ORIGINAL

Development of the Harmony Scale for Postpartum Couples for First-time Parents

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Abstract : Transitioning from a dyadic to a triadic family structure after childbirth requires substantial adaptation to maintain relationship harmony. We develop and validate the Harmony Scale for Postpartum Couples (HSPC) to assess harmony among first-time parents. The scale development proceeded in three phases. In Study 1, a conceptual framework was established, and experts evaluated content and face validity. In Study 2, item analysis and exploratory factor analysis (EFA) were conducted to refine items and construct a preliminary scale. In Study 3, psychometric properties were examined using data from 376 participants (188 couples) with infants aged 3–6 months. EFA identified 15 items across four factors : [Intimacy with partner], [Physical・Social Health], [Mental Health], and [Self-Efficacy in Parenting]. The overall Cronbach's α for the scale was .825, indicating good internal consistency. Construct validity was supported by confirmatory factor analysis indices (GFI = .908, AGFI = .869, CFI = .880, RMSEA = .083). The final 15-items, four-factors HSPC demonstrated reliable and valid performance for evaluating couple harmony during the early postpartum period. This concise instrument provides comprehensive assessment of couple harmony, supports early identification of relational difficulties, and can inform targeted interventions to promote healthy family functioning, parental well-being, and infant health. J. Med. Invest. 73 : 176-185, February, 2026

Keywords **:** *harmony, postpartum couples, first-time parents, development of a scale*

INTRODUCTION

In recent years, the global decline in birth rates has been accelerated. In 2022, the total fertility rates among OECD member countries were 1.8 in France ; 1.7 in the United States ; 1.5 in the United Kingdom and Germany ; 1.3 in Canada, Finland, and Japan ; and 1.2 in Italy (1). In Japan, this persistent decline has contributed to socioeconomic challenges— including a shrinking labor force and increased pressure on the social security system—and posed serious implications for the sustainability of families and local communities (2). Beyond higher rates of unmarried individuals and unstable marital relationships, studies show that harmony within couples and families significantly influences fertility intention and parenting satisfaction (3). According to the Ministry of Health, Labour and Welfare (2022), approximately 39.0% of marriages in Japan end in divorce. Among single-mother households following divorce, 11.9% and 19.9% have children aged 0–2 and 3–5 years, respectively, indicating that approximately 31.8% of divorces occur during early childhood (4). Similarly, since the 1990s in the United States, approximately half of the couples have reported a decline in marital quality within 3 years after childbirth, primarily due to disagreements regarding household labor, finances, employment, their relationship, and social life (5).

Couple relationships during pregnancy have been examined from the perspectives of intimacy, support, and stress (6), and these relationships have been shown to influence subsequent couple functioning and maternal mental health. This makes relationship assessment during pregnancy essential for postpartum family functioning (7). Conversely, the transition to parenthood is a complex and transformative experience that reshapes self-concept, social roles, and daily life (8, 9). Previous studies consistently reported that marital satisfaction declines during this transition (10-12). The first 6 months following childbirth are particularly critical for both parents, marked by major physical, emotional, and relational changes. During this phase, couples must adapt to new parenting roles while managing chronic sleep deprivation and elevated stress (13, 14). These factors exert immediate strain and compromise the long-term quality of a couple relationship (15).

Unequal childcare responsibilities, reduced time spent together, and communication-related disagreements contribute to relationship deterioration after childbirth (16, 17). Postpartum stress and sleep deprivation in particular have direct negative effects on marital relationships (18), leading to decreased satisfaction and diminished harmony. This decline can have enduring consequences for children's emotional and behavioral development (19-22). Furthermore, couple harmony is associated with enhanced social support, lower risk of postpartum depression, and improved long-term marital satisfaction (23, 24), underscoring its importance for overall family stability. Health encompasses not only freedom from illness but also the capacity to manage stressors. Effective stress management promotes well-being, whereas inadequate coping can undermine marital harmony and mental health (14). Therefore, understanding and assessing couple harmony after childbirth is essential because it supports mental health, satisfaction, and long-term family stability (25-27).

Given the major relationship changes associated with childbirth, establishing methods to assess and support couple harmony during the postpartum period is critical. Although several tools measure maternal and paternal mental health after childbirth (e.g., the Edinburgh Postnatal Depression Scale : EPDS

Received for publication November 6, 2025 ; accepted December 20, 2025.

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and its Partner Version) (28, 29), well-developed instruments focused specifically on couple's relationship remains limited.

Recently, numerous studies have examined the effectiveness of couple-based interventions designed to support marital relationships during the perinatal period. Randomized controlled trials have shown that the Family Foundations program improves coparenting quality, enhances parental mental health, and reduces intimate partner violence (30). Furthermore, a 2-year follow-up of the same program demonstrated sustained positive effects on couple relationships and child behavioral outcomes (31). The Bringing Baby Home program similarly increases fathers' involvement in childcare, enhances marital satisfaction, and reduces parenting stress (32). A meta-analysis of marital satisfaction among postpartum couples (12–24 months after childbirth) emphasized that interventions initiated during pregnancy and early postpartum are essential for preventing declines in marital satisfaction during the transition to parenthood (27).

Against this background, the need remains for a reliable and valid scale that accurately measures couple harmony (relationship quality) as a foundation for understanding and supporting partners' adjustment after childbirth. Relationship changes after childbirth are transient and critical, with long-term implications for family functioning and child development (33, 15). In nursing practice, a comprehensive approach that addresses maternal physical recovery, infant health management, and support for couple communication and relationship quality is necessary.

Transitioning to first-time parenthood involves substantial changes in roles and increased psychological burden, thus making marital harmony particularly vulnerable (27). Currently available scales fail to sufficiently capture the unique relational changes experienced by first-time parents. Therefore, a tool that comprehensively assesses intimacy and cooperation during this period is highly valuable for both research and practical application.

To address this gap, the present study develops a new scale called the Harmony Scale for Postpartum Couples (HSPC), designed to assess and promote marital harmony among first-time parents. Accordingly, we aimed to examine the reliability and validity of the HSPC. By establishing a reliable tool, this study intends to contribute to the literature on couple harmony and individual well-being, ultimately supporting couples in achieving a smoother transition into parenthood.

METHOD

This study consisted of three phases. Study 1 developed a preliminary version of the scale based on prior research. Study 2 involved a pretest to finalize items. Study 3 verified the validity and reliability of the final scale. Statistical analyses were performed using SPSS version 29.0 and AMOS version 28.0 for Windows.

The Ethics Committee for Life Science and Medical Research of Tokushima University Hospital approved this study (No. 3608-1). Participants provided written informed consent after being informed that participation was voluntary, responses would remain anonymous, and results would be analyzed and reported in aggregate. The study was conducted in accordance with the Declaration of Helsinki and institutional ethical standards.

Study 1 : Development of a Preliminary Scale

Objective : To develop a preliminary version of the HSPC, designed to measure couple harmony among first-time parents.

Item development

Concepts underlying harmony among postpartum first-time parents were identified through a literature review in The PubMed and CINAHL, using keywords such as "postpartum couples," "process of becoming a parent," "coparenting," "relationship quality," and "intimacy." Overall, 22 relevant articles were analyzed. From this, four domains were identified as follows : <Intimacy with partner>, <Health>, <Comfortable environment>, and <Affection toward the child>.

The harmony of postpartum couples experiencing parenthood for the first time is defined as a relationship where, while facing the sudden changes in their living environment and the new challenges of childcare, they respect each other as partners, cooperate emotionally and practically, maintain <Intimacy with partner>, support each other's physical, mental, and social <Health>, build a <Comfortable environment>, and nurture mutual <Affection toward the child> while progressing in their adaptation to parental roles.

<Intimacy with partner> : Defined as an interpersonal process where one partner discloses personal information and the other responds with understanding, validation, and care (34). This process supports marital satisfaction and stability in daily life and parenting (35).

It includes 38 items covering communication, equality, reciprocity, fairness, acceptance of dependency, and emotional support.

<Health> : Encompasses Health is a broad concept encompassing postpartum physical recovery (fatigue, sleep deprivation, pain), psychological aspects (depression, anxiety, stress coping), and social aspects (interpersonal relationships, privacy). Mutual support promotes relationship harmony by reducing parenting stress and postpartum depression, contributing to psychological recovery and relationship stability (30). This attribute comprises 29 items covering physical, mental, and social health.

<Comfortable environment> : Includes physical factors (housing safety, rest, convenience) and social factors (economic stability, external support). The physical environment influences parental mental health and indirectly affects the couple's relationship (36). Adequate social support reduces stress between spouses and promotes cooperative coparenting behavior (30). Conversely, housing instability pose risks for postpartum depression and relationship confit (36). This domain consists of 31 items addressing support, housing, finances, childcare, and parenting self-efficacy.

<Affection toward the child > : Covers emotional concern, parenting goals, and shared values. Conflicts arise when childcare expectations differ, negatively affecting coparenting (37). Furthermore, it has been suggested that when one partner's parenting efficacy is high, the other parent's sense of efficacy increases (38). Shared affection and common parenting goals are vital for couple harmony. This domain has 11 items on child development, shared childcare information, and affection and responsibility toward children.

In total, the preliminary scale comprised 109 items across these four domains.

Examination of content validity

The content validity of the scale items was evaluated using the Content Validity Index (CVI) (39, 40). The expert panel consisted of nine professionals : three researchers with doctoral degrees in nursing or public health and experience in midwifery or community health ; three nursing administrators ; and three researchers with master's degrees in nursing or public health.

The experts assessed the relevance between each of the four domains and drafted items rated using a four-point Likert-type

scale (1 = *Not necessary*, 2 = *Somewhat unnecessary*, 3 = *Important*, 4 = *Very important*) (41). Based on these evaluations, this study calculated the item-level content validity index (I-CVI), which represents the validity of each item, and the scale-level content validity index (S-CVI), indicating the overall validity of the instrument. Additionally, the experts provided open-ended feedback regarding the wording of items, examples, and potential omissions or redundancies. According to the established criteria, items with an I-CVI of ≥ .70 (42) or preferably ≥ .78 and an S-CVI of ≥ .90 (43) are considered acceptable. This study retained items with I-CVI ≥ .78 and S-CVI ≥ .90.

Consequently, five items with I-CVI values < .78 were omitted, and minor revisions were made based on qualitative feedback. The overall S-CVI of the revised scale reached .91, which indicated excellent content validity.

Examination of face validity

To assess face validity, 10 participants (five couples) raising their first child aged 3–6 months were invited to review the draft questionnaire. They were requested to evaluate the clarity and comprehensibility of each item. Based on their responses, no revisions to wording or expressions were deemed necessary.

Based on the examinations of content and face validity, the researchers developed a draft version of the HSPC that consists of 104 items across the four conceptual domains.

Study 2 : Pretest

Objective : To evaluate the validity and reliability of the draft scale developed in Study 1.

A pretest was conducted between October 2020 and April 2021.

Methods

This study was conducted at related facilities used by infants aged 3–6 months, in Western Japan (Osaka, Nara and Okayama prefectures), including two medical institutions for infant health checkups, two postnatal care facilities, and one local child-rearing support center. Researchers explained this study's purpose, significance, and methods to facility directors and proceeded at those that consented. At the start of this study, COVID-19 infections were spreading, so we obtained cooperation from facility staff. We explained the purpose, significance, methods, and participation conditions of this study to the facility staff. The facility staff distributed this study information sheet and questionnaire to participants who met the eligibility criteria.

Previous studies have reported that couple satisfaction and intimacy often decline between 3–6 months postpartum (27, 15). This is an important transitional period marked by increased childcare burden and sleep deprivation (13, 14), making relationship harmony vulnerable to fluctuations. Therefore, this study targeted Japanese heterosexual couples aged ≥ 20 years, in good health, with their first healthy child aged 3–6 months. Participants indicated consent by checking a box on the questionnaire. Couples completed forms individually, sealed them to ensure privacy, and mailed them together in one envelope. Couple data were assigned identification numbers to link partners.

Items were rated using a four-point Likert-type scale (1=*strongly agree*, 2=*agree*, 3=*disagree*, and 4=*strongly disagree*). High scores indicate high levels of harmony between partners after childbirth.

Data analysis

Frequency distribution, mean, and standard deviation (SD) were calculated for each item. Missing data, ceiling effects (mean +SD > 4.0), floor effects (mean −SD < 1.0), inter-item correlations (r ≥ .70), and item–total correlations (I-T correlation ≥ .40) were examined to evaluate the adequacy of each item.

In the initial factor analysis, the number of factors was determined by eigenvalues, cumulative contribution ratio, and scree plot. Subsequently, EFA was performed using the principal factor method with Promax rotation. Items with factor loadings ≥ .40, adequate communalities, and no cross-loading on multiple factors were retained.

To assess sample adequacy and sphericity, this study employed the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity. The internal consistency reliability of the scale and subscales was evaluated using Cronbach's α coefficients.

Results

Questionnaires were distributed to 320 participants (160 couples), of which 118 (59 couples) responded (response rate : 36.8%). After excluding incomplete data, 116 participants (58 couples ; 36.3% valid response rate) were included in the analysis.

Regarding ceiling effects, 56 items were omitted : 26 from <Intimacy with partner>, 16 from <Comfortable environment>, 7 each from <Affection toward the child>, and <Health>. Regarding floor effects, 12 items were excluded : 2, 4, and 6 items from <Intimacy with partner>, <Affection toward the child>, and <Health>, respectively. In total, 68 items were removed. No inter-item correlations exceeded .70.

Initial factor analysis suggested a four-factor structure for both parents. Since items were identical, EFA was performed on the combined scale.

This study confirmed the sampling adequacy for factor analysis using the KMO and Bartlett's test of sphericity (KMO = .812 ; Bartlett's test, p< .001), which exceeded the recommended thresholds (KMO ≥ .50 ; p< .005). The first factor analysis was conducted with 36 items. Using principal factor method with Promax rotation and adopting a factor loading cutoff of .40, 14 items were further removed. After four iterations, this study obtained stable four-factor solution composed of 22 items.

- Factor I [Physical･Social Health] : 4 items on physical fatigue, sleep, and life discretion reflecting health status
- Factor II [Mental Health] : 7 items on motivation and calmness reflecting psychological well-being.
- Factor III [Intimacy with partner] : 4 items on role-sharing and feelings toward the partner reflecting relational intimacy.
- Factor IV [Self-Efficacy] : 7 items on childcare anxiety and general unease reflecting parenting confidence and self-efficacy

The Cronbach's α coefficient for the overall scale was .879, with Factors I to IV obtained subscale reliabilities of .826, .819, .769, and .773, respectively, thereby confirming internal consistency.

Based on these findings, 22 items formed the provisional version of the HSPC.

Study 3 : Main Study

Objective : To examine the reliability and validity of the preliminary version of the HSPC among first-time parents developed through the pretest (pilot study) outlined in Study 2.

The main study was conducted from October 2021 to February 2023.

Methods

This study was conducted in two public health centers, three clinics, and five midwifery facilities. The participants and data collection procedures were the same as those used in the pretest.

Instruments for Criterion-Related Validity

- Quality of Marriage Index

Originally developed by Norton (44), the Quality of Marriage Index (QMI) was designed to assess overall martial satisfaction.

The Japanese version, translated and validated by Moroi (45), demonstrated acceptable reliability.

The QMI consists of six items rated using a four-point Likert-type scale. It evaluates marital satisfaction, including the stability, strength, and happiness of the marital relationship. High scores indicate high levels of marital satisfaction.

Given the theoretical association between high levels of harmony and greater marital satisfaction, the QMI was selected as a criterion measure to assess the criterion-related validity of the developed scale.

In the present study, the Cronbach's α coefficient for the QMI was .945.

・Parenting Self-Efficacy Scale

The Parenting Self-Efficacy Scale (PSE), developed by Kanaoka *et al*. (46), assesses the level of confidence of mothers of infants and toddlers in their ability to adopt to and cope with various parenting situations. The scale has been validated as a unidimensional measure with established reliability and validity for evaluating mothers' sense of self-efficacy in parenting.

The PSE consists of 13-items rated using a five-point Likert-type scale ; high scores indicate high levels of perceived parenting self-efficacy.

Given that high levels of harmony between partners are theoretically associated with greater parenting self-efficacy, the PSE was adopted as a criterion measure to assess criterion-related validity.

In the present study, the Cronbach's α coefficient for the PSE was .788.

・World Health Organization Quality of Life 26

World Health Organization Quality of Life 26 (WHO-QOL26), developed by Tazaki *et al*. (47), is a 26-item instrument composed of four domains, namely, [Physical Health], [Psychological Health], [Social Relationships], and [Environmental] Factors. Items are rated using a five-point Likert-type scale ; high scores indicate high levels of quality of life (QOL).

In relation to measuring couple harmony, this study hypothesized that greater harmony between partners would reflect as high levels of QOL. Therefore, the WHO-QOL26 was adopted as a criterion measure, because its conceptual framework aligns with the construct of the proposed scale.

In the present study, the Cronbach's α coefficient for WHO-QOL26 was .924.

These scales were used with appropriate permission or under license.

Data analysis

EFA with the principal factor method and Promax rotation was used to examine construct validity. To assess model fit, this study performed confirmatory factor analysis (CFA). The following fit indices were used : chi-square minimum/degree of freedom ratio (χ^2/df), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA).

A small χ^2/df value indicates better model fit, and a ratio of 2.0 to 3.0 or less is generally considered acceptable (48, 49). GFI values range from 0 to 1 : values closer to 1 indicate better fit (50). Similarly, AGFI values closer to 1 reflect a good fit (48). For the CFI, values of 0.95 or higher indicate a good model fit (48). Regarding RMSEA, smaller values indicate better fit ; values of ≤ .05 are considered good, and values < .08 represent an acceptable level of approximation error (51, 52).

Internal consistency reliability was assessed using Cronbach's α coefficients. As external evidence of validity, Spearman's correlation coefficients were calculated between the newly developed scale and QMI, PSE, and WHO-QOL26 to evaluate criterion-related validity.

RESULTS

The questionnaire was distributed to 1,928 participants (964 couples) ; of whom, 472 participants (236 couples) responded (response rate : 24.5%). After excluding cases with missing data, valid responses from 376 participants (188 couples) were included in the analysis, which resulted in a valid response rate of 19.5%.

Participant characteristics

The mean age of the mothers was 31.7 (5.1) years, while that of the fathers was 33.3 (5.8) years. The average duration of marriage or cohabitation was 36.1 (19.1) months. The mean age of children was 4.5 (1.3) months. Majority of the parents were company employees. Approximately 70% of the participants reported receiving certain forms of childcare support. For parental leave, 66.0% of mothers used childcare leave compared with 21.3% of father (Table 1).

Construct validity and reliability

EFA was conducted on the 22 items. Based on the scree-plot, this study identified a four-factor structure. EFA was performed using the principal factor method with Promax rotation. Using G*Power, the required sample size for this study was estimated to be 386 participants. The KMO measure was .783, and Bartlett's test of sphericity was significant (p< .001), thus indicating the adequacy of the sample for factor analysis.

Items with factor loadings < .40 or with high cross-loadings on multiple factors were examined. The result the omission of seven items (three with loadings < .40 and four with cross-loadings). The final scale consisted of 15 items across four-factors, explaining 48.47% of cumulative variance.

The four-factors were interpreted as follows :

・Factor I [Intimacy with partner] : 4 items
・Factor II [Physical・Social Health] : 4 items
・Factor III [Mental Health] : 4 items
・Factor IV [Self-Efficacy in Parenting] : 3 items

The total scale score ranged 23–56, with a mean of 41.73 (6.53). The Cronbach's α coefficient for the overall scale was .825, whereas the coefficients for the four subscales were .785, .751, .767, and .673, which showed satisfactory internal consistency reliability (Table 2).

Criterion-related validity

Criterion-related and convergent validity were examined using the QMI, PSE, and WHO-QOL26.

The correlation between the HSPC scale and the QMI displayed a positive association between the total HSPC score (r = .458, p< .01) and Factor I [Intimacy with partner] (r = .523, p< .01).

Similarly, the correlation between the HSPC and PSE indicated positive associations between the total HSPC score (r = .539, p< .01) and Factors Ⅲ [Mental Health] (r = .642, p< .01) and IV [Self-efficacy in parenting] (r = .412, p< .01).

Furthermore, the correlation between the HSPC and WHO-QOL26 revealed significant positive associations between the total HSPC score (r = .730, p< .01) and Factors I [Intimacy with partner] (r = .427, p< .01), II [Physical・Social Health] (r = .522, p< .01), Ⅲ [Mental Health] (r = .715, p< .01), and Ⅳ [Self-Efficacy in Parenting] (r = .411, p< .01).

The [Physical Health] subscale of the WHO-QOL26 was also positively correlated with Factor II [Physical・Social Health] (r = .624, p< .01) of the HSPC, while the [Psychological Health] subscale of the WHO-QOL26 was positively correlated with Factor Ⅲ [Mental Health] (r =.691, p< .01) of the HSPC (Table 3).

Table 1. Participants' characteristics

		Study2		Study3	
		N = 58	N = 58	N = 188	N = 188
		mother	father	mother	father
Age (SD)		32.5 (5.0)	34.0 (5.7)	31.7 (5.1)	33.3 (5.8)
Months of marriage (cohabitation) (SD)		41.1 (24.5)		36.1 (19.1)	
Age of the child month (SD)		5.2 (1.2)		4.5 (1.3)	
Occupation (%)	Businessmen	25 (43.1)	36 (62.1)	92 (48.9)	120 (63.8)
	Official	7 (12.1)	9 (15.5)	26 (13.8)	36 (19.1)
	Independent Business	0	4 (6.9)	6 (3.2)	10 (5.3)
	Company Officers and Managers	1 (1.7)	0	2 (1.1)	2 (1.1)
	Faculty and Researchers	6 (10.3)	5 (8.6)	10 (5.3)	8 (4.3)
	Full-time housewife and househusband	12 (20.7)	0	31 (16.5)	2 (1.1)
	Part-time job	2 (3.4)	1 (1.7)	12 (6.4)	2 (1.1)
	Not recorded	5 (8.6)	3 (5.2)	9 (4.8)	8 (4.3)
Childcare support (%)	Yes	46 (79.3)	47 (81.3)	138 (73.4)	148 (78.7)
	No	10 (17.2)	9 (15.5)	50 (26.6)	40 (21.3)
	Not recorded	2 (3.4)	2 (3.4)	0	0
Childcare leave (%)	Yes	35 (60.3)	4 (6.9)	124 (66.0)	40 (21.3)
	No	21 (36.2)	52 (89.7)	64 (34.0)	145 (77.1)
	Not recorded	2 (3.4)	2 (3.4)	0	3 (1.6)

Table 2. Factor Structure of the Harmony Scale for Postpartum Couples for First-time Parents

N=376

Factor/item	Factor Ⅰ	Factor Ⅱ	Factor Ⅲ	Factor Ⅳ
Factor Ⅰ [Intimacy with partner] α = .785				
Q9. I am satisfied with how household chores are divided between me and my partner.	.816	.005	.051	.103
Q5. I feel I have too many roles or responsibilities. (R)	-.684	.230	.237	-.055
Q2. I am satisfied with how childcare is divided between me and my partner.	.636	.026	.049	-.097
Q18. I often feel irritated with my partner. (R)	-.561	-.129	-.183	.086
Factor Ⅱ [Physical・Social Health] α = .751				
Q21. It is hard for me to recover from fatigue. (R)	.112	.800	-.099	.107
Q6. I feel physically tired. (R)	-.028	.739	-.078	-.022
Q10. I am not getting enough sleep. (R)	-.074	.630	.121	.028
Q15. I am always busy and cannot do the things I want to do. (R)	-.066	.410	-.118	.091
Factor Ⅲ [Mental Health] α = .767				
Q1. I feel fulfilled every day.	.056	.211	.767	-.117
Q4. I feel energetic every day.	-.056	-.215	.745	.156
Q17. I am motivated about things.	-.042	-.064	.598	.017
Q19. I can spend my days feeling relaxed.	.131	-.174	.428	.033
Factor Ⅳ [Self-efficacy in Parenting] α = .673				
Q13. I cannot parent the way I want to. (R)	-.006	.093	.019	.671
Q20. I worry about whether I can raise my child. (R)	-.047	-.042	-.062	.669
Q16. There are many things that make me worried about parenting. (R)	.045	.126	.098	.526

An exploratory factor analyses was conducted the principal factor method and promax rotation.
The KMO was .783 and Bartlett's test of sphericity was significant ($p < .001$).
Cronbach's α for the total score was .825.
Cumulative variance was 48.47%.

Confirmatory factor analysis

Three models (Models A–C) were compared. Model A, which enabled covariances among the four latent factors (Factors I–IV), demonstrated the best model fit (χ^2/df = 3.573, GFI = .908, AGFI = .869, CFI = .880, RMSEA = .083) and was, therefore, adopted (Table 4).

The standardized path coefficients between the latent and observed variables ranged from .53 to .87 (Figure 1).

DISCUSSION

Factor structure of the HSPC for First-time Parents

The HSPC, developed for first-time parents after childbirth, was initially constructed based on four conceptual domains identified through concept analysis, namely, <Intimacy with partner>, <Health>, <Comfortable environment>, and <Affection toward the child>. EFA yielded a final four-factor structure consisting of 15 items : [Intimacy with partner], [Physical・Social Health], [Mental Health], and [Self-Efficacy in Parenting].

Among these four attributes, <Intimacy with partner> was retained as [Intimacy with partner]. <Health> was divided into two independent factors—[Physical・Social health] and [Mental health]. <Comfortable environment>, which had encompassed parenting self-efficacy as well as the physical and social environment, was reorganized to focus solely on [Self-Efficacy in Parenting]. <Affection toward the child> was not extracted as either a factor or an item.

The total HSPC scores ranged 15–60, with higher scores indicating greater harmony between postpartum couples. High

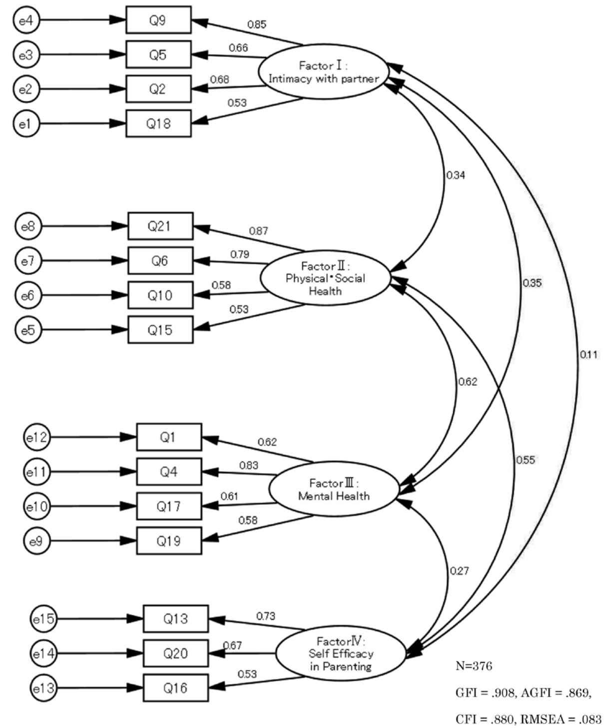

Figure 1. Confirmatory Factor Analysis of the Harmony Scale for Postpartum Couples for First Time Parents
○ indicates a latent variable, □ indicates an observed variable, and Q refers to the item number in the questionnaire.

Table 3. Criterion-Related Validity Based on Correlations with Existing Scales (N=376)

		HSPC 15 All item	Factor Ⅰ Intimacy with partner	Factor Ⅱ Physical・Social Health	Factor Ⅲ Mental Health	Factor Ⅳ Self-Efficacy in Parenting
QMI		.458**	.523**	.172**	.420**	.181**
PSE		.539**	.233**	.331**	.642**	.412**
WHO-QOL26	26 All Item	.730**	.427**	.522**	.715**	.411**
	Physical Health	.700**	.319**	.624**	.628**	.378**
	Psychological Health	.679**	.397**	.460**	.691**	.410**
	Social Relationships	.420**	.193**	.294**	.442**	.263**
	Environment factors	.604**	.390**	.407**	.592**	.345**

Spearman's rank correlation coefficient test. ** p < .01.

HSPC = Harmony Scale for Postpartum Couples
QMI = Japanese version The Quality of Marriage Index
PSE = Japanese version Parenting Self-Efficacy Scale
WHO-QOL26 = Japanese version World Health Organization Quality of Life 26

Table 4. The model fitness index of the HSPC (N = 376)

Model	χ^2	df	GFI	AGFI	CFI	RMSEA
A	300.143	84	.908	.869	.880	.083
B	302.834	85	.908	.870	.879	.083
C	373.025	85	.891	.846	.840	.095

Structural equation modeling was used for the analysis ; Chi-square(χ^2), degree of freedom ratio (df), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA)
HSPC = Harmony Scale for Postpartum Couples
Model A was 15-items of the HSPC by the exploratory factor analysis.

scores for both partners reflect a high level of overall couple harmony.

Based on the findings of the factor analysis, this study examined the characteristics of each subscale and the resulting factor structure to clarify the conceptual validity of harmony among postpartum couples as measured using the HSPC scale.

Characteristics and interpretation of each factor

[Intimacy with partner] reflects the extent to which couples maintain and develop an emotional and practical cooperative relationship while raising a child. The extracted items mainly focus on specific role adjustments and fairness in daily life, such as “Satisfaction with the division of childcare and household with partner (Q2, Q9),” and “Sense of role burden (Q5).” Furthermore, the inclusion of “irritation with my partner (Q18),” suggests that satisfaction with role allocation and cooperation in daily parenting and household tasks influences emotional evaluations of one’s partner.

[Intimacy with partner] is essential for sustaining emotional intimacy during the postpartum period through “appropriate division of roles” and “collaboration” in daily life. The postpartum transition is a time when relationship functioning tends to decline (15). However, this study indicates that intimacy is shaped by how couples adjust and support one another in their role responsibilities. Therefore, [Intimacy with partner] is a key factor supporting couple harmony after childbirth.

[Physical · Social Health] reflects the physical recovery of both partners (particularly mothers) after childbirth and their capacity—stamina, sleep, and available time—to manage childcare and daily responsibilities. The extracted items focus on accumulated physical fatigue, including “hard for me to recover from fatigue (Q21),” “feel physically tired (Q6),” and “not getting enough sleep (Q10),” as well as activity limitations caused by insufficient physical or time resources, such as “I am always busy and cannot do the things I want to do (Q15).”

Although the original conceptual framework for postpartum couple harmony treated health as a comprehensive concept encompassing physical, mental, and social aspects, the factor analysis identified physical · social and mental aspects as independent domains. Physiological exhaustion, such as physical fatigue and lack of sleep, strongly influenced physical health Regarding social aspect, the response “I am always busy and cannot do the things I want to do (Q15),” indicated that postpartum couples have limited time flexibility due to the responsibilities of work, childcare, and housework, which affects their discretion in life. Subjective health has been shown to decline among first-time parents from pregnancy to 6 months postpartum, influenced by work and partner-related factors (53). Thus, balancing work and life is essential. [Physical · Social Health] is a crucial factor for supporting couple harmony after childbirth.

[Mental Health] represents psychological stability and the maintenance of positive affect as partners adjust to rapid lifestyle changes and parenting-related stress. The extracted items relate to vitality, such as “fulfilling every day (Q1),” and “motivated about things (Q17),” as well as psychological stability, such as “feeling relaxed (Q19).” Both men and women experience fluctuations in depression and anxiety from early pregnancy through the early postpartum period (54), and mutual awareness and support for each partner’s mental health are essential for sustaining harmony. Postpartum depression affects marital relationships—and marital relationships, in turn, influence depression (55, 56). [Mental Health] is a key factor supporting couple harmony after childbirth.

[Self-Efficacy in Parenting] reflects couples’ confidence in their parenting roles and their shared belief in their ability to manage the challenges of raising a child. The extracted items relate to perceived parenting anxiety, worry, and failure, such as “I cannot parent the way I want to (Q13 R),” “I worry about whether I can raise my child (Q20 R),” and “There are many things that make me worried about parenting (Q16 R).” This factor indicates a decline in self-efficacy. [Self-efficacy in Parenting], defined as a <Comfortable environment> in the original conceptual framework, was extracted as a single stable factor. <Comfortable environment> was a broad concept encompassing physical (housing, rest), social (support, finances), and parenting self-efficacy. This result was extracted as a measure of individuals’ adjustment to their parenting role against the backdrop of external environmental factors (physical environment, economic stability) rather than external environmental factors themselves. [Self-Efficacy in Parenting] thus captures cognitive aspects, such as anxiety, confidence, and worry regarding childcare, and serves as a key component supporting postpartum couple harmony.

In the original conceptual framework, <Affection toward the child> which included emotional concern for children and shared parenting goals, was included but was removed due to ceiling and floor effects. Because expressions of <Affection toward the child> (e.g., love, protectiveness, anticipation of growth) are strongly influenced by social desirability, they may not reflect meaningful variance. However, marital relationships are significantly associated with abusive tendencies among both men and women (57), marital discord is a risk factor for abuse (58), and marital relationships affect children’s mental health (59, 60).

<Affection toward the child> which is correlated with marital relationships, remain theoretically important when evaluating couple harmony. Future measurement approaches should consider developing items that minimize social desirability bias.

Many existing marital (couple) relationship assessment scales (e.g., QMI) (44, 45) primarily focus on relational functions such as communication, conflict, and intimacy between spouses. In contrast, depression assessment scales (e.g., EPDS) (28) and parenting self-efficacy scales (e.g., PSE) (46) emphasize individual mental states and adaptation to parental roles. However, the HSPC in this study extracted not only the core aspect of relational functioning, [Intimacy with partner], but also the aspects of [Physical and Social Health] and [Mental Health] as independent factors. These aspects pertain to the individual resources essential for each partner to maintain a healthy relationship while raising children. In particular, [Physical · Social Health] assesses aspects rooted in life with children, such as “physical fatigue (Q6, Q10, Q21),” and “time constraints (Q15),” which have been largely overlooked by existing couple relationship scales. This scale suggests that these factors influence the harmony of postpartum couples. Furthermore, [Self-Efficacy in Parenting] is a factor that captures the anxiety and confidence experienced by first-time parent couples as they face new role challenges, premised on their relationship with their partner and daily mutual cooperation. This allows for an assessment of adaptation to parental roles formed within the postpartum living environment and couple interactions, differing in this respect from existing scales.

Reliability and validity
Reliability of the HSPC

Cronbach’s α coefficients were calculated to examine the internal consistency of the 15 items extracted through EFA, which comprised four factors. The Cronbach’s α coefficient for the overall scale was .825, and the coefficients for the four subscales (Factors I–IV) ranged from .673 to .785. Although no universally accepted standard exists for Cronbach’s α coefficients in scale development—given that are dependent on the constructs being measured and number of items—values above .80 are generally considered desirable, while values below .50 warrant the need

for revision (61). A minimum acceptable threshold of .70 has also been recommended for reliability in the social and behavioral sciences (62). Based on these criteria, the present scale demonstrated adequate internal consistency both for the overall scale and for its subscales.

Criterion-related validity

The HSPC exhibited a strong positive correlation with the QMI, which measures marital satisfaction, and with the [Intimacy with partner] subscale of the HSPC. These findings confirm the concurrent validity of the HSPC in relation to marital satisfaction and indicate that the scale is suitable for assessing harmony among postpartum couples.

The PSE measures parenting-related self-efficacy. This study found strong positive correlations between the HSPC and PSE, particularly between the PSE and the [Mental Health] and [Self-efficacy in Parenting] subscales. These results confirm the concurrent validity of the HSPC with parenting self-efficacy. Previous studies have reported that participants with higher self-efficacy exhibit better mental health and experience less stress in daily life (63, 64), which supports the observed associations between [Self-efficacy in Parenting] and [Mental Health] in this study.

A strong positive correlation was also observed between the overall HSPC score and WHO-QOL26, which comprehensively assesses QOL, as well as between the HSPC subscales and WHO-QOL26. The physical health subscale of WHO-QOL26 was strongly correlated with [Physical・Social Health] subscale of the HSPC, while the psychological health subscale of the WHO-QOL26 was strongly positively correlated with the [Mental Health] subscale of the HSPC. These findings suggest that the HSPC captures perspectives related to marital satisfaction, parenting self-efficacy, and physical and mental health.

Based on these results, the four domains extracted through concept analysis—<Intimacy with partner>, <Health>, <Comfortable environment>, and <Affection toward the child>—were ultimately operationalized as [Intimacy with partner], [Physical・Social Health], [Mental Health], and [Self-Efficacy in Parenting]. Collectively, these dimensions indicate that harmony among postpartum couples can be assessed through these constructs.

Model Fit

The model fit indices obtained via CFA were as follows : GFI = .908, AGFI = .869, CFI = .880, and RMSEA = .083. In general, GFI, AGFI, and CFI values more than .90 are considered desirable, and the AGFI value should be typically less than the GFI value (48).

The RMSEA was slightly above .08, which is considered to be an acceptable level within the range of approximation error (65). The path coefficients showed factor loadings (standardized coefficients) for all items ranging .53–.87, exceeding the standard of .50 (66).

Inter-factor correlations showed moderate correlations between [Physical・Social Health] and[Mental Health] (r = .52) . And between [Mental Health] and [Self-efficacy in Parenting] (r = .55), consistent with findings that physical and mental health correlates with parenting confidence. On the other hand, the correlation between [Intimacy with partner] and [Self-efficacy in Parenting] was weak (r = .11). This suggests that intimacy with partner and [Self-efficacy in Parenting] are independent psychological constructs, supporting the discriminant validity of this scale. Clinically, anxiety about parenting for the first time is frequently observed, even in healthy couple relationships, making this result theoretically consistent.

The cumulative contribution rate obtained in this study was 48.474%. In the social sciences, because psychological and social constructs are multifaceted, a cumulative contribution rate of approximately 50–60% is considered valid (66). Although the cumulative contribution rate of the HSPC fell just short, because the HSPC deals with multidimensional constructs such as postpartum couple intimacy, physical health, mental health, and self-efficacy in parenting, a cumulative contribution rate of approximately 48% is an acceptable level. From the above, it was confirmed that this scale has a theoretically consistent structure in terms of both reliability and validity.

Practical implications of the HSPC

The HSPC can serve as a useful tool for examining how first-time parents navigate the transition to parenthood, a period during which relationship satisfaction commonly declines. Using the scale during individual consultations at infant health checkups enables healthcare providers to obtain a comprehensive and multidimensional assessment of couple harmony during the postpartum period.

Based on the results, couples may be encouraged to engage in dialogue and mutual adjustment, which can strengthen relational harmony and enhance collaborative adaptation to early parenting demands.

LIMITATIONS AND FUTURE DIRECTIONS

The 188 couples who participated in this study understood the research objectives and represented a relatively high marital satisfaction group, as indicated by their average QMI score (mean : 19.4/24), reflecting fewer disagreements than couples experiencing postpartum relationship deterioration (16, 17). Additionally, participants generally had good physical and mental health, both for themselves and their infants ; therefore, the findings may not be generalizable to couples facing health or relationship challenges. Moreover, this study is that data collection occurred during the unprecedented period of the COVID-19 pandemic. This period may have involved qualitatively different circumstances for perinatal care and marital relationships compared to normal times, requiring caution in interpreting the results and applying them.

Future research should apply the HSPC to couples with diverse characteristics—including varying health conditions, socioeconomic backgrounds, and relationship satisfaction levels—to examine differences in harmony across populations and further validate the robustness and applicability of the scale. While the present results help clarify postpartum harmony among relatively stable first-time parents, further validation in more diverse samples is needed for broader application.

CONCLUSION

This study developed and validated the HSPC, a scale specifically designed for first-time parents after childbirth. The final scale consisted of 15 items across four factors, namely, [Intimacy with partner], [Physical・Social Health], [Mental Health], and [Self-Efficacy in Parenting], and demonstrated satisfactory reliability and validity.

The HSPC supports the assessment of harmony among postpartum couples, thereby facilitating dialogue and mutual adjustment between partners. Furthermore, the scale holds the potential to contribute to the development and evaluation of programs aimed at promoting couple harmony during the transition to parenthood.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

ACKNOWLEDGMENTS

We would like to express our sincere gratitude to the couples who participated in this study and to the staff of the collaborating facilities for the valuable cooperation.

AUTHOR CONTRIBUTIONS

K.I and M.H conducted all aspects of the research. All authors read and approved the final manuscript.

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