

Developing a Short Version of the Co-Parenting Awareness Scale Through Confirmatory Factor Analysis: Associations with Parenting Time, Number of Children, Age of Children, and Prenatal Discussions

Yoshiko Shimizu*

Department of Nursing, Nagoya University of Arts and Sciences, Naka-ku, Japan

*Corresponding Author: Yoshiko Shimizu, Department of Nursing, Nagoya University of Arts and Sciences, Naka-ku, Japan.

Received: August 28, 2023; Published: September 15, 2023

Abstract

Cooperative parenting by couples after the birth of a child is a topic that has been attracting attention in Japan and other countries because of its positive impact on mothers, fathers, and children. In this study, a 29-item co-parenting awareness scale was developed based on an interview survey conducted with Japanese respondents. A confirmatory factor analysis of the co-parenting awareness scale was conducted using the marriage “reality” scale and the marital communication attitude scale to test the reliability and validity of the co-parenting awareness scale, analyze its associations with time spent parenting, number of children, age of children, and prenatal discussions, and develop a short version of the scale. A preliminary online survey was conducted with 1000 mothers and fathers using the self-administered questionnaire tool of the academic and research institution Freeasy. In the main survey, 378 parents of children up to 5 years old who had expressed a willingness to take part in the study were invited to participate, and 334 responses were received. Based on the analysis, a co-parenting awareness short scale composed of 15 items in 4 sub-scales was developed, with the following factor names and item numbers (Cronbach’s alpha coefficient): “Mutual emotional support”, 4 items (0.84); “Mutual material support”, 4 items (0.82); “Parenting agreements and negotiations”, 3 items (0.73); “Difficulty sharing responsibility”, 4 items (0.77). The Co-parenting Awareness Short Scale was significantly associated with parenting time, number of children, age of children, and prenatal discussions of shared parenting. Characteristics relating to age of children, discussion of shared parenting during pregnancy, and awareness of parental cooperation using the Co-parenting awareness short scale were predictive of active parenting behavior.

Keywords: Co-Parenting; Short Scale; Development; Associated Factors; Childcare Time

Introduction

Co-parenting refers to parents sharing childcare duties and supporting and coordinating each other’s parental roles, as well as their relationship with their child. It can also be described as a cooperative approach to fulfilling parental roles. Co-parenting does not mean equal involvement in parenting by the father and mother. What is important is that both parents agree with and assure one another that their roles and responsibilities are fair. Successful co-parenting has been found to improve couples’ relationships with each other, reduce childcare anxiety and stress, enhance the quality of parenting and parents’ kindness toward their children, and build positive relationships that promote children’s development [1-3].

Co-parenting has been studied outside Japan as well, with reports that expectations regarding co-parenting form during or even before pregnancy [4]. In a study on co-parenting, the parent-child relationship and whole-family co-parenting behavior was reported in the case of 30-month-old children; co-parenting has been linked to behavior associated with the family situation, and ideal co-parenting varies from culture to culture [5]. An independent comparison of new parents in eight European countries conducted through long-term qualitative analysis explored various methods used by dual-income couples to plan, realize, and justify the division of work and care duties during the transition to parenting. The study examined young women's expectations for future choices in professional work-life balance and found associations with work culture and family policy services in work and family life courses, among others [6]. A strong association with gender roles was observed outside Japan, as well. In a comparative report of Finland, Portugal, and Japan-countries that have seen progress in gender equality and egalitarian views on the division of parenting between couples [7]-commonalities were revealed between the three countries, as well as points that were specific to Japan. The commonalities include the processes by which couples build consensus and team spirit. Finland and Portugal display ambivalent expectations in that although parenting is expected to be centered on mothers, equality is pursued and emotional support is desired, whereas in Japan, it is accepted that fathers will prioritize paid work.

An intervention study through a program for couples expecting a child was conducted in Japan by the Tohoku University Co-parenting Research Team [8,9]; further, a Co-parenting Regulation Scale was developed [10,11] based on previous research. Although scales had been created based on the translation of those developed outside Japan, the issue of developing a scale for Japanese was left unresolved. Therefore, as the importance of support for co-parenting became evident, a Co-parenting Awareness Scale was developed based on interviews with Japanese parents [12,13]. The Co-parenting Awareness Scale reveals couples' opinions on and commitment to cooperation in parenting and factors promoting and inhibiting that awareness. The resulting Co-parenting Awareness Scale is composed of 29 items under four factors: "Compassion and gratitude toward one's spouse", "Desire to help each other and related behavior", "Communication between spouses", and as an inhibiting factor "Barriers to cooperation between spouses". However, the association between scores on the Co-parenting Awareness Scale and parenting behavior by couples remained to be examined. Therefore, the present study conducts a confirmatory factor analysis to assess the reliability and validity of the scale and discusses associations with parenting behavior and changes in co-parenting awareness due to children's growth to develop a short version of the scale and contribute to its wider use.

Purpose of the Study

This study's purpose is to revalidate the co-parenting awareness scale and create its short version. Further, it aims to examine changes during children's growth and their associations with parenting behavior.

Research Methods

Survey methods

A questionnaire was administered through an online survey (via Freeasy, an academic and research institution).

Survey respondents

The study targeted the prefectures with the highest number of children, namely, Aichi, Hiroshima, Saitama, Shizuoka, Chiba, Osaka, Tokyo, Fukuoka, Hyogo, and Hokkaido. Respondents were married (not widowed or divorced) fathers and mothers (aged 27 - 39 years) of children up to 5 years old.

Survey details

Preliminary survey

The survey items confirmed whether respondents had children up to 5 years old, whether they were married and not widowed or divorced, the age of the children, the number of children, responses to the Co-parenting Awareness Scale, and willingness to cooperate in a future survey.

The survey was conducted on March 13, 2023. In this survey, 1000 people (500 men, 500 women) were invited to participate, and 1000 responses (100%) were received. There were 608 valid responses (305 men, 303 women), and 378 respondents (188 men, 190 women) expressed a willingness to cooperate in a future survey. The respondents' average age was 34.38 ± 2.94 years for men and 33.47 ± 3.09 years for women.

Main survey

The survey was conducted between April 7 and April 20, 2023. Among those invited to participate, responses were received from 168 out of 190 women (88.4%), and 170 out of 188 men (91.0%). The survey items confirmed the presence or absence of cohabitants other than the couple and children, sleep and waking up times (5 days a week or more), whether respondents woke up before 5 AM, whether respondents went to bed after 12 AM, whether respondents performed childcare on non-working days, and fathers' parenting time on working and non-working days, as well as responses to the childcare happiness short scale, childcare stress short scale, marriage "reality" scale, and marital communication attitude scale.

Scales used in the surveys

Co-parenting awareness scale

The co-parenting awareness scale developed [12,13] is composed of 29 items on married couples' awareness of cooperation in parenting, divided into four sub-scales: "Compassion and gratitude toward one's spouse", "Desire to help each other and related behavior", "Communication between spouses", and "Barriers to co-parenting." "Barriers to co-parenting" has an inhibiting effect on co-parenting.

Marriage "reality" scale

The study used the marriage "reality" scale, developed [14] which represents awareness of married life. The scale examines the mutual agreement between husband and wife. It is divided into three sub-scale items: "Mutual affection", which relates to mutual affection and respect between husband and wife; "Understanding and support for husband", on how the wife shows understanding, respect, and support for the husband's individual role and lifestyle; and "Understanding and support for wife", on how the husband shows understanding, respect, and support for the wife's individual role and lifestyle. Each sub-scale consists of 4 items; thus, there is a total of 12 items.

Marital communication attitude scale

The marital communication attitude scale, developed [15], is composed of 4 dimensions-Coercion (5 items); Empathy (5 items); Reliance and intimacy (7 items); Neglect and avoidance (5 items)-and there is a total of 22 items. Responses are evaluated on a four-point scale (with options ranging from "Often" to "Never"). Empathy and Reliance and intimacy constitute positive attitudes, whereas Coercion and Neglect and avoidance are negative attitudes. The husband and wife respond with regard to each other's attitudes. The Marital Communication Attitude Scale was developed based on a survey of middle-aged married couples. Since the present survey targeted young married couples, the factor structure was confirmed through an exploratory factor analysis, and the goodness of fit of the model was confirmed through a confirmatory factor analysis.

Additionally, for surveys with item options on housework and childcare that husbands perform equally with their wives (50 childcare items), childcare happiness short scale [16] childcare stress short scale [17] were administered. However, these were excluded from the analysis in the present study.

Analysis methods

The results collected through the web survey were saved as CSV files, which were downloaded, aggregated to import into statistical analysis software, and analyzed using the statistical analysis software IBM SPSS 25 and IBM Aoms 26. A path diagram of F1 to F4 was created using the 29 items in the co-parenting awareness scale as observed variables (after reverse processing the reverse items); the four factors “compassion and gratitude toward one’s spouse”, “desire to help each other and related behavior”, “communication between spouses”, and “barriers to co-parenting” were set as latent variables. The arbitrary coefficient for the path from the factors to the observed variables was set to 1, and it was hypothesized that a correlation coefficient (covariance) would be found between the four factors. A confirmatory factor analysis was also conducted, with all paths from the error variables derived from the observed variables set to 1. The 21 items in the marital communication attitude scale were scored with 1 for “never”, 2 for “rarely”, 3 for “sometimes”, and 4 for “often”, and an exploratory factor analysis followed by a confirmatory factor analysis was conducted. The 21 items in the marital communication attitude scale were scored with “1” for “never”, “2” for “rarely”, “3” for “sometimes”, and “4” for “often.” an exploratory factor analysis and a confirmatory factor analysis were performed.

To indicate the husband’s parenting behavior, respondents selected the approximate mean amount of time per day over the relevant days of the week, for working days and non-working days, respectively. The data processing values for each time option were: 0 minutes = 0, approximately 10 minutes = 10, approximately 30 minutes = 30, approximately 30 - 60 minutes and approximately 60 minutes = 60, approximately 1 - 2 hours = 90, approximately 2 - 3 hours = 150, approximately 3 - 4 hours = 210, and 4 hours or more = 270. These figures were collected for one working day and one non-working day, and the total was considered to be the respondent’s parenting time. Parenting time was divided into 5 categories: up to 60 minutes, 1 - 2 hours, 2 - 3 hours, 3 - 4 hours, and 4 hours or more. Time spent parenting by the husband was defined according to the amount of housework and childcare behavior the husband engaged in. Amounts of time such as “long” or “much” were expressed as “high” and amounts of time such as “short” or “little” were expressed as “low.” A stepwise multiple regression analysis was conducted with the Co-parenting Awareness sub-scales as the explanatory variables to find associations and direction of impact on parenting time (the dependent variable).

Ethical considerations

Through a written invitation for participating in the survey, participants were informed that cooperation was voluntary and that they could withdraw from the study without negative consequences. The questionnaire included a checkbox to confirm participants’ consent. This study was reviewed by the Research Ethics committee of Nagoya University of Arts and Sciences (approval number: 621; approval date: October 28, 2022).

Results

Valid responses were obtained from 334 participants, with women and men, respectively, aged 33.48 ± 3.04 years and 34.61 ± 2.95 years. The sample of men included 170 workers and 0 homemakers and that of women included 94 workers and 70 homemakers. The number of children was 1.67 ± 0.74 , and the age of children (up to 5 years old) was 2.26 ± 1.58 years.

Co-parenting awareness scale: Confirmatory factor analysis

The exploratory factor analysis focused on the factor structure of the group of items, as well as which items were loaded by which factors. The confirmatory factor analysis statistically verified whether the data fit the researcher’s hypothetical model and whether

multiple question items represented the constructs that the scale aimed to measure as per the hypothesis. Based on the data obtained, an exploratory factor analysis was conducted, and sub-scales were created. If the results were in line with the theoretical structure, it was considered strong evidence for the scale’s structural aspects. However, in many cases, the results of the exploratory factor analysis were not in line with the theoretical structure. In these cases, a confirmatory factor analysis based on the theoretical structure was conducted, and its results were given careful consideration. Thus, the goodness of fit of the co-parenting awareness scale model was confirmed. The co-parenting awareness scale sub-scale items and statistics are shown in table 1. When confirmatory factor analysis was performed with the standardized solutions, the results were CMIN = 1033.83, DF = 375, P = 0.000, GFI = 0.815, AGFI = 0.785, CFI = 0.869, RMSEA = 0.073; the goodness of fit of the model was found to be insufficient. To improve goodness of fit, the paths from the observed values with the highest modification index were subtracted, estimates were calculated each time, and the items were eliminated, obtaining results that fit the data better than the initial model. With CMIN = 106.19, DF = 84, and P = 0.051, the significance probability was .05 or more. It was, thus, determined that “the constructed model was correct”, and the hypothesis was not dismissed. With GFI = 0.96, AGFI = 0.94, CFI = 0.99, and RMSEA = 0.028, four items were within the range of fit. The factors and the respective items are shown in table 2. The four sub-scale items were: F1, four items, “mutual emotional support”; F2, four items, “mutual material support”; F3, three items, “parenting agreements and negotiations”; and F4, four items, “difficulty sharing responsibility”.

Factors	Items	MEAN	SD	α coefficient
Compassion toward one's spouse				
	1 The husband wants to make his wife comfortable.	3.83	.89	.91
	2 The husband cares about his wife.	3.91	.78	
	3 The husband cherishes the time he spends with his wife.	3.85	.84	
	4 The husband tries to find out what his wife wants.	3.52	.89	
	5 The husband is considerate of his wife.	3.84	.86	
	6 The husband tries to listen to his wife.	3.77	.84	
	7 The husband praises his wife and expresses his gratitude with words.	3.65	.97	
	8 Both the wife and the husband say “thank you” and remember to express gratitude.	3.80	.90	
	9 The husband understands the burden carried by his wife.	3.64	.97	
	10 The husband guides his wife so that she would not have regrets.	3.49	.90	
Desire to help each other and related behavior				
	11 The husband spontaneously helps with both housework and childcare.	3.76	.92	.89
	12 The husband does what he can in terms of cooking.	3.49	1.16	
	13 The husband takes care to help his wife and give her some alone time so that she would not be frustrated.	3.51	.96	
	14 The husband does his best not to leave everything to his wife.	3.66	.97	
	15 The husband wants to do what he can.	3.84	.85	
	16 The husband is motivated and always thinking of better ways to do things.	3.42	.98	
	17 The husband cooperates with everything without comment or complaint.	3.40	1.00	
Communication between spouses				
	18 We pay attention to each other and discuss things as they happen.	3.59	.87	.77
	19 We put our feelings and opinions into words and communicate with each other.	3.74	.83	
	20 The wife can leave anything to her husband.	3.29	1.07	
	21 The wife asks her husband for his opinion even when she is in charge.	3.58	.88	
	22 The husband responds calmly to the children.	3.56	.94	
Barriers to cooperation between spouses				
	23 The husband has little time to interact with his wife.	2.89	1.02	.86
	24 The husband leaves almost everything to his wife.	3.04	1.12	
	25 The husband prioritizes his job.	2.78	1.08	
	26 The husband does all kinds of things but leaves all responsibility to his wife.	3.37	1.07	
	27 The husband has a strong belief that "work is for men, housework is for women."	3.45	1.19	
	28 The wife would like to talk and share with her husband, but he does not agree.	3.45	1.01	
	29 It feels like the husband and wife have different values.	2.99	1.08	

Table 1. Co-parenting Awareness Scale Statistics

Items	Factors			
	F1	F2	F3	F4
Q2 The husband cares about his wife.	.76			
Q4 The husband tries to find out what his wife wants.	.76			
Q5 The husband is considerate of his wife.	.80			
Q6 The husband tries to listen to his wife.	.71			
Q11 The husband spontaneously helps with both housework and childcare.		.75		
Q13 The husband takes care to help his wife so that she would not be frustrated.		.77		
Q16 The husband is motivated and is always thinking of better ways to do things.		.70		
Q17 The husband cooperates with everything without comment or complaint.		.68		
Q18 We pay attention to each other and discuss things as they happen.			.76	
Q19 We put our feelings and opinions into words and communicate with each other.			.78	
Q21 The wife asks the husband for his opinion even when she is in charge.			.58	
R23 The husband has little time to interact with his wife.				.53
R27 The husband has a strong belief that "work is for men, housework is for women."				.62
R28 The wife would like to talk and share with her husband, but he does not agree.				.84
R29 It feels like the husband and wife have different values.				.72
Inter-factor correlation				
	F1	F2	F3	F4
F1 Mutual emotional support	-	.90	.80	.42
F2 Mutual material support		-	.75	.34
F3 Parenting agreements and negotiations			-	.26
F4 Difficulty in sharing responsibilities				-

Reverse items are marked with an R.

$\chi^2 = 106.19$, $df = 84$, $p = .051$, $GFI = .96$, $AGFI = .94$, $CFI = .99$, $RMSEA = .028$

Table 2. Co-parenting Awareness Scale: Confirmatory Factor Analysis Results (Standardization Estimate)

Validity of the co-parenting awareness short scale

Evidence from a structural aspect

The co-parenting awareness scale was created by verifying the factor analysis results, internal consistency, and logical structure of prior research, as well as the adequacy of scoring procedure and correlation between items. A confirmatory factor analysis based on the scale's theoretical structure was performed, and the results were carefully considered. The structural aspect of the scale was thus verified.

Confirmation of internal consistency

Although similar observed variables were expected to cluster in the confirmatory factor analysis, as a precaution, a Cronbach's alpha coefficient was used to test for internal consistency. The results were sufficient, with over 0.7 for all four factors, namely 0.84 for four items in F1, 0.82 for four items in F2, 0.73 for three items in F3, and 0.77 for four items in F4.

Evidence from a generalizability aspect

Although the conditions were the same for all respondents in the co-parenting awareness scale questionnaire, the goodness of fit was confirmed for data on the different populations of model 1 (prior research) and model 2 (preliminary survey) and for the two parts of the sample of respondents in the main survey, model 3 (fathers) and model 4 (mothers). A Mann-Whitney U test confirmed that data from

the short co-parenting awareness sub-scale scores were different for model 1 and model 2 and for model 3 and model 4 (Table 3), and a confirmatory factor analysis was subsequently performed. The results for the fit of the models are shown below (Table 4). The estimates were calculated once and not improved based on the modification index.

	F1	p	F2	p	F3	p	F4	p
Model 1	16.00	.00 **	14.00	.02 *	11.00	.00 **	13.00	.00 **
Model 2	15.00		14.00		11.00		12.00	
Model 3	16.00	.00 **	15.00	.00 **	11.00	.15 ns	12.00	.24 ns
Model 4	15.00		13.00		11.00		12.00	

p: Mann–Whitney U test p > .05
Model 1×Model 2, Model 3×Model 4

Table 3 Comparison of Sub-scale Scores for the Models

	CMIN	GMIN/DF	P	GFI	AGFI	CFI	RMSEA
Model 1	259.53	3.1	.00	.95	.93	.95	.06
Model 2	207.34	2.5	.00	.96	.94	.96	.05
Model 3	108.40	1.3	.04	.92	.89	.98	.04
Model 4	130.70	1.6	.00	.91	.87	.96	.06
Goodness of fit range	Good	<2	>.05	>.95	>.90	>.97	<.05
	Acceptable	<3		>.90	>.85	>.95	<.08

Table 4 New Co-parenting Awareness Scale Goodness of Fit for Each Model

Models 1 and 2 were in a good range of fit in the model’s goodness of fit index for the four items. Models 3 and 4 were in an acceptable range in the model’s goodness of fit index for the four items.

Evidence from an external aspect

This refers to evidence that the hypothesized correlation patterns between different variables exist in practice. The correlation is expected to be high when the same properties are measured (convergent evidence) and low when different properties are measured (discriminant evidence). Moreover, even when the same properties are measured, simply using different measurement methods will result in lower correlation. The fact that sub-scales are independent of each other means not only that they are separate entities in terms of factor structure but also that the distinctive properties of each sub-scale can be confirmed based on associations with other primary factors. Correlation was tested with two existing scales: the marriage “reality” scale and the marital communication attitude scale.

Exploratory factor analysis and confirmatory factor analysis were performed to confirm the fit of the marital communication attitude scale model. The validity of the exploratory factor analysis was measured at 0.85, and three factors had eigenvalues of 1 or more, with a factor structure of 5.255, 2.590, 1.408, 0.853... After conducting a factor analysis on the three-factor structure using the principal factor method and promax rotation method, a confirmatory factor analysis was performed by creating a 15-item path diagram with factors 1–3 as latent variables. The fit indices of the model were P of CMIN = 0.000, GFI = 0.739, AGFI = 0.656, CFI = 0.739, and RMSEA = 0.149, indicating insufficient fit. After improvement based on the modification index, the values of four items were within the range of fit: P of CMIN = 0.000, GFI = 0.952, AGFI = 0.923, CFI = 0.952, and RMSEA = 0.06. Factor 1 contained items on “Empathy and reliance”, Factor 2 on “Coercion”, and Factor 3 on “Neglect and avoidance”. The number of items and reliability alpha coefficient for each factor were as follows,

indicating a sufficiently high reliability coefficient: 0.81 for factor 1 (five items); 0.77 for factor 2 (four items); and 0.82 for factor 3 (two items). The marital communication attitude scale was, thus, divided into three sub-scales: Empathy, coercion, and neglect. The marital communication attitude confirmatory factor analysis results are shown below (Table 5).

	Factors		
	Empathy	Coercion	Neglect
My wife sincerely listens to me and puts herself in my shoes.	.78		
When I am feeling down, my wife talks to me with kindness.	.71		
My wife and I open up to each other and talk about our innermost feelings.	.66		
My wife openly expresses her emotions to push the conversation forward.	.65		
When I ask her for advice, my wife gives useful and helpful opinions.	.60		
My wife answers me mockingly and with an air of superiority.		.78	
When I speak, she rushes me to get to the point.		.72	
Even when I talk about my feelings, my wife does not listen to me properly.		.67	
My wife quickly gets angry if she does not like what I tell her.		.56	
My wife responds perfunctorily when I talk to her.			.95
My wife listens absentmindedly while she does other things.			.72
	Factor correlation		
	F1	-	.28
	F2		-.54
	F3		-

Table 5. Marital Communication Attitude Scale: Confirmatory Factor Analysis Results

The marriage “reality” scale was considered comparable based on the existing number of items and sub-scale scores that had been calculated during the development of the co-parenting awareness scale. The Cronbach’s alpha coefficients for internal consistency were sufficient at 0.89 for “mutual affection”, 0.72 for “support and understanding for husband”, and 0.72 for “support and understanding for wife”. Correlation between the co-parenting awareness short scale, the marital communication attitude scale, and the marriage “reality” scale is shown below (Table 6).

	Short Co-Parenting Awareness				Marital Communication Attitude			Marriage Reality		
	F1	F2	F3	F4	Empathy	Coercion	Neglect	Understanding and support for husband	Understanding and support for wife	Mutual affection
F1 Mutual emotional support	-	.76**	.64**	-.36**	.49**	-.24**	-.24**	.35**	.45**	.61**
F2 Mutual material support		-	.63**	-.28**	.40**	-.12*	-.23**	.31**	.52**	.51**
F3 Parenting agreements and negotiations			-	-.19**	.46**	-.13*	-.15**	.32**	.49**	.49**
F4 Difficulty in sharing responsibilities				-	-.27**	.42**	.27**	-.14*	-.21**	-.33**

** Correlation coefficient is significant at the 1% level (on both sides).

* Correlation coefficient is significant at the 5% level (on both sides).

Reverse items were not processed.

Table 6. Marital Communication Attitude Short Scale Sub-scale Correlation

A relationship of significant association was observed between two values. It was determined that the short co-parenting awareness sub-scales of mutual emotional support (F1) and mutual material support (F2) measure the same constructs as the empathy sub-scale of the marital communication attitude scale, achieving considerable correlation with an existing test, and that positive and negative directions display a logical fit, indicating convergent validity. Moreover, coercion and neglect, which had a low correlation coefficient, received numerous “no” responses, indicating that there is no significant correlation between “coercion” and “neglect” and other factors for husbands. An attitude of coercion and neglect are predicted to be less relevant for young married couples compared to middle-aged married couples. Assuming a low correlation, the scale was determined to have discriminant validity. In sum, it was found that the constructs are being accurately represented, which means that validity is high.

Association between the co-parenting awareness short scale and children’s growth and parenting behavior

Children’s growth

In consideration of the relevant challenges and characteristics of each developmental stage, children were divided into four categories based on their age: infants (under 1 year), toddlers (1 - 5 years), toddlers and infants, and children aged 6 years or older. The number of respondents in each category was as follows: 1. “Only infants”, 45 (17.4%), 2. “Only toddlers”, 126 (48.8%), 3. “Toddlers and infants”, 26 (10.1%), 4. “Children aged 6 years or older”, 61 (23.6%). A Kruskal-Wallis test was performed to determine whether sub-scale scores in the co-parenting awareness short scale had the same distribution for these four categories of children’s growth. The results are shown in table 7. Significant differences were found in sub-scale scores for the four categories of children’s growth.

Factor	Age bracket	N	MEAN	MEDIAN	SD	MIN	MAX	PERCENTILE			Kruskal-Wallis p
								25	50	75	
F1 Mutual emotional support	1	45	4.01	4.00	0.54	2.75	5.00	3.75	4.00	4.50	.033**
	2	126	3.70	3.75	0.71	2.00	5.00	3.25	3.75	4.00	
	3	26	3.95	4.00	0.73	2.00	5.00	3.50	4.00	4.50	
	4	61	3.70	3.75	0.70	2.00	5.00	3.13	3.75	4.00	
F2 Mutual material support	1	45	3.69	4.00	0.74	2.00	5.00	3.25	4.00	4.25	.030**
	2	126	3.47	3.50	0.78	1.25	5.00	3.00	3.50	4.00	
	3	26	3.76	3.88	0.86	1.75	5.00	3.19	3.88	4.31	
	4	61	3.35	3.50	0.77	1.75	5.00	2.75	3.50	4.00	
F3 Parenting agreements and negotiations	1	45	3.82	4.00	0.61	2.67	5.00	3.33	4.00	4.33	.012**
	2	126	3.55	3.67	0.64	2.00	5.00	3.00	3.67	4.00	
	3	26	3.91	4.00	0.67	2.00	5.00	3.58	4.00	4.33	
	4	61	3.54	3.67	0.75	2.00	5.00	3.00	3.67	4.00	
F4 Difficulty in sharing responsibilities	1	45	2.33	2.25	0.78	1.25	3.75	1.75	2.25	3.13	.015**
	2	126	2.80	3.00	0.78	1.00	4.75	2.25	3.00	3.25	
	3	26	2.70	2.50	1.04	1.00	4.75	2.00	2.50	3.56	
	4	61	2.71	2.75	0.67	1.00	4.25	2.25	2.75	3.13	

Age brackets : 1. Only infants 2. Only toddlers 3. Infants and toddlers 4. Children aged 6 years and above **p < .05

The values are mean values for the sub-scale items.

Table 7 Association Between New Co-parenting Awareness Short Scale and Age of Children

Mutual emotional support (F1) scores were higher for category 1, “Only infants”, indicating that husbands care about and are considerate of their wives. Mutual material support (F2) scores were higher for category 2, “Only infants”, indicating that husbands help

their wives and give them alone time so that they are not frustrated. Parenting agreements and negotiations (F3) scores were higher for category 3, “Infants and toddlers”, indicating that husbands and wives pay attention to each other and discuss things as they happen and that they put their feelings and opinions into words and communicate with one another. Difficulty sharing responsibility (F4) scores were higher for category 2, “only toddlers”, indicating that husbands have a strong belief that “work is for men, housework is for women”.

No significant difference in co-parenting awareness short scale scores was found for number of children, and both only children (118) and multiple children (140) were present in the four categories. A comparison (Mann-Whitney test) between the two groups revealed in the difficulty sharing responsibility (F4) sub-scale that parents of multiple children experienced a situation where the wife wants to talk and share with the husband, but he does not agree more than parents of only children, with a significance probability of .022 ($p < .05$).

Husbands’ parenting time

Parenting time ranged from a minimum of 0 minutes to a maximum of 480 minutes (8 hours), with an average of 256.6 minutes (4.3 hours). Parenting time was 60 minutes or less for 12 respondents (4.7%), 1 - 2 hours for 19 respondents (7.4%), 2 - 3 hours for 30 respondents (11.6%), 3 - 4 hours for 48 respondents (18.6%), and 4 hours or more for 149 respondents (57.8%). Attributes and other information are shown in table 8.

		N = 258						
		N	%	MEAN	SD	MIN	MEDIAN	MAX
Age of parents				34.2	2.9	27		39
Number of children				1.7	0.7	1		4
	Only infants	45	17.4					
	Only toddlers	126	48.8					
	Infants and toddlers	26	10.1					
	Children aged 6 years	61	23.6					
Number of housework items performed equally by husband and wife				10.3	9.9	0	7	50
Time from waking up to leaving the house (minutes)				79.3	26.7	60	60	150
Time from getting home to going to bed (minutes)				41.3	40.7	0	30	120
Parenting time on working days (minutes)				68.4	53.0	0	60	210
Parenting time on non-working days (minutes)				188.2	83.6	0	210	270
Parenting Time (minutes)				256.6	119.25	0	270	480
Parenting Time								
	60 minutes or less	12	4.7					
	1–2 hours	19	7.4					
	2–3 hours	30	11.6					
	3–4 hours	48	18.6					
	4 hours or more	149	57.8					
Cohabitants								
	No	219	84.9					
	Yes	39	15.1					
Prenatal discussions of sharing								
	No	169	65.5					
	Yes	89	34.5					
Childcare on vacation								
	No	214	82.9					
	Yes	44	17.1					
Wakes up before 5 AM								
	No	239	92.6					
	Yes	19	7.4					
Goes to bed after 12 AM								
	No	185	71.7					
	Yes	73	28.3					

Table 8. Parenting Time Statistics

Association between the co-parenting awareness short scale and parenting time

The co-parenting awareness scale is expected to support cooperation in parenting between couples, especially husbands. A stepwise multiple regression analysis was performed to investigate the magnitude and direction of the influence of the co-parenting awareness short scale on parenting time. The presence or absence of prenatal discussions on shared parenting was used as an independent variable. The results were close to 1 ($R = 0.92$, $R^2 = 0.85$), indicating a good model. The analysis of variance table indicated significant usefulness as a predictor, with a significance probability of 0.000 $p < 0.01$. The influencing variables were mutual emotional support (F1), prenatal discussions of sharing, and mutual material support (F2). Based on the standardized beta coefficient, the magnitude of their influence was $F1 > F2 >$ Presence or absence of prenatal discussions (Table 9). Normal distribution of residuals was confirmed using a RES-value Kolmogorov-Smirnov normality test (exploratory), with significance probability 0.19 ($p > .05$).

	Non-standard coefficient		Standard coefficient			B confidence interval of 95.0%	
	B	Standard deviation	Beta	t value	p	Min	Max
Mutual emotional support (F1)	10.22	2.97	.55	3.44	.001	4.36	16.07
Prenatal discussions of sharing	32.00	14.68	.07	2.18	.030	3.10	60.90
Mutual material support (F2)	6.46	3.16	.33	2.05	.042	.25	12.68

Table 9. Factors Influencing Parenting Time

A parenting time comparison (Mann-Whitney test) of the groups who did and did not discuss shared parenting before birth found significantly higher parenting time in the groups that had discussed the matter, with $p = 0.000$ ($p > 0.01$).

Further, respondents were divided into a high and a low group based on median parenting time, and a Mann-Whitney U test was performed to verify whether the high group and the low group had the same sub-scale scores in the co-parenting awareness short scale (Table 10). The high-parenting-time group had significantly higher scores for all four sub-scales in the co-parenting awareness short scale.

Sub-scales	Parenting Time		PERCENTILE						Mann-Whitney U	Z	P
	0 to 1	N	MEDIAN	MIN	MAX	25	50	75			
F1	0	115	15.00	8.00	20.00	12.00	15.00	16.00	5230.50	-5.08	0.00 **
Mutual emotional support	1	143	16.00	8.00	20.00	15.00	16.00	17.00			
F2	0	115	13.00	5.00	20.00	11.00	13.00	16.00	5649.50	-4.34	0.00 **
Mutual material support	1	143	15.00	7.00	20.00	13.00	15.00	17.00			
F3	0	115	11.00	6.00	15.00	9.00	11.00	12.00	6024.00	-3.75	0.00 **
Parenting agreements and negotiations	1	143	12.00	6.00	15.00	10.00	12.00	12.00			
RF4	0	115	12.00	7.00	18.00	11.00	12.00	15.00	6546.50	-2.83	0.00 **
Difficulty in sharing responsibilities	1	143	14.00	5.00	20.00	11.00	14.00	16.00			

High- and low-parenting-time groups: Divided into two based on median value.

Table 10. Comparison of Short Co-Parenting Awareness Sub-scale Scores for High- and Low-Parenting-Time Groups

Discussion

Reliability and validity of the co-parenting awareness short scale based on confirmatory factor analysis

Confirmatory factor analysis is based on the approach of first developing a specific measurement model among the observed variables on constructs and then using the given data to check whether a factor structure has been established [18]. Therefore, although the confirmatory factor analysis gathered similar observed variables, as a precaution, the Cronbach's alpha coefficient was used to test for internal consistency. The results were sufficient, with over 0.7 for all four factors: 0.84 for F1 (four items); 0.82 for F2 (four items); 0.73 for F3 (three items); 0.77 for F4 (four items).

Further, it was found that a confirmatory factor analysis model could be used to estimate a generalizability coefficient and a multivariate generalizability coefficient [19]. Models 1 and 2 were in a good range of fit and models 3 and 4 were in an acceptable range in the model's goodness of fit index for the four items. This proved that the item structure of the co-parenting awareness short scale was invariant even with different data.

As for evidence from an external aspect, correlation was tested with two existing scales: the marriage "reality" scale and the marital communication attitude scale. A relationship of significant association was observed between two values, and positive and negative directions had a logical fit. This demonstrated that the co-parenting awareness short scale and marital communication attitude scale measure the same constructs, achieving considerable correlation with an existing test, which indicates convergent validity.

The 29-item, four-sub-scale co-parenting awareness scale was developed into a short version consisting of 15 items and four sub-scales. The four sub-scales were F1 "mutual emotional support" (four items), F2 "mutual material support" (four items), F3 "parenting agreements and negotiations" (three items), and F4 "difficulty sharing responsibility" (four items). The factor names were changed from the previous ones, "compassion and gratitude toward one's spouse", "desire to help each other and related behavior", "communication between spouses", and "barriers to cooperation between spouses". The new names used in the short version were selected with a focus on describing the elements of co-parenting [20]. Based on this process, the co-parenting awareness short scale was developed through confirmatory factor analysis, the internal and external reliability and validity of the short scale were confirmed, and it was determined that its factor structure fully encompassed the elements of co-parenting.

Married couples range from "equal" to "unequal" across six categories, which are concentrated in the transition to parenthood: financial circumstances, lifestyle, changes in career decisions, long working hours, differences in parenting between husband and wife, and events outside the household. Differences between husband and wife, particularly in terms of parenting, involve different attitudes toward parenting and different levels of skill in caring for children [21]. To maintain an equal relationship, it is important that couples care for their children together during the child-rearing years. Mutual emotional support, material support, and parenting agreements and negotiations are essential elements to this end. It is also important to note how many factors cause difficulty in sharing responsibility; finding ways of addressing these factors is a crucial challenge.

Association between the co-parenting awareness short scale with parenting time, number of children, age of children, and couples' prenatal discussions

Respondents who display high awareness of mutual emotional support (F1) and mutual material support (F2) in the co-parenting awareness short scale inevitably devote more time to parenting behavior. Moreover, parenting time is higher for husbands who have participated in prenatal discussions regarding shared parenting.

In terms of children's growth, indicated by the age of children, couples with only infants are new to parenting, and husbands are very caring and considerate toward their wives and take care to help them and give them alone time so they will not be frustrated, displaying high mutual emotional support (F1) and mutual material support (F2). In the case of couples with multiple children including infants

and toddlers, spouses pay attention to each other, discuss things as they happen, and put their feelings and opinions into words and communicate with one another, thus scoring high in parenting agreements and negotiations (F3). In the case of couples with only toddlers, husbands tend to strongly believe that “work is for men, housework is for women”, indicating high difficulty sharing responsibility (F4). Further, in the case of couples with multiple children, although wives would like to talk and share with their husbands, husbands do not agree, resulting in high difficulty sharing responsibility (F4).

Through continuous interactions with specific adults such as the parents, infants receive love and care, deepen emotional connections (attachment), stabilize their emotions, and build trust in others. As they grow into toddlers, they expand the scope of their interests, developing relationships with the people and things around them and with nature and other parts of their environment. As their cognitive and social development progresses, children develop basic habits such as eating, sleeping, and toileting. As roles and expectations for the family and community change, fewer people within the household have experience interacting with children, and it is difficult to establish suitable daily routines for children of this age. There are reports of increased child abuse and decreased nurturing skills by anxious and struggling parents [22]. Growing parental cooperation between couples during children’s infancy stage, often in the form of emotional and material support by the husband, frequent parenting agreements and negotiations in children’s infancy and toddlerhood, and difficulties with sharing responsibility during toddlerhood, particularly in terms of the husband’s awareness, all reveal the characteristics and challenges of parental cooperation adapting to children’s growth stages.

Changes in husbands’ awareness as children grow are particularly notable. In an era in which dual-income couples are prevalent, the characteristics of parental cooperation gradually change as children grow, influencing parents’ opinions of their lifestyles and leading to greater challenges in parental cooperation for couples.

Further, the influencing variables were found to be mutual emotional support, prenatal discussions of sharing, and mutual material support. Based on the standardized beta coefficient, the magnitude of their influence was mutual emotional support > mutual material support > prenatal discussions of sharing (had taken place). In terms of prenatal discussions of sharing, the father’s parenting time was significantly higher when the matter had been discussed. The usefulness of discussions between couples during pregnancy has been reported many times [1,4,23] and the present study corroborates these findings. It is important to discuss these matters during pregnancy and to maintain continuous mutual support, parenting agreements, and negotiations while raising children.

The high-parenting-time group had significantly higher scores for all four sub-scales in the co-parenting awareness short scale. In sum, raising awareness of parental cooperation using the co-parenting awareness short scale can be expected to increase parenting behavior. The analysis of associations with parenting conducted in this study has produced several valuable insights.

Conclusion

A confirmatory factor analysis was done on the 29-item co-parenting awareness scale, and its validity was verified using the marriage “reality” scale and the marital communication attitude scale. It was confirmed that the 15-item co-parenting awareness short scale could successfully explain the data. Moreover, the high-parenting-time group had significantly higher scores in all four co-parenting awareness short sub-scales. Support scores and parenting agreements and negotiations scores were higher for parents of younger children, and difficulty sharing responsibility scores rose as the age of the children increased. Finally, prenatal discussions of shared parenting and other matters by the couple were found to have a beneficial effect on co-parenting.

In terms of the limitations of the study, the survey area was restricted to regions with a high number of children. As a result, the study may have failed to consider the situation in regions with fewer children, indicating the need to broaden the range of respondents. A task for future research is to write a second report on the analysis of the selection of housework and childcare items performed equally by the husband and wife (50 childcare items) and of childcare happiness and stress items with the co-parenting awareness short scale.

Acknowledgments

This study was supported by the Ministry of Education, Culture, Sports, Science and Technology Grant-in-Aid for Scientific Research C “Development and Assessment of a Plan to Promote Co-parenting” [22K10939 0001] (2022–2025).

We/The authors thank Crimson Interactive Pvt. Ltd. (Ulatas) - www.ulatus.jp for their assistance in manuscript translation and editing.

Conflict of Interest

There are no conflicts of interest to disclose in association with this study.

Bibliography

1. Ezaki Glico Co. “A comprehensive comparison of co-parenting in Japan and Finland. Awareness survey of couples during pregnancy and childcare. Close communication between husband and wife since pregnancy to reduce post-partum depression and stress during childcare. Realizing a coparenting society for a family full of smiles and love for children” (2019).
2. Kato Tsuguhiko. “Research on fathers’ health status and its effects on participation in parenting”. Research contribution report, FY 2020 Ministry of Health, Labor and Welfare Grant-in-Aid for Scientific Research (Comprehensive Research Project for the Health of Future Generations) (2023).
3. Kato Tsuguhiko., *et al.* “Review of the influence of paternal involvement in childcare on mothers, children, and fathers”. *Japanese Journal of Public Health* 5 (2022): 321-337.
4. Alakärppä O., *et al.* “Confident, cautiously confident or concerned? Working life profiles, capabilities, and expectations for work-family reconciliation among young Finnish women”. *Community, Work and Family* 26.3 (2023): 312-333.
5. McHale JP., *et al.* “Parental reports of coparenting and observed coparenting behavior during the toddler period”. *Journal of Family Psychology* 14.2 (2000): 220-236.
6. Grunow Evertsson., *et al.* “Yōroppa no atarashī oya shigoto to kaigo no jissen, jendā kihan oyobi kazoku seisaku Doitsu no Furankufuruto gēte daigaku no daniera gurunou to suu~ēden no Sutokkuhorumu daigaku no marī evu~ātoson ga henshū hakkō-bi” (2019): 272.
7. Anna Ronka.Th3 CeSDeS pen eminar on DGs eynote speech (2023).
8. Takeishi Yoko., *et al.* “Developing a Prenatal Couple Education Program Focusing on Coparenting for Japanese Couples. A Quasi-Experimental Study”. *The Tohoku Journal of Experimental Medicine* 249.1 (2019): 9-17.
9. Takeishi Yoko., *et al.* “Implementing a program to promote co-parenting as prenatal education”. *The Japanese Journal for Midwives* 73.9 (2019): 762-767.
10. Kato Michiyo., *et al.* “Trends and Issues on Maternal Gatekeeping Research: For Better Understanding of Co-parenting”. *Annual Report of the Graduate School of Education, Tohoku University* 61.1 (2012):109-126.
11. Kato Michiyo., *et al.* “Development of the Coparental Regulation Inventory and cross-sectional analysis of mothers’ encouragement and criticism”. *Japanese Journal of Psychology* 84.6 (2014):566-575.
12. Shimizu Yoshiko and Suganuma Nobuhiko. “Developing a New Co-parenting Awareness Scale for Measuring Effective Co-parenting Awareness Strategies: Relationship with Attribute/Parental Awareness Development”. *Clinics in Mother and Child Health* 20.1000445. (2023): 1-9.

13. Shimizu Yoshiko. "Developing a Co-parenting Awareness Scale". *Bulletin of the Faculty of Nursing, Nagoya University of Arts and Sciences* 2 (2023): 2-12.
14. Kashiwagi Keiko and Junko Hirayama. "Marital norm, reality and satisfaction in middle-aged couples: Why are wives less satisfied than husbands?" *The Japanese Journal of Psychology* 74.1 (2003): 122-130.
15. Hirayama Junko and Kashiwagi Keiko. "Attitudes of Married Couples Toward Communication: Husband/Wife Comparison". *The Japanese Journal of Developmental Psychology* 12.3 (2001): 216-227.
16. Shimizu Yoshiko., *et al.* "Development of a short form of a childcare happiness scale". *Journal of Japan Academy of Midwifery* 24.2 (2010): 61-270.
17. Shimizu Yoshiko and Shinobu Sekimizu. "Mothers' Child Care Stress Scale (CSS): Development and validity of a short-form scale". *Japanese Journal of Child Abuse and Neglect* 12.2 (2010): 261-227.
18. Abe Shuzo. "The Validity of Satisfaction Research based on Hypothetical Consumption Data". *The Bulletin of the Faculty of Commerce, Meiji University* 84.1 (2002): 1-10.
19. Nakamura Kentaro. "Generalizability theory, multivariate generalizability theory". Edited by Toyoda Hideki, *Covariance structure analysis: Technical edition*, Asakura Shoten (2003): 71-78.
20. McHale and Lindahl. "Coparenting: A conceptual and clinical examination of family systems". Washington, DC: American Psychological Association Press. *Physical description* (2011): 314.
21. Niwano Akiko. "The Consideration of 'Equity' cognitive change into the marital relationship of a childcare term: Analysis which focused on the opportunity of 'Unequity' cognition". *Faculty Bulletin, University of Shizuoka Junior College* 26-W (2012): 1-15.
22. Ministry of Education, Culture, Sports, Science and Technology. "Round-table conference on children's moral education: Strategies to enhance children's moral education" (2023).
23. Horiguchi Michiko. "Parenting Education during Prenatal Period: A Program with Gender and Developmental Perspectives in the U.S". *FGENS Journal* 4 (2005): 13-20.

Volume 12 Issue 10 October 2023

©All rights reserved by Yoshiko Shimizu.