The Parental Bonding Instrument: A Four-Factor Structure Model in a Japanese College Sample

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Abstract: The Parenting Bonding Instrument (PBI) is a widely used battery to assess parenting behaviours. Although, it was originally developed to measure two attributes of parenting behaviour, care and overprotection, there is still disagreement about the factor structure of the scale. The aim of the present study is to examine the fit of different factorial structures of the PBI in a Japanese college sample. A total of 4,357 Japanese college students (1392 male and 2965 female) participated in the study. The age range was 17-40 years old with the mean age of 20.29 (SD = 1.85). Based on the previous research, five different models of factor structures were identified, and confirmatory factor analyses using AMOS were performed to evaluate the fit of each factorial structure model. A four-factor model (care, indifference, overprotection, and encouragement of autonomy) yielded the best fit among the five models. It was found that the original two-factor model did not reach the acceptable fit. Although the original scoring instruction indicates the four subscales be treated as two sets of bipolar factors (care-indifference, overprotection-autonomy), the present study suggests that four subscales be treated as independent factors when parenting behaviours are assessed in a Japanese population.

Keywords: College sample, factor analysis, Japanese, Parental Boding Instrument (PBI), structural equation modelling.

INTRODUCTION

Parenting style is one of the most essential and crucial components of parent-child interaction and is influential to children's emotional and behavioural development. Since Bowlby [1] formulated his theory on attachment style and discussed the impact of parenting on attachment, many studies have been conducted on parental styles and several significant attributes was identified. Baumrind [2] called these attributes responsiveness *vs* demandingness. Rohner and Pettengil [3] named these characteristics acceptance/rejection *vs* control. Similarly, Schaefer's [4] factor analysis of the children's report about their parents' behaviours extracted three factors, which were interpreted as acceptance *vs* rejection, psychological autonomy *vs* psychological control, and firm control *vs* lax control. Parker [5] postulated care and overprotection as two main domains of perceived parenting styles.

Based on a two-domain theory, Parker *et al*. [6] developed the Parental Bonding Instrument (PBI) which asks respondents to retrospectively assess how they were raised by their parents during the first 16 years of their life. The PBI consists of two bipolar factor scales, care and overprotection. Care dimension is composed of care and indifference while overprotection dimension is composed of overprotection and autonomy. Based on the two parenting dimensions, five types of parenting style were identified: average; high care and low overprotection conceptualised as optimal parenting; high care and high overprotection conceptualised as affectionate constraint; low care and high overprotection conceptualised as affectionless control; and, low care and low overprotection conceptualized as neglectful parenting [6].

The PBI has been used widely in research which examines the relationships between childrearing styles and mental health issues in adulthood, including mood disorders [e.g., 7-11], anxiety disorders [e.g., 12, 13], eating disorders [e.g., 14, 15], and personality disorders [e.g., 16, 17]. Also, the associations between parenting styles and parenting stress [18], risk of coronary heart disease [19], and emotional distress in providing care for a parent with dementia [20] has been investigated using the PBI. Moreover, aberrantly low care subscale score, in some cases with overprotection, is related to psychopathology. For instance, it was reported that low care score with or without high overprotection score were associated with depressive symptoms [5, 8, 11], low care score was associated with antisocial personality traits [21], and high overprotection score was associated with obsessive traits and obsessive compulsive disorder [13].

Psychometrics of the PBI, such as validity, reliability, and factor structure, were investigated in many previous studies [e.g., 22-27]. Parker *et al*. [6] introduced a two-factor structure model (care *vs* overprotection) during the initial development of the scale with an Australian sample. Although, some studies supported the original factorial structure [e.g., 24, 26], others demonstrated superior fit of three-factor structure models [22, 23, 25, 27]. Cubis *et al*.

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[22] explored the factor structure of the PBI in a community sample of 2,147 Australian adolescents and identified three factors. The first factor consists of the original care items, and the second and the third factor together make up the original overprotection factor. The first factor is labelled Care(C), the second factor Protection – Social Domain (PS), and the third factor Protection – Personal Domain (PP). With the use of the three-factor solution, they found that sons and daughters perceive fathers and mothers differently, which was not found with the use of the two-factor solution. Gomez-Beneyto *et al.* [23] administered the PBI to a sample of 205 Spanish mothers right after their childbirth to examine the factor structure of the Spanish version of the PBI, and they found that a three-factor structure of Affect, Restraint, and Overprotection is a better fit to this population. Affect includes the items indicative of the Parker's original care factor, while restraint and overprotection make up the Parker's original overprotection factor. Murphy *et al.* [27] also indentified three dimensions in the PBI administered to the US and the UK students, and they named those factors Care, Denial of psychological autonomy and Encouragement of behavioural freedom. Similarity among the three studies which found three dimensions in the PBI is that one of the factors consists of items largely similar to the original care items and the other two factors consist of items similar to original overprotection items. Uji *et al.* [28] examined the factor structure of the Japanese version of the PBI in a Japanese sample and found that a four-factor structure fits consistently across various age and gender groups. In Parker's original model, care and overprotection are consisted of two bipolar factors (i.e. some items are scored in the reverse direction); however, Uji *et al.* concluded that those reverse scoring items be treated as different factors instead of bipolar factors. All the factor structure models and items in each model's factors were detailed in Table **1**.

Since a three-factor model has been introduced by Cubis *et al.* [22], a number of studies were conducted to validate the factor structure of the PBI. Among four models of three-factor structures, Kendler's model [25] was shown to have a good fit in three confirmatory factor analysis studies [29-31]. However, in Kendler's study [25], the numbers of items were reduced from 25 to 16 without validation, and it is not clear whether the 16-item PBI measures the same parenting behaviours as the 25-item PBI. Thus, the validity of the results in which a three-factor solution is shown to be superior remains unclear.

In regard with the Japanese version of the PBI, the factor structure has been examined in a Japanese workers sample and a Japanese family sample [28, 30]; however, the results are inconsistent and inconclusive. Sato and his colleagues [30] used 418 Japanese working adults to conduct confirmatory factor analysis and found that Kendler's three-factor model fit the best to their sample. Uji and her colleagues [28] conducted exploratory factor analysis, which initially resulted in a three-factor model. However, when they performed a confirmatory factor analysis with the three extracted factors, they failed to obtain a satisfactory goodness-of-fit. Therefore, they tested the fit of a four-factor model, obtained a better fit, and concluded that the four-factor model should be used in Japanese samples.

Table 1. Factor Structures of the Six Models and Items in Each Factor

	Factor	Number of Items	Item Number	Sample Characteristics
Parker model	Care	12	1, 2, 4, 5, 6, 11, 12, 14, 16, 17, 18, 24	Australian adolescents and
	Protection	13	3, 7, 8, 9, 10, 13, 15, 19, 20, 21, 22, 23, 25	Adults
Cubis model	Care	12	1, 2, 4, 5, 6, 11, 12, 14, 16, 17, 18, 24	Australian adolescents
	Protection-personal	5	8, 10, 13, 19, 23	
	Protection-social	8	3, 7, 9, 15, 20, 21, 22, 25	
Gomez-Beneyto model[§]	Care	11	1, 2, 4, 5, 6, 11, 12, 14, 17, 18, 23	Spanish mothers
	Overprotection	6	8, 9, 13, 19, 22, 25	
	Restraint	6	3, 7, 15, 20, 21, 24	
Murphy model[‰]	Care	12	1, 2, 4, 5, 6, 11, 12, 14, 16, 17, 18, 24	US and UK students
	Denial of psychological autonomy	6	8, 9, 13, 19, 20, 23	
	Encouragement of behavioral freedom	6	3, 7, 15, 21, 22, 25	
Kendler model	Warmth	7	1, 4, 5, 11, 12, 17, 18	US twin families
	Protectiveness	5	8, 9, 13, 19, 23	
	Authoritarianism	4	7, 15, 21, 25	
Uji model	Care	6	1, 5, 6, 11, 12, 17	Japanese family units
	Indifferent	6	2, 4, 14, 16, 18, 24	
	Overprotection	7	8, 9, 10, 13, 19, 20, 23	
	Autonomy	6	3, 7, 15, 21, 22, 25	

[§]Item 10 and 16 were omitted due to an insufficient factor loading. [‰]Item 10 was omitted due to an insufficient factor loading.

The present study aims to identify the appropriate factorial structure of the PBI for a Japanese sample by conducting confirmatory factor analysis in a large sample of Japanese adolescents and young adults. The sample set of only less than 1,000 Japanese were used in the past studies; thus, it is important to conduct a factor analysis with a large sample set so that results would be applicable to general Japanese populations.

METHOD

Procedure and Participants

This is a part of a larger study on the sexual and contraceptive behaviours of Japanese adolescents and young adults. The details of the study procedure are available elsewhere [32]. Six hundred and fifteen universities were contacted to participate in a questionnaire survey. The schools were instructed to distribute the questionnaire to all the students in a giving setting to minimize the selection bias; however, the choice of the settings was given to each school. For example, some schools handed the questionnaire to students in a class, while others provided it to all the students visiting the health care centre. Anonymity was guaranteed as participants were instructed to return the questionnaire directly to the researchers in a self-stamped envelope.

One hundred and ten of all the schools contacted participated in the study, and a total of 4,357 students returned their questionnaire. There were 1392 male and 2965 female in the sample, and the age range was 17-40 years old (mean = 20.29, SD = 1.85). For statistical purposes, we only used the questionnaires in which all the PBI items were answered. All of the paternal PBI items were filled by 4,152 participants, and all of the maternal PBI items were filled by 4,191 participants.

The study was proved by the Ethical Committee of the National Institute of Mental Health, National Center of Neurology and Psychiatry in Japan.

Instrument

The Parental Bonding Instrument (PBI) asks respondents to recall how their parents acted towards them during the first 16 years of their life. The questionnaire consists of 25 items with each item being rated on a 4-point Likert scale from 'very like' to 'very unlike.' Participants are asked to rate their mothers' and fathers' attitudes separately. According to the original scoring instruction [6], 12 items are intended to measure care dimension (e.g., "Spoke to me in a warm and friendly voice" "Did not help me as much as I needed"), and 13 items are intended to measure Overprotection dimension (e.g., "Liked me to make my own decisions" "Did not want me to grow up"). Six items of both Care and Overprotection are reverse scoring items, which can be interpreted as Indifference and Encouragement of Autonomy, respectively. In this study, the Japanese version of the PBI [33] was used. The Japanese version of the scale was developed with a back-translation method, and the psychometrics has been tested to be valid and reliable [34].

Statistical Analyses

The PBI for fathers and mothers were analyzed separately throughout this study. Structural equation modelling (SEM) for five different factor models were created to perform confirmatory factor analyses (CFAs), and the fit of each model was compared. The models used in the analyses were the Parker'soriginal two factor model [6], the Cubis' [22], Gomez-Beneyto's [23], Murphy's [27] three factor models, and Uji's four factor model [28] (Table **1**). We did not test the Kendler's three-factor model [25] in this study. This is because a short version of the PBI containing only 16 items was used in their study and therefore we have regarded it different from the original 25-item PBI.

The fit of the model was examined in terms of chi-square (CMIN), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and Akaike Information Criterion (AIC). According to conventional criteria, the value of CMIN/df < 3, CFI > 0.95, RMSEA < 0.08, GFI > 0.85 and AGFI > 0.80 indicates as acceptable fit in confirmatory factor analysis [31, 35].

All the statistical analyses were performed with Statistical Package for the Social Sciences (SPSS) 16.0 and Amos 16.0. Example SEM of the four-factor model is shown in Fig. (**1**).

RESULTS

The detailed results of the confirmatory factor analysis for each model were shown in Table **2**. Uji's four factor model earned the best fit with the lowest χ^2 value and AIC and the highest GFI and AGFI. The GFI > .85 and the AGFI > .80 in both paternal and maternal PBI obtained in Uji's model indicate an acceptable fit. All the estimates of covariance between factors in Uji's four-factor model reached statistical significance (Table **3**).

On the contrary, the GFI and the AGFI of Parker's model and Gomez-Beneyto's model did not reach the acceptable criteria in both paternal and maternal PBI. In Parker's model, the GFI and the AGFI of the paternal PBI were 0.840 and 0.810 respectively, and the GFI and the AGFI of the maternal PBI were 0.822 and 0.789 respectively. In Gomez-Beneyto's model, the GFI and the AGFI of the paternal PBI were 0.832 and 0.796 respectively, and the GFI and the AGFI of the maternal PBI were 0.815 and 0.785 respectively.

DISCUSSION

In the present study, confirmatory factor analyses of the Japanese version of the PBI were conducted to examine the fit of factorial models in a Japanese college sample. It has not been consistent which factor model should be used with a Japanese population. In addition, the numbers of the samples used in the past studies have not been very large. Thus, this study attempted to solve the issue of inconsistency by increasing the sample size.

The results demonstrate that the four-factor model provides superior fit to the two-factor and the three-factor models. Two studies investigated the factorial models of the PBI in a Japanese population in the past. Our results support the findings of Uji *et al.* [28] in which they concluded that four-factor model was considered fit across different generational and gender groups in their sample of Japanese families. The results of our study is in part inconsistent with
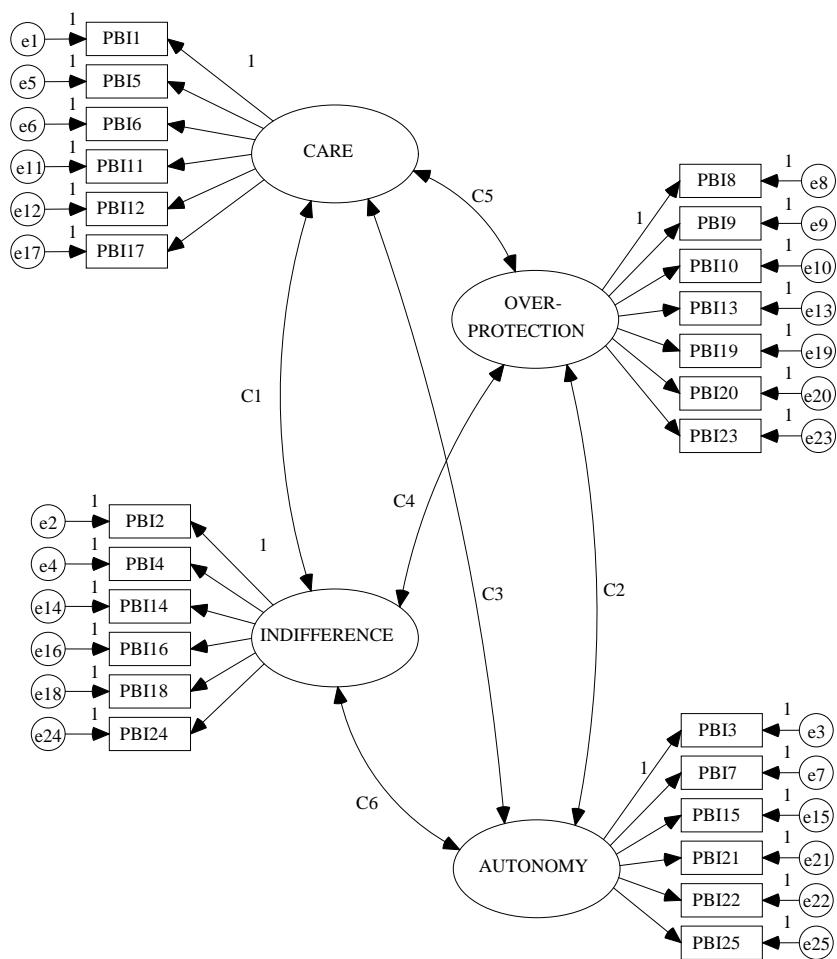
Fig. (1). Example SEM of the confirmatory factor analysis: the four-factor model.

Table 2. **Fits Provided by the Five Factor Models**

	Paternal PBI						Maternal PBI					
	χ^2/df	GFI	AGFI	CFI	RMSEA	AIC	χ^2/df	GFI	AGFI	CFI	RMSEA	AIC
2-factor model												
Parker model	28.708	0.840	0.810	0.815	0.082	7968.020	32.281	0.822	0.789	0.809	0.086	8947.089
3-factor models												
Cubis model	27.124	0.857	0.829	0.827	0.079	7483.794	30.223	0.845	0.714	0.823	0.084	8326.656
Gomez-Beneyto model	36.860	0.832	0.796	0.784	0.093	8465.229	39.883	0.815	0.775	0.785	0.096	9151.379
Murphy model	24.532	0.879	0.854	0.851	0.075	6210.409	26.034	0.874	0.848	0.854	0.077	6584.438
4-factor model												
Uji model	20.958	0.892	0.870	0.869	0.069	5749.592	22.496	0.884	0.860	0.871	0.072	6163.404

Note. PBI = Parental Bonding Instrument; GFI = goodness of fit index; AGFI = adjusted goodness of fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation; AIC = Akaike information criterion.

another study conducted on a sample of Japanese workers by Sato *et al*. [30] in which Kendler's three-factor model provided the best fit. Considering that Kendler and his colleagues have reduced the item numbers to 16 [25], it is inappropriate to compare the fit of the 25-item PBI factor model to the fit of the 16-item PBI factor model as covariance matrixes of the two would be different. Thus, we believe that this inconsistency between the two studies is dismissible. There is a consistency among the three studies:

all three studies concluded that Parker's original two-factor model produced insufficient fit. Therefore, it is recommended to use the four-factor model when the parenting behaviours are examined in Japanese samples in future studies.

The limitation of this study is low participation rate despite a large sample size. About 18% of invited schools actually participated in the study. It is speculated that this

low participation rate is related to the aim of the original study. The study is about sexual behaviours, including abortion, of young adults, and Japanese are quite reserved and feel uncomfortable talking about the topics related to sexual behaviours. Consequently, majorities of universities may have felt reluctant to participate and to have their students fill out the survey.

Table 3.   Estimates of Covariance Between Factors in the Four-Factor Model

	C1	**C2**	**C3**	**C4**	**C5**	**C6**
Paternal PBI	.246***	.176***	-.198***	-.077***	-.071***	-.115***
Maternal PBI	.137***	.204***	-.173***	-.078***	-.083***	-.109***

Note. C1, C2, C3, C4, C5, and C6 correspond to those shown in Fig. (**1**).
*** $p < .001$.

One of the issues in regard with SEM is to which criteria be used in order to determine the goodness-of-fit. The non-significance of χ^2 test has been routinely used as an index of goodness-of-fit of the model; however, the χ^2 value is affected by the sample size. Although a large sample size is needed to appropriately interpret the study, the large sample size may influence the χ^2 value to increase, which may erroneously result in rejecting the model. This rejection of the model could occur, even if the differences between observed and predicted covariance are slight [36]. Therefore, in the present study, we have used the value of GFI, AGFI, and AIC to compare the models.

Although, various factor structures have been introduced thus far, it is common to employ the original two-factor model in research setting unless the focus of the study is on the factor structure. Based on the two bipolar factors, care and overprotection, parenting styles were categorised into four types [5]. If, as suggested in this study, care and indifference as well as overprotection and autonomy are, though substantially correlated with each other, discrete attributes of parenting styles, the characteristics of child rearing behaviours would be categorised into a detailed schema. For example, it has been repeatedly reported that depression in adulthood is linked to low care in childhood [e.g., 8]. In the two-factor model, because care score is the sum of care scale score and indifference scale score, the components of low care are unclear: low care could mean low care and low indifference, high care but high indifference, or low care and high indifference. However, in the four-factor model, because care scale and indifference scale are treated separately, three types of low care with clear components can be identified. We labelled those three types of low care: 'general apathy' depicted as low care and low indifference, 'inconsistent care' depicted as high care but high indifference, and/or 'typical low care' depicted as low care and high indifference. Though one or all of which may be linked to adult onset of depression, the previous research with two-factor structure doesn't make that part clear. Therefore, dividing the bipolar scale to two distinct scales is meaningful especially in a research setting.

This highlights the importance of differentiating the parenting behaviours into greater details. First, with a more refined schema of child rearing styles, researchers can examine the different effects of parenting styles on children's psychological development. The broader knowledge we gain on diverse kinds of parenting, the more we can contribute to parents' education on child rearing practice. Consequently, the better education on parenting can lead to prevention of psychological harm in children, which potentially can reduce the chances of developing psychopathology. Second, in the similar manner, better parenting can enhance the quality of parent-child relationships. Interpersonal relationships are dynamic and reciprocal, and a parent-child relationship is not exceptional. Improving parenting may result in enhancing child's attachment towards parents which can lead to psychological well-being of both parents and children.

In the present study, the confirmatory factor analyses of the PBI were conducted with a Japanese collage sample, and the results suggest that the four-factor model have the best fit to this population and be used in the future research using the PBI. The factors of the model were Care, Indifference, Overprotection, and Autonomy.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST

None declared.

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