in behavioral observations as engaging in more positive, consistent, and less harsh parenting behaviors than those who scored low on mindful parenting (Duncan et al. 2015). Mindful parenting was also associated with lower levels of parenting stress, higher levels of authoritative parenting style, and lower levels of authoritarian and permissive parenting styles (Gouveia et al. 2016). Positive associations between mindful parenting and parent-child relational functioning showed the same contextual results in families of children with attention deficit hyperactivity disorder (Singh et al. 2010; Van der Oord et al. 2012), developmental disabilities (MacDonald and Hastings 2010; Singh et al. 2007), and autism spectrum disorders (de Bruin et al. 2015; Hwang et al. 2015; Ridderinkhof et al. 2017).

The findings from the above-mentioned studies suggest that mindful parenting enables parents to be more aware of their automatic reactivity to child problems in parent-child interaction. When parents are mindful, they may be more aware of their own experiences in the context of the relationship that they have with their child. That is, it is suggested that integrating mindful awareness into parenting interactions can allow parents to delay their reactions and fundamentally shift their awareness in order to view their present-moment parenting experience before taking action (de Bruin et al. 2015; Duncan et al. 2009).

Parent intervention studies have often used general mindfulness scales, such as the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006), to measure dispositional mindfulness because of the lack of a rating scale specifically to assess mindfulness in the context of parenting. Apart from the very recently developed Mindfulness In Parenting Questionnaire (MIPQ; McCaffrey et al. 2017), the Interpersonal Mindfulness in Parenting Scale (IM-P; Duncan 2007) is currently the only self-report instrument to measure mindful parenting. Duncan (2007) initially developed and psychometrically validated a 10-item IM-P. The instrument was later extended to a 31-item version with five hypothesized subscales corresponding to five dimensions in the theoretical model proposed by Duncan et al. (2009): listening with full attention to the child (five items), non-judgmental acceptance

of the self and the child (seven items), emotional awareness of the self and the child (six items), self-regulation in the parenting relationship (six items), and compassion for the self and the child (seven items).

The psychometric properties of the 31-item IM-P scale have been reported by de Bruin et al. (2014), Lo et al. (2018), and Moreira and Canavaro (2017) in studies of the Dutch, Chinese, and Portuguese versions, respectively. These psychometric evaluations revealed factor structures that differed somewhat from the theoretical framework suggesting five dimensions of mindful parenting. Using exploratory factor analysis, de Bruin et al. (2014) extracted six factors for the Dutch version, which the authors named as follows: (1) *listening with full attention* (five items), (2) *compassion for the child* (six items), (3) *non-judgmental acceptance of parental functioning* (six items), (4) *emotional non-reactivity in parenting* (five items), (5) *emotional awareness of the child* (three items), and (6) *emotional awareness of the self* (four items). Two items (items 3 and 6) were removed due to their poor psychometric properties, and reliability of this proposed 29-item were overall good. The main difference from the dimensions as proposed by Duncan et al. (2009) was a clear separation of child-oriented items and self/parent-oriented items. The Dutch version of the IM-P correlated positively with optimism in life and FFMQ, and negatively with depression and dysfunctional styles in parenting, attesting to the construct validity of the scale.

The Portuguese version of IM-P (Moreira and Canavaro, 2017) showed a five-factor structure that is similar to the Dutch structure: (1) *compassion for the child* (six items), (2) *listening with full attention* (five items), (3) *emotional awareness of the child* (three items), (4) *non-judgmental acceptance of parental functioning* (seven items), and (5) *self-regulation in parenting* (eight items). The subscales *compassion for the child*, *listening with full attention*, and *awareness of the child* were identical to the subscales of the Dutch IM-P. The *non-judgmental acceptance of parental functioning* subscale was also very similar to the Dutch subscale, which included one more item in the Portuguese version. The *emotional non-reactivity in parenting* subscale and *emotional awareness of self* subscale of the Dutch version were combined into the *self-regulation in parenting* subscale in the Portuguese version. The same two items were excluded as with the Dutch version, and reliability for this scale with 29-item were overall good. The Portuguese version of the IM-P had a significant positive correlation with self-compassion and authoritative parenting style, and a negative correlation with perceived stress, parenting stress, authoritarian and permissive parenting styles, anxiety, and depression, confirming the convergent and discriminant validity of the scale.

The Chinese version of the IM-P was validated using two large samples of parents in Hong Kong. Eight items were discarded during testing of psychometric properties, resulting

in a final set of 23 items grouped into four subscales: (1) *compassion for child* (seven items), (2) *nonjudgmental acceptance in parenting* (six items), (3) *emotional awareness in parenting* (six items), and (4) *listening with full attention* (four items). The latter subscale, *listening with full attention* subscale, was the most similar to those of the other versions: the Chinese version contained items 1, 9, 13, and 19, while the Portuguese and Dutch versions also contained item 24. For *compassion for child*, four of the seven items were also in the equivalent subscales in the Dutch and Portuguese versions, three of six for *nonjudgmental acceptance in parenting*, and four of six for *emotional awareness in parenting*. As with the other language versions, convergent and discriminant validity was tested using various measures known to be correlated with mindfulness. For both the total as well as subscale scores, significant correlations in the expected directions were noted for variables such as mindfulness, family functioning, happiness, well-being, mental health, parental distress, and parent-child dysfunctional interaction.

The purpose of the present study was to develop and validate a Korean version of the IM-P to enable its use in Korean contexts and thus facilitate cross-cultural research on mindful parenting. Given the well-documented differences in parenting styles between the East and the West (Dwairy and Achoui 2010; Vinden 2001), one may expect that the factor structure may approximate more that of the Chinese version (Lo et al. 2018) and less those for the Dutch (de Bruin et al. 2014), English (Duncan et al. 2009), and Portuguese versions (Moreira and Canavaro, 2017). The present study provided a thorough test of the factor structure of the Korean IM-P (IM-P-K) using both a classical test theory approach (exploratory and confirmatory factor analyses), which was later replicated using Rasch analyses. All analyses were conducted on a large sample of parents ($n = 554$) and later replicated on a further sample of 283 parents, which also served as an additional sample to investigate convergent and discriminant validity.

Method

Participants

Two samples of Korean parents participated in this study. The purpose of collecting sample 1 was to assess the psychometric properties of the scale using factor analysis together with assessment of convergent and discriminant validity, while the purpose of assessing sample 2 was to confirm the results using an independent sample and to provide additional analyses of convergent and discriminant validity with other measures. Sample 1 included 554 parents (mothers = 92.2%, fathers = 7.8%) of children aged 1 to 18 (mean age of 10.56 years with standard deviation of 5.17). Participants had a mean age of 42.65 years ($SD = 20.32$; range 25–56) and an average of 1.54

children ($SD = 0.59$; range 1–3). The majority (90.2%) had an education level of bachelor's degree or above. Forty-five percent of the parents were stay-at-home mothers and 55% were working parents. Sample 2 consisted of 283 parents (mothers = 87.6%, fathers = 12.4%) of children aged 3 to 5 (mean age of 4.03 years with standard deviation of 0.82). Participants had a mean age of 37.01 years ($SD = 4.46$; range 27–58). The majority (72.8%) had a bachelor's degree or above.

Procedure

A participant recruitment notice was posted on Korea's popular cooking information site to recruit participants of sample 1. They were invited to participate in a study about mindful parenting and its correlates, and required to be the mother or the father of at least one child aged between 1 and 18 years. The study protocol was provided to the participating parents through an Internet link, which led them to the online questionnaires. For convergent and discriminant validity verification, the Korean versions of the following rating scales were included in addition to the IM-P: parenting style, self-compassion, depression, and life orientation test. The parents were informed that their participation was voluntary and anonymous, and that no identifying information was to be collected. Coffee gift certificates were provided to all parents who completed the questionnaire.

Participants of sample 2 were parents whose children were enrolled in three local kindergartens. Parents were invited to participate in a survey about their parenting in a pre-test phase, which formed the baseline of the intervention study. The study protocol was provided to the participating parents and only those who agreed to the study conditions completed the questionnaire. In addition to the Korean version of the IM-P, the following other scales in Korean were administered to the participants: Five Facet Mindfulness Questionnaire and Psychological Well-Being Scale. As with sample 1, coffee gift certificates were provided to all parents who completed the questionnaire.

Measures

Interpersonal Mindfulness in Parenting Scale–Korean A four-step process was used to translate the English version of the IM-P into Korean, which was named Interpersonal Mindfulness in Parenting Scale–Korean (IM-P-K). First, a mindfulness researcher proficient in both Korean and English translated the English version of IM-P into Korean. Second, a bilingual expert reviewed and revised the initial Korean translation. Third, another bilingual native English speaker with expertise in mindfulness back-translated the IM-P-K without reference to the original English version of

the IM-P. Fourth, experts proficient in English reviewed and compared the back-translated English version of the IM-P-K to the original IM-P for conceptual, semantic, and idiomatic clarity. As in the original IM-P, the IM-P-K consists of 31 items and is rated on a 1 (never true) to 5-point (always true) Likert scale. Items in the Korean version are presented in the same order as in the English-language version. Prior to analyzing the data, all negatively worded items were reverse-coded so that a higher value represented a higher level of mindfulness for all items.

Parenting Style Questionnaire This questionnaire was developed by the Korea Institute of Child Care and Education and used to assess parenting styles of parents (Korea Institute of Child Care and Education 2013). This questionnaire has two subscales, with six items in each subscale: (1) warmth style (e.g., “When my child has a question, I explain it well”) and (2) control style (e.g., “I make my child obey me”). The items are rated on a 5-point Likert scale. Internal consistency has been shown to be good in a study using this scale (Kim 2016), and in the present study, Cronbach’s alpha was also good (α was 0.80 and 0.74 for warmth style and control style, respectively).

Self-Compassion Scale The Korean version of the Self-Compassion Scale (SCS; Neff 2003; Kim et al. 2008) was used to assess self-compassion. The SCS contains 26 items rated on a 5-point Likert scale and measures six components: (1) self-kindness (e.g., “I am kind to myself when I am experiencing suffering”), (2) self-judgment (e.g., “When times are really difficult, I tend to be tough on myself”), (3) common humanity (e.g., “I try to see my failings as part of the human condition”), (4) isolation (e.g., “When I fail at something that’s important to me, I tend to feel alone in my failure”), (5) mindfulness (e.g., “When something upsets me, I try to keep my emotions in balance”), and (6) over-identification (e.g., “When something upsets me, I get carried away with my feelings”). The original SCS has shown adequate reliability (Neff 2003). Likewise, the Korean version of the SCS has demonstrated good psychometric properties, including adequate reliability for all the subscales (Kim et al. 2008). In the present study, Cronbach’s alpha was also good, ranging from $\alpha = 0.73$ to $\alpha = 0.82$.

Center for Epidemiologic Studies Depression Scale Level of depression of parents was assessed by the Korean version of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977; Chon et al. 2001), which can be added to provide a single score (Radloff 1977). This instrument has 20 items rated on a 4-point Likert scale (e.g., “I felt sadness”). Internal consistency has been shown to be good (Chon et al. 2001), and in the current sample, reliability was also good ($\alpha = 0.90$).

Life Orientation Test The Korean version of the Life Orientation Test-Revised (LOT-R; Scheier et al. 1994; Shin et al. 2005) was used to assess level of optimism and pessimism. LOT-R has two subscales, each with three items: (1) optimism (e.g., “I am always optimistic about my future”) and (2) pessimism (e.g., “I don’t expect anything good to happen to me”). Items are rated on a 5-point scale, with higher scores indicating greater optimism and pessimism, depending on which subscale items belong to. Internal consistency has been shown to be good (Shin et al. 2005), and in the present study, Cronbach’s alpha was also good (α was 0.74 and 0.75 for optimism and pessimism, respectively).

Five Facet Mindfulness Questionnaire The Korean version of the FFMQ (Baer et al. 2006; Won and Kim 2006) was used to assess mindfulness. The FFMQ contains 39 items that are organized in a five-factor structure: (1) acting with awareness (e.g., “I find myself doing things without paying attention”), (2) nonjudging of experience (e.g., “I think some of my emotions are bad or inappropriate and I shouldn’t feel them”), (3) observing (e.g., “I pay attention to how my emotions affect my thoughts and behavior”), (4) nonreactivity (e.g., “I perceive my feelings and emotions without having to react to them”), and (5) describing (e.g., “I am good at finding the words to describe my feelings”). Items are rated on a 5-point Likert scale, with higher scores indicating greater mindfulness. Both the original FFMQ and the Korean FFMQ versions have shown adequate reliability, and in the current sample, reliability was also good, with α ranging from 0.77 to 0.91.

Psychological Well-Being Scale The Korean version of the Psychological Well-Being Scale (PWB; Ryff 1989; Kim et al. 2001) was used to assess level of personal well-being of parents. This scale consists of 46 items that are organized in a six-factor structure: (1) self-acceptance (e.g., “I like almost every facet of my personality”), (2) positive relation (e.g., “I have difficulty maintaining intimate relationships with others”), (3) purpose in life (e.g., “I live with my life goal”), (4) environmental mastery (e.g., “It is not easy for me to make life satisfactory”), (5) autonomy (e.g., “Although I disagree with the majority of people, I tend to speak my opinion clearly”), and (6) personal growth (e.g., “Looking back on the past years, I think that I have not made much progress”). The items are rated on a 5-point Likert scale. Internal consistency has been shown to be good (Kim et al. 2001), and in the present study, reliability was also good (α ranging from 0.68 to 0.80).

Perceived Stress Scale Level of perceived stress of parents was assessed by the Korean version of the Perceived Stress Scale (PSS; Cohen et al. 1983; Lee et al. 2012). The 10-item questionnaire is rated on a 5-point Likert scale (e.g., “In the last month, how often have you felt nervous and stressed?”). After reverse coding negative items, it is possible to get an overall

score of PSS by estimating the mean of the 10 items, with higher scores indicating higher level of perceived stress. Internal consistency has been shown to be good (Lee et al. 2012), and in this study, Cronbach's alpha was marginally acceptable level ($\alpha = 0.59$).

Data Analyses

Participants in sample 1 completed their questionnaire online, and a response was required for each item before being able to move on. For sample 2, who completed their questionnaire on paper, there were 12 instances (< 1%), where values were missing. An MCAR test revealed that these were missing at random. For the psychometric analyses, no imputation was required. However, for subsequent calculation of final subscale scores, missing values were imputed using the rounded average of the remaining items of the subscale, provided that no more than one value of the three-item subscale was missing (which was not the case).

Confirmatory factor analysis (CFA) initially tested the suitability of the proposed factor structures of the Chinese (Lo et al. 2018), Dutch (de Bruin et al. 2014), and English (Duncan et al. 2009) versions of the IM-P. However, as none of the models converged, a suitable factor structure for the Korean version was then determined using principal component analysis (PCA). These analyses were conducted with the software package SPSS v.24.0 using promax factor rotation, thus allowing extracted factors to be correlated. CFA was then utilized to test the suitability of the resulting factor solution and also to investigate sources of misfit such as through inspection of modification indices. These analyses were conducted in an iterative fashion and were guided by conceptual criteria such as interpretability of factor solutions and item content as well as knowledge of previously published factor structures.

CFA was conducted using the program LISREL v.8.80 (Jöreskog and Sörbom 1993). Since the data were ordinal in nature, these analyses were conducted with diagonally weighted least squares and polychoric correlations (Flora and Curran 2004). For a fit to be considered excellent, root-mean-square error of approximation (RMSEA) was to be < 0.060, comparative fit index (CFI) > 0.950, and standardized root-mean-square residual (SRMR) < 0.080 (Hu and Bentler 1998). Throughout this manuscript, results of these fit indices will be shown with three decimal places.

As the development of the final factor structure relied partly on conceptual decisions involving examination of content coverage of items (Smith et al. 2000), the suitability of this model was also confirmed using Rasch analysis (Mitchell-Parker et al. 2017)—first with the sample 1 dataset and subsequently with the independent dataset from sample 2. These analyses were conducted using the software RUMM2030 (Andrich et al. 2009). Items that are conceptually related or that share a similar format or wording are often found to

exhibit local response dependency, which may appear as indication of multidimensionality but can be addressed by creating super-items (Lundgren-Nilsson et al. 2013). Lundgren-Nilsson and Tennant (2011) distinguish between local response dependency and local trait dependency. Both can result in multidimensionality, produce misfit to the Rasch model, but only the former can be resolved using super-items. If an overarching latent construct (e.g., mindful parenting) exists, then scale items sharing common variance combined into super-items should satisfy expectations of the unidimensional Rasch model (Lundgren-Nilsson et al. 2013; Mitchell-Parker et al. 2017). Following the approach by Medvedev et al. (2017a), the generation of super-items was informed by an established factor structure (in this case informed by the preceding CFA). This approach has the advantage that ordinal-to-interval conversion tables may be generated for an overall score, provided that the data fit the Rasch model. The development of ordinal-to-interval conversion algorithms has the advantage that researchers are able to use scale summary scores without the need to break assumptions of parametric statistics, which cannot be conducted with ordinal scales. Ordinal-to-interval transformation tables are now also considered the standard for reporting results from Rasch analysis (Leung et al. 2017). These scores can be interpreted as having excellent internal consistency reliability if the person separation index (PSI) exceeds 0.80. The PSI is thus similar to Cronbach's alpha (Tennant and Conaghan 2007).

After a final factor structure of the IM-P-K was confirmed, we conducted reliability tests to examine the internal consistency of the subscales. Finally, we analyzed the correlation between the IM-P-K and other constructs (i.e., parenting style, mindfulness, self-compassion, psychological well-being, life orientation, depression, and perceived stress) to verify discriminant and convergent validity, which was then also investigated by making comparisons between demographic groups.

Results

Exploratory Factor Analysis

Following the Kaiser criterion of extracting number of factors with an eigenvalue above 1.00, PCA generated six factors that explained 53% of the variance in sample 1. Two of these factors consisted of five items each (items 15, 17, 18, 23, and 26; items 1, 4, 9, 13, and 19) and two other factors consisted of seven items each (items 8, 14, 16, 20, 21, 25, and 29; items 5, 22, 24, 27, 28, 30, and 31). These four clusters somewhat resembled the factor structure of the Portuguese version of the instrument (Moreira and Canavaro 2017), although there were substantial differences. The factor structure was also unstable as evidenced by the fact that forcing a five-factor structure instead of the six-factor structure changed the

allocation of a number of items in the above-mentioned factors, which was consistent with the complex cross-loading pattern found for the six-factor solution.

Confirmatory Factor Analysis

Inspection of the four largest factors extracted in the PCA revealed the following meaning clusters: nonjudgmental acceptance of parental functioning (NONJUDG), emotional self-regulation (EMO), compassion for child (COMP), and listening with full attention (LISTEN). Several items clearly did not align with the others semantically and were thus re-assigned. These items were generally those with cross-loadings, such as item 24, which PCA had assigned to the COMP cluster but which also had a cross-loading above 0.40 with LISTEN. Item 20 was discarded due to a translation error. The initial NONJUDG factor subsequently consisted of items 15, 17, 18, 23, and 26; EMO had items 5, 8, 14, 16, 20, 21, and 29; COMP had items 25, 27, 28, and 31; and LISTEN had items 1, 4, 9, 13, 19, and 24. Items 12, 22, and 30 were grouped together as a factor called *noticing child's feelings* (NOTICE), based on semantic relatedness and also informed by the factor solution proposed by Moreira and Canavaro (2017). The remaining items forming the sixth factor were items 2, 3, 6, 7, 10, and 11. The fit indices for this model were marginally acceptable, with RMSEA = 0.085, CFI = 0.915, and SRMR = 0.101.

The subsequent iterative analyses deleted items with low factor loadings, namely, item 5 (0.03), item 20 (0.29), and item 19 (0.37). Item 15 was also deleted due to a low factor loading compared to those of the other items (0.47) coupled with modification indices suggesting error co-variance with other items. The remaining patterns of modification indices revealed complex error co-variances, which could partly be resolved by deleting items that had previously been identified as loading across factors. This included item 25, which was semantically related to compassion but shared the word “upset” with items in the EMO factor. Other items (e.g., item 10) were conceptually unrelated to any other items or were too complex or double-barreled (e.g., item 14). The final model contained six factors with three items each: items 17, 23, and 26 in NONJUDG; items 8, 16, and 21 in EMO; items 27, 28, and 31 in COMP; items 12, 22, and 30 in NOTICE, and items 3, 6, and 11 in a final factor now called *insight into effect of mood* (INSIGHT). The model fit of this final model is shown in Fig. 1. Fit indices indicated a very good to excellent fit, with RMSEA = 0.062, CFI = 0.966, and SRMR = 0.0723.

Rasch Analysis

As the final factor structure was derived involving not only empirical but also conceptual criteria, the tenability of this factor solution was also tested using Rasch analysis—first

with sample 1 and subsequently with sample 2. This involved the creation of six super-items reflecting the above-proposed six-factor structure. While reliability in this fit for sample 1 was already very good with PSI = 0.80, item-trait interaction was significant ($\chi^2(54) = 98.73, p < 0.001$), and there was evidence of significant misfit for NONJUDG as well as local dependency between the super-items NONJUDG and COMP. Combining these super-items resolved these issues. Item-trait interaction was no longer significant ($\chi^2(45) = 38.47, p = 0.74$), and PSI was 0.80. Person location also indicated good targeting of the sample. This factor solution was further replicated by a Rasch analysis using the smaller dataset from sample 2 ($n = 283$). Here, item-trait interaction was also not significant ($\chi^2(54) = 68.44, p = 0.09$), and this time, there was no local dependency between any of the super-items. With a value of 0.71, PSI was slightly lower with sample 2.

As the proposed structure fit the Rasch model, ordinal-to-interval conversion algorithms could be generated (Table 1). This conversion only applies to the total score and permits measurement of an overall mindful parenting construction accounting for individual contribution of each factor to the construct. This measurement will then be at interval level, thus permitting the use of parametric statistics without the need to violate fundamental statistical assumptions. Please note that scores can only be converted for respondents with no missing data. The authors may be contacted for assistance with the conversion of scores.

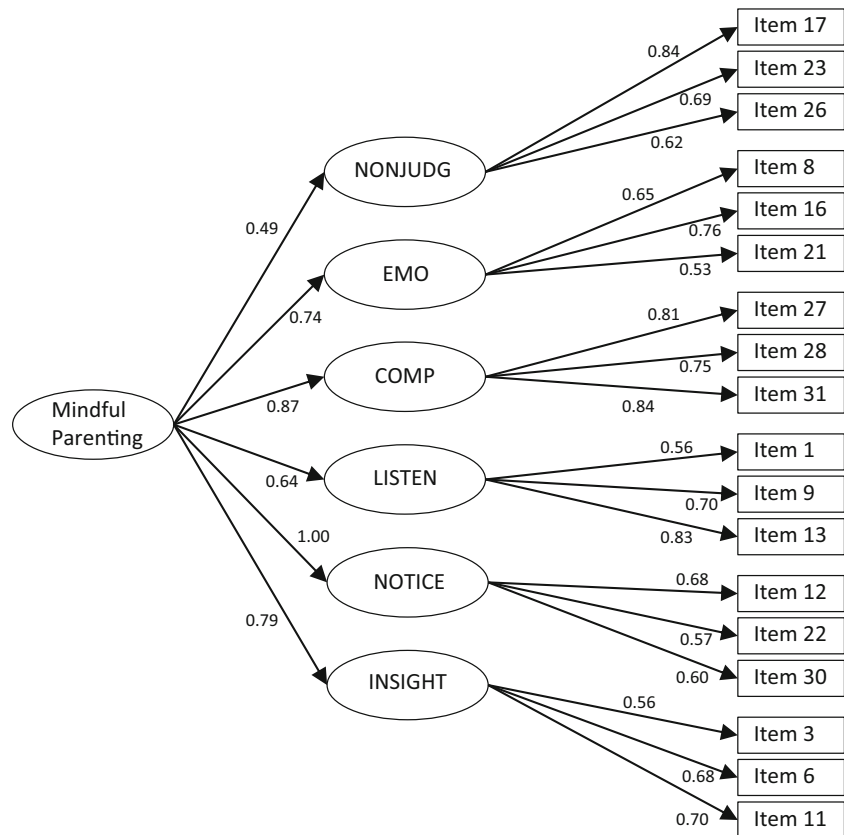
Internal Consistency and Intercorrelations Among Subscales

Cronbach's alphas were computed to estimate reliability. Total IM-P-K score and the six subscales' scores all evidenced acceptable to good reliability. The coefficient for the total score was 0.85, 0.71 for the nonjudgmental acceptance subscale, 0.63 for the emotional self-regulation subscale, 0.78 for the compassion for child subscale, 0.70 for the listening with full attention subscale, 0.58 for the noticing child's feelings subscale, and 0.61 for the insight into effect of mood subscale, indicating an acceptable reliability for this Korean version. Table 2 displays intercorrelations among the six subscales. Each subscale exhibited significant positive correlations with all other subscales and also high correlations with the total IM-P-K score.

Construct Validity

To examine the construct validity of the IM-P-K, correlations with measures of depression, perceived stress, and pessimism were calculated (discriminant validity) as well as correlations with measures of mindfulness, self-compassion, psychological well-being, and parenting style (convergent validity). All correlations between IM-P-K and these constructs are

Fig. 1 Results from fitting the six-factor model of the IM-P-K using CFA



presented in Table 3. As predicted, IM-P-K scores correlated positively with total scores of self-compassion ($r = 0.63$; $p < 0.001$), warmth parenting style ($r = 0.69$; $p < 0.001$), optimism ($r = 0.48$; $p < 0.001$), mindfulness ($r = 0.60$; $p < 0.001$), and psychological well-being ($r = 0.62$; $p < 0.001$), and negatively with control parenting style ($r = -0.14$; $p < 0.001$), depression ($r = -0.46$; $p < 0.001$), pessimism ($r = -0.48$; $p < 0.001$), and perceived stress ($r = -0.45$; $p < 0.001$).

Comparison With Other Language Versions

Table 4 summarizes how the items of the IM-P-K compare to their factor alignment in other language versions. The three items in the IM-P-K subscale *nonjudgmental acceptance of parental functioning* (items 17, 23, 26) are in the subscale *nonjudgmental acceptance of parental functioning* of the Dutch and Portuguese versions; items 27, 28, and 31 of the IM-P-K *compassion for child* subscale are in the *compassion for the child* subscale in the Dutch and Portuguese versions; items 1, 9, and 13 (IM-P-K *listening with full attention*) are in *listening with full attention*; and items 12, 22, and 30 of the IM-P-K *noticing child's feelings* subscale are in *emotional awareness of child* subscale. Items 8, 16, and 21 (IM-P-K *emotional self-regulation*) are in the subscale *emotional awareness of self* of the Dutch version and in *self-regulation in parenting* of the Portuguese version. The IM-P-K subscales

NONJUDG, EMO, COMP, and LISTEN also mapped clearly onto an equivalent structure in the Chinese version (Lo et al. 2018), but not NOTICE and INSIGHT. Unlike the Dutch and Portuguese versions, items from NOTICE (items 12, 22, and 30) did not form a separate subscale. Instead, item 12 was discarded, and items 22 and 30 were assigned to the compassion subscale. The correspondence with the theoretical English version was also less clear, with items in the IM-P-K subscales *nonjudgmental acceptance of parental functioning*, *emotional self-regulation*, and *compassion for child* being part of more than one factor in the English version.

Discussion

The present study provided a thorough psychometric evaluation of the IM-P-K and validated the scale with two independent samples of parents in South Korea. The dual-strategy approach of using both classical test theory methods such as confirmatory factor analysis together with other methods such as item response theory or Rasch analysis has been applied previously to provide a thorough investigation of factor structure and item performance (Galiana et al. 2017; Krägeloh et al. 2016). This dual-strategy approach permits direct comparisons of results with those of other studies that have used classical test theory methods, but it also utilizes the advantages of

Table 1 Ordinal-to-interval conversion table for the total score of the 18-item IM-P-K

Ordinal	Interval		Ordinal	Interval	
	Logits	Scale		Logits	Scale
18	-3.34	18.00	55	-0.10	49.33
19	-2.73	23.97	56	-0.03	49.95
20	-2.35	27.58	57	0.03	50.58
21	-2.13	29.75	58	0.10	51.20
22	-1.97	31.29	59	0.16	51.83
23	-1.84	32.47	60	0.23	52.48
24	-1.75	33.42	61	0.30	53.11
25	-1.66	34.22	62	0.36	53.77
26	-1.59	34.90	63	0.43	54.41
27	-1.53	35.50	64	0.50	55.07
28	-1.47	36.04	65	0.57	55.72
29	-1.42	36.54	66	0.63	56.37
30	-1.37	37.00	67	0.70	57.02
31	-1.33	37.44	68	0.77	57.67
32	-1.29	37.86	69	0.84	58.31
33	-1.24	38.27	70	0.90	58.94
34	-1.20	38.66	71	0.97	59.57
35	-1.16	39.07	72	1.03	60.19
36	-1.12	39.48	73	1.09	60.81
37	-1.07	39.90	74	1.16	61.42
38	-1.03	40.31	75	1.22	62.04
39	-0.99	40.75	76	1.29	62.65
40	-0.94	41.19	77	1.35	63.30
41	-0.89	41.65	78	1.42	63.96
42	-0.84	42.13	79	1.50	64.68
43	-0.79	42.62	80	1.57	65.44
44	-0.74	43.12	81	1.66	66.27
45	-0.69	43.64	82	1.76	67.21
46	-0.63	44.17	83	1.87	68.28
47	-0.58	44.70	84	2.00	69.51
48	-0.52	45.25	85	2.15	70.99
49	-0.46	45.81	86	2.34	72.78
50	-0.40	46.38	87	2.57	75.06
51	-0.34	46.95	88	2.89	78.14
52	-0.28	47.54	89	3.38	82.83
53	-0.22	48.13	90	4.12	90.00
54	-0.16	48.72			

Note that all negatively worded items need to be reverse coded prior to calculating interval-level scores

Rasch analysis, particularly testing internal validity and the production of ordinal-to-interval conversion tables to improve reliability. The present analysis proposed an overarching mindful parenting construct, which can be measured using the interval-converted total score. However, if more detailed information about mindful parenting is required, the ordinal scores of the three-item facets *nonjudgmental acceptance of*

parental functioning, emotional self-regulation, compassion for child, listening with full attention, noticing child's feelings, and insight into effect of mood may be analyzed.

Compared to the theoretical structure of the 31-item IM-P (Duncan et al. 2009) as well as the empirical findings from the 29-item Dutch version (de Bruin et al. 2014), the 29-item Portuguese version (Moreira and Canavaro, 2017), and the 23-item Chinese version (Lo et al. 2018), the 18-item Korean version of the IM-P is clearly shorter. As Cronbach's alpha is correlated with number of items (Peterson 1994), the internal consistency for the three-item IM-P-K subscales is therefore expectedly lower. Cronbach's alpha for the total score indicated excellent reliability, which was also confirmed by PSI obtained through Rasch analysis. In addition to enhanced reliability, the use of the total score also allows increased precision through the availability of the ordinal-to-interval conversion algorithm provided here. A total score may also be easier to analyze and interpret as it reduces the chance of type-1 error rate inflation when conducting multiple tests with the six individual subscale scores.

As shown in Table 4, the 18 items of the IM-P-K are generally in alignment with the factor solutions of the Dutch (de Bruin et al. 2014) and Portuguese (Moreira and Canavaro, 2017) versions of the IM-P. There was less overlap with the original theoretical English version, with items in the IM-P-K subscales not clearly mapping to a structure that may be considered equivalent. However, it is only in the English version that two of the IM-P-K items (items 3 and 6) were retained, while they were discarded in the Dutch and Portuguese versions. In the Dutch and Chinese versions, items 3 and 6 were discarded in the early stages of psychometric testing, while the items initially formed a separate two-item subscale called *emotional awareness of the self* in the Portuguese version, but the items were later discarded due to low inter-item correlation. Additionally, the English version contained all the IM-P-K *noticing child's feelings* and IM-P-K *insight into effect of mood* items in one subscale called *emotional awareness of self and child*, while the Korean version separated these into two. The distinction of these two factors could be justified from the meaning of the items as the three items in the IM-P-K *noticing child's feelings* factor (items 12, 22, and 30) are about noticing the feelings of the child, while the items in *insight into effect of mood* (items 3, 6, and 11) are more specifically focused on awareness of one's own and the child's mood combined with an understanding of how emotions affect behavior. Distinction of these two factors therefore allows separate assessment of whether parents have a more objective approach to interactions with their child, and whether they observe one's own moods and child's moods more accurately.

To explain any differences between the factor solutions of the IM-P-K and the solutions of the English (Duncan et al. 2009), Dutch (de Bruin et al. 2014), and Portuguese (Moreira and Canavaro, 2017) versions of the IM-P, one may argue that

Table 2 Intercorrelations among IM-P-K subscales and the total interval-converted total IM-P-K score for sample 1

	2	3	4	5	6	IMP-K
1. Nonjudgmental acceptance of parental functioning	0.29*	0.24*	0.40*	0.26*	0.18*	0.61*
2. Emotional self-regulation		0.51*	0.32*	0.40*	0.29*	0.68*
3. Compassion for child			0.33*	0.59*	0.51*	0.75*
4. Listening with full attention				0.38*	0.26*	0.68*
5. Noticing child's feelings					0.55*	0.75*
6. Insight into effect of mood						0.65*

* $p < 0.001$

this could reflect cultural differences in parenting styles between the East and the West. Parenting goals, values, and practices and parent-child interactions vary from culture to culture (Deater-Deckard et al. 2011). For example, while the desired childrearing goals are independence, individualism,

social assertiveness, confidence, and competence in the dominant Western culture in the USA, traditional Asian families tend to be culturally collectivistic, emphasizing interdependence, conformity, emotional self-control, and humility (Rubin and Chung 2013). In addition, a traditional Korean

Table 3 Correlations between IM-P-K subscale scores as well as interval-converted total scores with validation measures

Construct	NONJUDG	EMO	COMP	LISTEN	NOTICE	INSIGHT	IM-P-K total
Self-compassion total	0.64***	0.45***	0.39***	0.45***	0.34***	0.25***	0.63***
Self-kindness	0.37***	0.41***	0.41***	0.30***	0.27***	0.19***	0.48***
Self-judgment	-0.66***	-0.23***	-0.18***	-0.44***	-0.24***	-0.15**	-0.48***
Common humanity	0.20***	0.33***	0.43***	0.16***	0.27***	0.28***	0.40***
Isolation	-0.63***	-0.29***	-0.25***	-0.38***	-0.26***	-0.20***	-0.51***
Mindfulness	0.34***	0.52***	0.50***	0.32***	0.35***	0.29***	0.56***
Over-identification	-0.57***	-0.27***	-0.08	-0.40***	-0.15***	-0.05	-0.39***
Warmth parenting style	0.25***	0.52***	0.62***	0.39***	0.60***	0.49***	0.69***
Control parenting style	-0.22***	-0.11*	-0.05	-0.24***	0.04	0.03	-0.14***
Optimism	0.31***	0.31***	0.40***	0.26***	0.34***	0.34***	0.48***
Pessimism	-0.44***	-0.25***	-0.31***	-0.35***	-0.29***	-0.28***	-0.48***
Depression	-0.48***	-0.28***	-0.22***	-0.38***	-0.23***	-0.24***	-0.46***
FFMQ total	0.48***	0.33***	0.43***	0.37***	0.43***	0.27***	0.60***
Awareness	0.46***	0.22***	0.38***	0.45***	0.37***	0.25***	0.57***
Nonjudging	0.49***	-0.01	0.17**	0.15*	0.14*	0.07	0.28***
Observing	-0.06	0.23***	0.13*	0.07	0.23***	0.16**	0.18**
Nonreactivity	0.39***	0.38***	0.28***	0.17**	0.16**	0.17**	0.40***
Describing	0.18**	0.24***	0.35***	0.25***	0.38***	0.19**	0.39***
Psychological well-being total	0.52***	0.25***	0.51***	0.40***	0.40***	0.29***	0.62***
Self-acceptance	0.45***	0.23***	0.44***	0.26***	0.23***	0.23***	0.47***
Positive relation	0.40***	0.11	0.27***	0.24***	0.30**	0.20**	0.41***
Purpose in life	0.35***	0.26***	0.45***	0.41***	0.35***	0.25***	0.53***
Environmental mastery	0.51***	0.23***	0.47***	0.42***	0.36***	0.25***	0.59***
Autonomy	0.35***	0.21***	0.35***	0.23***	0.30***	0.14*	0.42***
Personal growth	0.34***	0.19***	0.43***	0.33***	0.31***	0.25***	0.48***
Perceived stress	-0.46***	-0.11	-0.30***	-0.32***	-0.27***	-0.27***	-0.45***

Measures of self-compassion (SCS), parenting style, the life orientation (LOT-R) subscales optimism and pessimism, and depression (CES-D) were from sample 1, and measures of mindfulness (FFMQ), psychological well-being (PWB), and perceived stress (PSS) were from sample 2

NONJUDG nonjudgmental acceptance of parental functioning, *EMO* emotional self-regulation, *COMP* compassion for child, *LISTEN* listening with full attention, *NOTICE* noticing child's feelings, *INSIGHT* insight into effect of mood

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 4 Overview of the IM-P-K items with their subscales and which subscales these items are assigned to in the English (Duncan et al. 2009), Dutch (de Bruin et al. 2014), Portuguese (Moreira and Canavaro, 2017), and Hong Kong Chinese (Lo et al. 2018) versions

IMP-K subscale	Item number	Language version			
		English	Dutch	Portuguese	Hong Kong Chinese
NONJUDG	17	CSC	NJAPF	NJAPF	NJAP
	23	NJASC	NJAPF	NJAPF	NJAP
	26	CSC	NJAPF	NJAPF	NJAP
EMO	8	SRPR	EAS	SRP	EAP
	16	SRPR	EAS	SRP	EAP
	21	NJASC	EAS	SRP	EAP
COMP	27	CSC	CC	CC	CC
	28	NJASC	CC	CC	CC
	31	CSC	CC	CC	CC
LISTEN	1	LFA	LFA	LFA	LFA
	9	LFA	LFA	LFA	LFA
	13	LFA	LFA	LFA	LFA
NOTICE	12	EASC	EAC	EAC	–
	22	EASC	EAC	EAC	CC
	30	EASC	EAC	EAC	CC
INSIGHT	3	EASC	–	EAS ^a	–
	6	EASC	–	EAS ^a	–
	11	EASC	ENRP	SRP	NJAP

Korean version: *NONJUDG* nonjudgmental acceptance of parental functioning, *EMO* emotional self-regulation, *COMP* compassion for child, *LISTEN* listening with full attention, *NOTICE* noticing child's feelings, *INSIGHT* insight into effect of mood

English version: *CSC* compassion for self and child, *NJASC* nonjudgmental acceptance of self and child, *SRPR* self-regulation in the parenting relationship, *LFA* listening with full attention, *EASC* emotional awareness of self and child

Dutch version: *NJAPF* nonjudgmental acceptance of parental functioning, *EAS* emotional awareness of self, *CC* compassion for child, *LFA* listening with full attention, *EAC* emotional awareness of child, *ENRP* emotional nonreactivity in parenting

Portuguese version: *NJAPF* nonjudgmental acceptance of parental functioning, *SRP* self-regulation in parenting, *CC* compassion for child, *LFA* listening with full attention, *EAC* emotional awareness of child, *EAS* emotional awareness of self

Chinese version: *NJAP* nonjudgmental acceptance in parenting, *EAP* emotional awareness in parenting, *CC* compassion for child, *LFA* listening with full attention

^a Items 3 and 6 initially formed a two-item subscale called emotional awareness of self, but was later discarded

parenting virtue is sternness, with few overt expressions of parental love (Kim 2006) and warmth often being expressed nonverbally and indirectly. However, if variation in factor structure had been due to cultural aspects in parenting, one would have expected the structure of the Korean IM-P to be more similar to that of the Hong Kong Chinese version (Lo et al. 2018), which was not the case. Other reasons may thus be related to subtle semantic differences from translating the questionnaire, or it may highlight the fact that a certain

proportion of the original English IM-P may not be sufficiently psychometrically stable. While the IM-P may be psychometrically robust for each of the language versions, more research is required if the measure is to be used for direct cross-cultural comparisons.

According to the results of this study, the IM-P-K showed expected correlations with the related constructs. IM-P-K was positively correlated with mindfulness, psychological well-being, and self-compassion, and negatively correlated with

perceived stress and depression. These findings are consistent with the results of other IM-P validation studies (de Bruin et al. 2014; Lo et al. 2018; Moreira and Canavaro, 2017), which reported that IM-P was positively correlated with measures such as self-compassion, mindfulness, happiness, well-being, and satisfaction with family functions, and negatively with stress, depression, dysfunctional parent-child interactions, and parent perception of child's disruptive behaviors. In addition, these results are consistent with reports from MBIs of parents significantly improving in mindfulness and psychological well-being, and showing significantly reduced stress (Bazzano et al. 2015). Additionally, an MBI for breast-feeding mothers increased their self-compassion and reduced their stress and psychological discomfort (Perez-Blasco et al. 2013). The present results suggest that when parents have a mindful parenting attitude during interaction with their children, they can improve their own psychological well-being and lower the level of stress or depression. Furthermore, a higher score on the IM-P-K was related to less reported control parenting style and pessimism in life, and more warm parenting style and optimism in life. This is in line with the Dutch version of the IM-P that showed a positive relation with optimism (de Bruin et al. 2014), and is similar to results that scores of both the Dutch and Portuguese IM-P versions were negatively associated with maladaptive parenting style (de Bruin et al. 2014; Moreira and Canavaro, 2017). Considered together, our results suggest that the IM-P-K could be a useful tool when studying the effects of mindfulness training for parents or examining parents' embodiment of mindfulness in their interactions with children. This scale will therefore be useful to evaluate the effectiveness of mindful parenting programs in Korea.

Limitations

The current study has some limitations. Firstly, the demographic profile of the participants contained some imbalances. At first glance, it may appear that there was an elevated percentage of participants with a university qualification (around 90% in sample 1 and 70% in sample 2). However, this is not inconsistent with data about educational attainment in South Korea, which estimates the percentage of individuals with a higher education qualification to be between 68 and 82% for the age group 35 to 40 years (Korea National Statistics Office, 2018). In terms of gender, on the other hand, our samples were imbalanced, as they mainly included mothers. Although some social changes have occurred in Korea such as increased employment of women, Korean mothers typically still provide most of the daily parenting to their children (Yee 2012) and experience more parenting stress due to the influence of traditional values that dominate the view that the mother is the parent who is primarily responsible for child care (Kim and Cho 2000). Future research is necessary to examine the factor

structure of the IM-P-K in a sample of fathers as the quality and nature of interaction with children may be different due to societal expectations around work and career. This includes the use of more diverse recruitment strategies or purposive sampling to ensure a sufficient representation of fathers.

Secondly, test-retest reliability of the Korean IM-P needs to be examined in future research. Such information would reveal the extent to which scores on the instruments are stable over time. More detail can be achieved using Generalizability Theory studies, which collect data over three time points and are able to provide information on the extent to which each item measures a state or a trait (Medvedev et al. 2017b). Lastly, future research needs to examine responsiveness of the IM-P-K to interventions and whether any items may be affected by response shift, or the fact that subjective standards of evaluation may have changed as a result of a MBI (Krägeloh et al. 2018).

With careful comparison to other versions of the IM-P developed in different languages and cultural contexts, we have carried out a rigorous psychometric evaluation of the Korean version of the IM-P. This investigation makes an important contribution by laying the groundwork for future cross-cultural studies of mindful parenting.

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Compliance with Ethical Standards

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

Ethical Statement This study was approved by Wonkwang University institutional review board.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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