

Factors Influencing Parenting Stress in the Mothers of Infants and the Effects of Artwork Production

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ABSTRACT

Background The importance of support for the mothers of infants to cope with parenting stress due to isolated parenting environments is being emphasized. In order to reduce the parenting stress in parenting mothers while improving the quality of parenting support for them, it is important to identify factors influencing such stress. We investigated the effects of artwork production in different styles, conducted self-evaluation of such production, and identified factors influencing parenting stress in mothers, involving those who participated in a handprint artwork production workshop.

Methods We included 140 mothers who participated in a handprint artwork production workshop, dividing them into 2 groups: A: 70 with children younger than 3 years of age who engaged in artwork production alone; and B: 70 who engaged in it through collaboration with their children aged 3 years or older. The instructor distributed an anonymous, self-administered questionnaire to all the mothers, and collected their responses. The questionnaire examined the following items: attributes, the number of participations in the workshop, artwork production self-evaluation, and parenting stress.

Results There were 140 (100%) responses, and the number of valid responses was 65 from Group A and 54 from Group B, a total of 119 (85%). The mean [parenting strain] score was significantly higher in Group B. Multiple regression analysis identified the child's age and presence/absence of his/her siblings overall and in Group A, and <confidence in one's work>, an item for artwork production self-evaluation, in Group B as factors influencing the total [parenting strain] score.

Conclusion The present results suggest that the child's age and presence/absence of his/her siblings could influence parenting stress in the mothers. Additionally, there was a correlation between the level of parenting stress and score for <confidence in one's work> among the mothers who engaged in artwork production through collaboration with their children.

Key words artwork production; handprint art; infants; mother; parenting stress

With a decreasing birth rate, increase in the number of nuclear families, and decline in the support function of communities, there is a growing concern over isolated parenting environments¹ in Japan. Studies on parenting stress in mothers emphasize the importance of support for mothers, and discuss methods for effective support. According to a survey conducted by the Ministry of Internal Affairs and Communications in 2017,² the time spent by mothers of children younger than 6 years of age on parenting each day continues to increase year after year, and it is a concern that the burden on mothers will further increase in the future. Some mothers find fulfillment in their children,³ and enjoy parenting, but parenting is thought to be a stressful event for others.⁴ Parenting-related stress has been shown to be a predictor of anxiety and depression in mothers,⁵ and it has also been reported that maternal depression is associated with child neglect and abuse.^{6,7} Additionally, some reports demonstrated that parenting stress is associated with decreased parental sensitivity, as well as increased parental intrusiveness and hostility toward the child.⁸ Based on these findings, measures to foster the mothers' sensitivity, as well as opportunities and methods for them to develop a sense of appropriate psychological distance from their children should be discussed as strategies to cope with their parenting stress and maintain/improve their psychological health.⁹

As a form of psychotherapy to recover mental and physical health, art therapy where participants engage in expressive and creative activities in various art forms is drawing attention. According to the French psychiatrist Jean-Pierre Klein,¹⁰ art therapy may be defined as “a form of psychotherapy using artistic media, where art and therapy complement and enrich each other to develop a common perspective”. Art therapy has been shown to be effective to reduce stress, understand oneself and others, improve self-evaluation, and develop

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Abbreviations: ARCS, Attention Relevance Confidence Satisfaction; PSI, Parenting Strain Index

imagination.¹¹ The rationale for art therapy is that a creative process essentially has a therapeutic effect.¹² This is based on the idea that artistic expression does not only affect the final outcome, but both the creative process and the final product promote an important mental process.¹³ Some overseas studies reported the effectiveness of art therapy for children with mental/physical disabilities,¹⁴ parents with depression,¹⁵ and the parents of school-age children.¹⁶ Creative and sensuous painting activities experienced by mothers and their infants together were shown to promote a new positive mother-child bond.¹⁷ Furthermore, a study involving school-age children reported that the amount of information in pictorial expressions was larger than in verbal expressions.¹⁸ This has led to growing interest in the use of art as a means to promote communication with children, and drawing is most frequently offered to children in both clinical and research settings.¹⁹ All of these studies suggest that art therapy positively affects parent-child relationships and children's self-recognition.

In Japan, previous studies on art therapy reported that art activities provided a "self-object" experience for school-age children to find themselves,²⁰ and that art therapy reduced crying at night in some children.²¹ Another study analyzed creative activities through parent-child collaboration, and reported that parenting stress was reduced in mothers who performed such activities with their children in groups.²² However, there have been no studies examining the relationship between art therapy or creative activities and parenting stress, involving the mothers of infants or both.

In this respect, the present study focused on handprint artwork production, which can be easily undertaken at home by the mother and child together. Using the child's and mother's hand/footprints as part of the work, handprint art is not just a simple painting or print, but an art technique that nurtures mother-child bonding, and conveys warmth. The completed works are used as memorials or gifts to record the growth of children. They are pieces of artwork featuring animal/plant motifs based on mothers' and children's hand/footprints, which allow mothers as the creators to project their feelings. In recent years, handprint art has begun to be widely recognized by the general public, with the sale of specialized production kits.

For the mothers to evaluate their own artwork production, we presented 7 original questions based on the ARCS model developed by Keller.²³ The ARCS model²⁴ is an instructional design, consisting of 4 concepts: [Attention], [Relevance], [Confidence], and [Satisfaction]. As this model is designed to assess motivation for learning, we used it as an index to measure the motivation for

artwork production among the subjects of the present study, and examine the relationship between such motivation and parenting stress.

As a scale to measure parenting stress, we used the Parenting Strain Index (PSI).^{25, 26} This scale limits the basic elements of [parenting strain] for [appraisal of limitation on (the mother's own) social activities] due to parenting and [appraisal of (the mother's own) negative emotions] toward the child. As the present study focused on factors influencing parenting stress in mothers, in particular, their psychological health, we used this scale that also examines the mothers' appraisal of negative emotions toward the child. The scale consists of only 8 questions, and the small number of questions was another reason for using it in consideration of the burden on the mothers.

The purpose of the present study was to examine the effects of artwork production in different styles, conduct self-evaluation of such production, and identify factors influencing parenting stress in mothers, involving those who participated in a handprint artwork production workshop, and dividing them into 2 groups: those who engaged in artwork production alone and through collaboration with their children. According to Erikson's stages of development, late infancy or the age of 3 to 5 years is the period when independence is nurtured, and children begin to think and act on their own.²⁷ At this age, children become able to identify the shapes they draw as objects, and perceive differences in hue.²⁸ Therefore, we regarded children aged 3 to 5 years as old enough to collaborate with their mothers in artwork production.

SUBJECTS AND METHODS

Subjects

The subjects were 140 mothers who participated in a handprint artwork production workshop. The study period was from July to October 2020. To clarify the relationships between parenting stress in mothers and different artwork production styles, the mothers were divided into 2 groups. Group A were made up of 70 mothers who engaged in artwork production alone, and Group B were made up of 70 mothers who engaged in it through collaboration with their children. Mothers in Group A participated in the workshop with their children aged 0 to younger than 3 years, and those in Group B participated in it with their children aged 3 to younger than 6 years, who were old enough to collaborate in artwork production. In both groups, all participants formed mother-child pairs.

Methods

We asked the instructor of the handprint artwork production workshop, as well as the persons responsible in two large commercial complexes and daycare centers, to distribute a flyer outlining the study to recruit participants in a same city. The subjects voluntarily participated in the handprint artwork production workshop after reading this flyer and understanding the objective of the study. Immediately after the end of the artwork production, an anonymous, self-administered questionnaire survey was conducted involving all the mothers, with the instructor distributing the questionnaire. After filling out the questionnaire, the mothers themselves placed their responses in a collection box set up at the workshop venue. The questionnaire examined the following items: basic attributes, the number of participations in the workshop, artwork production self-evaluation, and parenting stress. The workshop sessions were held at event spaces of two different large commercial complexes and Group A and B participated in the sessions held in the two commercial complexes separately. Four and three workshop sessions were held for Group A and B, respectively. The number of participants of each session was 11 to 33.

The instructor handed out the necessary materials and explained the method of artwork production to the subjects. The production procedure was as follows: The mothers took their children's hand/footprints on drawing paper using stamp ink, cut and pasted masking tape with animal motifs, and drew patterns on the paper. The mothers referred to samples of their work. The time required for the artwork production was approximately 1 hour. Mothers in Group A engaged in artwork production alone after taking the footprints of their children who participated in the workshop together. Mothers in Group B took the handprints of their children who participated together, and then continued their artwork production freely through collaboration with the children.

Basic attributes

We examined the mother's age, age (in months) of the child who participated in the workshop, number of his/her siblings, his/her birth order, and household structure as basic attributes.

Artwork production self-evaluation

Based on the ARCS model developed by Keller,²³ we presented 7 original questions for the mothers to evaluate their own artwork production. The ARCS model²⁴ is an instructional design, consisting of 4 concepts: [Attention], [Relevance], [Confidence], and [Satisfaction]. The 7 questions examined <interest in artwork

production> and <willingness to produce artwork at home> (Attention), <perception of the significance of the workshop> and <realization of the growth of the child> (Relevance), <confidence in one's work> (Confidence), and <satisfaction with the workshop> and <satisfaction with one's work> (Satisfaction). Among these, <willingness to produce artwork at home> was rated on a 3-point scale, whereas the 6 other questions were rated on a 4-point scale. The mothers chose the most appropriate answer for each question.

Parenting stress

We measured parenting stress using the PSI developed by Nakajima et al.²⁵ This index is a scale with established reliability and validity. The PSI adopts a second-order factorial model, with [appraisal of limitation on social activities] and [appraisal of negative emotions] as first-order factors, and [parenting strain] as a second-order factor.²⁶ Each first-order factor consists of 4 items, and the second-order factor consists of 8 items. This index evaluates how things have been over the last month. Respondents choose the most appropriate answer for each question, and rate it on a 5-point Likert scale (0: Never, 1: Rarely, 2: Sometimes, 3: Often, and 4: Always). We totaled all scored answers to calculate the [parenting strain] score. Thus, the [parenting strain] score ranged from 0 to 32. The scores for [appraisal of limitation on social activities] and [appraisal of negative emotions] ranged from 0 to 16, with higher values indicating higher levels of parenting strain. In the present study, Cronbach's α for the [parenting strain] score was 0.81 overall, 0.82 in Group A, and 0.79 in Group B.

Analytical methods

We analyzed the data using descriptive statistics. We compared the attributes, results of the artwork production self-evaluation, number of participations in the workshop, and [parenting strain] score between Groups A and B; to compare the results of artwork production self-evaluation regarding each of the 7 items between the groups, we used the Wilcoxon rank-sum test. Among the items for artwork production self-evaluation, 1 to 3 points were given for those rated on a 3-point scale, and 1 to 4 points for those rated on a 4-point scale, so that higher scores indicated higher self-evaluation. Using these scores, we examined the relationship between each item for artwork production self-evaluation and the [parenting strain] score overall, Group A, and Group B.

For parenting stress, we compared the mean [parenting strain] score and mean scores for [appraisal of limitation on social activities] and [appraisal of negative emotions] between Groups A and B. As the

Shapiro-Wilks test for normality did not show a normal distribution of [parenting strain] scores, we used a nonparametric test. We used the Mann-Whitney *U* test to compare 2 groups and the Kruskal-Wallis test to compare 3 or more groups. For the items revealing significant differences among 3 or more groups, we performed multiple comparisons. For the mother's age, age of the child who participated in the workshop, presence/absence of siblings of the child, and mothers who participated in the workshop for the first time, we compared the [parenting strain] score within each of Groups A and B. For the household structure and [parenting strain] score, we calculated Spearman's rank correlation coefficient. We performed statistical processing using the statistical software SPSS Ver. 26, with the significance level set at 5%.

Additionally, we performed multiple regression analysis with the [parenting strain] score as a dependent variable and the mother's age, the child's age, number and presence/absence of his/her siblings, household structure, artwork production style, number of participations in artwork production, and 7 items for artwork production self-evaluation as independent variables. Those other than continuous variables were analyzed as dummy variables.

Ethical considerations

The subjects voluntarily participated in this study after reading a document for participant recruitment which explained the study outline, objective, and methods. As ethical considerations, the document mainly explained the following points: participation is voluntary in all cases; participants may withdraw during the artwork production process, but not after the submission of a response to the questionnaire; and the results will not be used for any purpose other than those described. Filling out the questionnaire and submitting it was regarded as consenting.

Subjects' rights to access to the study-related data were guaranteed, and in the case of questions, they could contact the researchers as their contact information was provided in writing. The questionnaire was anonymous, and the data were encoded to prevent the identification of individuals. The data were statistically tabulated and analyzed. This study was conducted with the approval of Hiroshima University Epidemiological Research Ethics Review Committee (Approval No. E2019-1929).

RESULTS

There were 140 (100%) responses, and the number of valid responses was 65 from Group A and 54 from

Group B, a total of 119 (85%).

Attributes

Table 1 shows the subjects' attributes. Mothers aged 30–39 were the largest age group, and they accounted for 64.6% in Group A and 70.4% in Group B. The mean age of the child was 0.94 ± 0.54 years (range: 1 month to 2 years and 8 months) in Group A and 4.44 ± 0.87 years (3 years to 5 years and 11 months) in Group B. Overall, the number of children at each age was as follows: 0: 42; 1: 18; 2: 5; 3: 18; 4: 18; and 5: 18. The rate of having a sibling/siblings among the children was 24.6% in Group A and 77.8% in Group B. The most common household structure was nuclear families, accounting for 95.4% in Group A and 87.0% in Group B.

Number of participations in the workshop and the results of the artwork production self-evaluation

In Group A, 35 (53.8%) mothers participated in the workshop for the first time, and 30 (46.2%) had participated in it at least once in the past. Similarly, in Group B, 51 (96.4%) were first-time participants, and 2 (3.6%) had participated in the workshop at least once in the past (Table 2).

Artwork production self-evaluation

Among the 7 items for artwork production self-evaluation, the rate of answering "Very satisfied" for <satisfaction with the workshop> was significantly higher in Group A ($P = 0.021$). In contrast, the rate of answering "Very confident" for <confidence in one's work> was significantly higher in Group B ($P = 0.002$) (Table 3).

Comparison of the [parenting strain] score and its relationship with each attribute

Table 4 compares the [parenting strain] score, and outlines its relationship with each attribute.

The mean [parenting strain] score was 8.48 ± 4.60 in Group A and 12.06 ± 5.04 in Group B; the latter was significantly higher ($P < 0.01$). The scores for [appraisal of limitation on social activities] were 5.37 ± 2.77 and 6.07 ± 2.86 , respectively, not revealing significant differences. The scores for [appraisal of negative emotions] were 3.11 ± 2.72 and 6.02 ± 3.25 , respectively, revealing a significantly higher score of Group B ($P < 0.01$).

On comparing the [parenting strain] score based on the mother's age, the score was significantly higher among mothers aged 30–39 compared with those aged 29 or younger in Group A ($P = 0.038$), whereas significant differences were not observed in Group B.

The relationship between child's age and the

Table 1. Subjects' attributes

Attributes	Group A <i>n</i> (%)	Group B <i>n</i> (%)	<i>P</i> †
Mother's age (<i>n</i> = 119)	65	54	
≤ 29 year-old	20 (30.8)	2 (3.7)	< 0.001**
30–39 year-old	42 (64.6)	38 (70.4)	0.560
40–49 year-old	3 (4.6)	14 (25.9)	0.001**
Child's age (<i>n</i> = 119)	65	54	
0-year-old	42 (64.6)		
1-year-old	18 (27.7)		
2-year-old	5 (7.7)		
3-year-old		18 (33.3)	
4-year-old		18 (33.3)	
5-year-old		18 (33.3)	
Presence/absence of siblings of the child (<i>n</i> = 119)	65	54	
Presence	16 (24.6)	42 (77.8)	< 0.001**
Absence	49 (75.4)	12 (22.2)	
Birth order of siblings (<i>n</i> = 58)	16	42	
First	0 (0.0)	22 (52.4)	
Second	16 (100)	15 (35.7)	
Third	0 (0.0)	4 (9.5)	
Fifth	0 (0.0)	1 (2.4)	
Household structure (<i>n</i> = 118)	65	53	
Nuclear families	62 (95.4)	47 (88.7)	
Three-generation families	1 (1.5)	4 (7.5)	
Parent + parents	2 (3.1)	2 (3.8)	

† χ^2 test. * $P < 0.05$. ** $P < 0.01$.

Table 2. Number of participations in the workshop (*n* = 118)

	Group A (<i>n</i> = 65) <i>n</i> (%)	Group B (<i>n</i> = 53) <i>n</i> (%)	<i>P</i> †
For the first time	35 (53.8)	51 (96.4)	< 0.001*
Twice	10 (15.4)	0 (0.0)	0.002*
Three times	5 (7.7)	1 (1.8)	0.221
Four times	2 (3.1)	0 (0.0)	0.501
Five times or more	13 (20.0)	1 (1.8)	0.003*

† χ^2 test. * $P < 0.01$.

parenting stress was compared for Group A and B, respectively. In Group A, the [parenting strain] ($P = 0.015$) and [appraisal of limitation on social activities] ($P = 0.030$) scores were significantly higher among the

mothers of 1-year-olds, and the [appraisal of negative emotions] ($P = 0.020$) score was significantly higher among the mothers of 2-year-olds, compared with 0-year-olds. In Group B, there were no significant differences in the [parenting strain] score based on the child's age.

When focusing on the presence/absence of siblings, the [parenting strain] ($P = 0.023$) and [appraisal of negative emotions] ($P = 0.047$) scores were significantly higher among the mothers of children with siblings in Group A, whereas there were no significant differences in the score depending on the presence/absence of siblings in Group B.

There was no significant correlation between the household structure and [parenting strain] score in Group A or B.

Table 3. Results of the artwork production self-evaluation

Items	Group A (<i>n</i> = 65) <i>n</i> (%)	Group B (<i>n</i> = 54) <i>n</i> (%)	<i>P</i> †
Interest in artwork production			
Very interested	55 (84.6)	39 (72.2)	0.100
Somewhat interested	10 (15.4)	15 (27.8)	
Somewhat uninterested	0 (0.0)	0 (0.0)	
Very uninterested	0 (0.0)	0 (0.0)	
Willingness to produce artwork at home			
Yes	54 (83.1)	51 (94.4)	0.058
No	3 (4.6)	1 (1.9)	
Neutral	8 (12.3)	2 (3.7)	
Perception of the significance of the workshop			
Very significant	56 (86.2)	40 (74.1)	0.980
Somewhat significant	9 (13.8)	14 (25.9)	
Somewhat insignificant	0 (0.0)	0 (0.0)	
Very insignificant	0 (0.0)	0 (0.0)	
Realization of the growth of the child			
Very realized	46 (70.8)	36 (66.7)	0.631
Somewhat realized	18 (27.7)	17 (31.5)	
Somewhat unrealized	1 (1.5)	1 (1.8)	
Very unrealized	0 (0.0)	0 (0.0)	
Confidence in one's work			
Very confident	20 (30.8)	32 (59.3)	0.002**
Somewhat confident	45 (69.2)	22 (40.7)	
Somewhat unconfident	0 (0.0)	0 (0.0)	
Very unconfident	0 (0.0)	0 (0.0)	
Satisfaction with the workshop			
Very satisfied	61 (93.8)	43 (79.6)	0.021*
Somewhat satisfied	4 (6.2)	11 (20.4)	
Somewhat unsatisfied	0 (0.0)	0 (0.0)	
Very unsatisfied	0 (0.0)	0 (0.0)	
Satisfaction with one's work			
Very satisfied	49 (75.4)	47 (87.0)	0.111
Somewhat satisfied	16 (24.6)	7 (13.0)	
Somewhat unsatisfied	0 (0.0)	0 (0.0)	
Very unsatisfied	0 (0.0)	0 (0.0)	

†Wilcoxon rank-sum test. * $P < 0.05$. ** $P < 0.01$.

Relationship between the number of participations in the workshop and [parenting strain] score

The [parenting strain] ($P < 0.001$) and [appraisal of negative emotions] ($P < 0.001$) scores of the mothers who participated in the workshop for the first time in

Group B were significantly higher than those in Group A (Table 5).

Table 4. Comparison of the [parenting strain] score and its relationship with each attribute

	<i>n</i>	[Parenting strain] score	Scores for the [appraisal of limitation on social activities]	Scores for the [appraisal of negative emotions]
		Mean (SD)	Mean (SD)	Mean (SD)
Group A	65	8.48 (4.60)	5.37 (2.77)	3.11 (2.72)
Group B	54	12.06 (5.04)	6.07 (2.86)	6.02 (3.25)
Mother's age				
Group A				
≤ 29 year-old	20	6.35 (3.51)	4.45 (2.37)	1.90 (2.37)
30–39 year-old	42	9.45 (4.71)	5.81 (2.87)	3.64 (2.90)
40–49 year-old	3	9.00 (6.08)	5.33 (3.22)	3.67 (3.06)
Group B				
≤ 29 year-old	2	11.00 (7.07)	4.00 (2.83)	7.00 (4.24)
30–39 year-old	38	11.74 (4.90)	5.97 (2.80)	5.82 (3.11)
40–49 year-old	14	13.07 (5.44)	6.64 (3.08)	6.43 (3.70)
Child's age				
Group A				
0-year-old	42	7.21 (4.30)	4.76 (2.49)	2.45 (2.49)
1-year-old	18	10.67 (4.27)	6.89 (3.12)	3.78 (2.42)
2-year-old	5	11.20 (4.87)	5.00 (1.87)	6.20 (3.42)
Group B				
3-year-old	18	11.11 (4.65)	5.61 (2.64)	5.56 (3.28)
4-year-old	18	12.50 (5.10)	6.28 (3.14)	6.22 (3.35)
5-year-old	18	12.56 (5.48)	6.33 (2.89)	6.28 (3.25)
Presence/absence of siblings of the child				
Group A				
Presence	16	10.69 (4.38)	6.31 (2.47)	4.38 (3.14)
Absence	49	7.76 (4.48)	5.06 (2.81)	2.69 (2.47)
Group B				
Presence	42	12.39 (4.79)	6.34 (2.74)	6.10 (3.19)
Absence	12	10.33 (5.55)	4.83 (2.95)	5.50 (3.56)

P-value was estimated by Mann-Whitney *U* test or Kruskal-Wallis test and multiple comparisons. **P* < 0.05, ***P* < 0.01.

Table 5. Comparison of the [parenting strain] score among mothers who participated in the workshop for the first time

	<i>n</i>	[Parenting strain] score	Scores for the [appraisal of limitation on social activities]	Scores for the [appraisal of negative emotions]
		Mean (SD)	Mean (SD)	Mean (SD)
Group A	35	8.00 (4.01)	5.09 (2.24)	2.91 (2.63)
Group B	51	11.86 (5.12)	5.98 (2.86)	5.92 (3.29)

P-value was estimated by Mann-Whitney *U* test. ***P* < 0.01.

Table 6-1. Association of the parenting strain scores with related factors for Overall (n = 116)

	β	95% CI		P†
Child's age	0.305	0.314	1.297	0.002**
Presence/absence of siblings	0.242	0.576	4.373	0.011*

(Adj R-squared 0.207)

†Multiple regression analysis adjusted by mother's age, child's age, presence/absence of siblings, household structure as basic attributes, artwork production style, number of participations in the workshop, and artwork production self-evaluation. CI, confidence interval. * $P < 0.05$, ** $P < 0.01$.

Table 6-2. Association of the parenting strain score with related factors for Group A (n = 64)

	β	95% CI		P†
Child's age	0.401	1.256	4.499	0.001**
Presence/absence of siblings	0.355	1.353	6.091	0.003**

(Adj R-squared 0.217)

†Multiple regression analysis adjusted by mother's age, child's age, presence/absence of siblings, household structure as basic attributes, number of participations in the workshop, and artwork production self-evaluation. CI, confidence interval. ** $P < 0.01$.

Table 6-3. Association of the parenting strain score with related factors for Group B (n = 52)

	β	95% CI		P†
Self-evaluation of the artwork production (Confidence)	-0.362	-6.340	-0.981	0.008**

(Adj R-squared 0.114)

†Multiple regression analysis adjusted by mother's age, child's age, presence/absence of siblings, household structure as basic attributes, number of participations in the workshop, and artwork production self-evaluation. CI, confidence interval. ** $P < 0.01$.

Relationship between each item for artwork production self-evaluation and the [parenting strain] score

There was no correlation between each item for artwork production self-evaluation and the [parenting strain] score overall and in each group. However, in Group B, <confidence in one's work> was negatively correlated with the total [parenting strain] score ($r = -0.359$, $P = 0.008$) and [appraisal of negative emotions] score ($r = -0.409$, $P = 0.002$).

Factors influencing the [parenting strain] score

Multiple regression analysis adopting the stepwise method, with the [parenting strain] score as a dependent variable and attributes, the artwork production style, number of participations in artwork production, and results of artwork production self-evaluation as independent variables identified the following items to influence the [parenting strain] score: overall: the child's age ($\beta = 0.305$, $P < 0.01$) and presence/absence of his/her siblings ($\beta = 0.242$, $P < 0.05$); Group A: the child's age ($\beta = 0.401$, $P < 0.01$) and presence/absence of his/her siblings ($\beta = 0.355$, $P < 0.01$); and Group B: <confidence in one's work>, an item for artwork production self-evaluation

($\beta = -0.362$, $P < 0.01$). The coefficient of determination was 0.5 or lower in all regression equations, indicating a lack of fit (Table 6-1, 6-2 and 6-3).

DISCUSSION

In this study, we examined parenting stress in the mothers of infants, comparing 2 different handprint artwork production styles.

The [parenting strain] score was higher in Group B, where mothers engaged in artwork production through collaboration with their children, than in Group A, where mothers engaged in it alone. Among previous studies using the PSI, a survey involving 229 mothers who were rearing preschool children²⁶ reported a [parenting strain] score of 9.7 ± 5.91 , [appraisal of limitation on social activities] score of 5.3 ± 3.76 , and [appraisal of negative emotions] score of 4.4 ± 3.01 . The [parenting strain] score of Group A was lower and that of Group B was higher than these values. The score for appraisal of the mother's own negative emotions toward the child as one of the first-order factors of the PSI was significantly higher in Group B. On the other hand, the score for appraisal of limitation on the mother's own social activities due to parenting did not vary between the 2

groups. This may be explained by the fact that mothers in both groups were willing and had ample opportunity to participate in the workshop.

According to previous studies, children's levels of externalizing behavior are unstable,²⁹ and their emotional regulation skills are still undeveloped despite marked increases in their physical independence and autonomy with the development of gross motor skills during late infancy and the early preschool period, and, therefore, parents are prone to stress due to difficulties in understanding the behavioral intentions of their children³⁰ during these periods. Furthermore, on comparing the level of parenting difficulty based on the child's age, markedly high levels of difficulty at the ages of 3³¹ and 4^{32, 33} years have been reported. In the present study, the [parenting strain] score was significantly higher among the mothers of 1-year-olds compared with 0-year-olds. However, in Group B, there were no significant differences in [parenting stress] scores among the age groups. This may have been associated with the high level of parenting stress among the mothers in Group B, who engaged in artwork production through collaboration with their children during late infancy.

In Group A, the [parenting strain] score was higher among the mothers of children with siblings than among those of children without siblings. This is consistent with the results of previous studies, where parenting strain scores were higher among mothers who had 2 or more children than among those of an only child.^{25, 34, 35} Furthermore, the [appraisal of limitation on social activities] score was higher among the mothers of 1-year-olds, and the [parenting strain] score related to [appraisal of negative emotions] was higher among the mothers of 2-year-olds, compared with 0-year-olds. The age of 1, at which many children begin to toddle, is a period of marked mental and physical growth, suggesting that mothers' social activities are limited during this period compared with the age of 0. The age of 2 is a period of marked motor and social development, and also a period when the first rebellious stage begins with the birth of the ego in mental aspects. Therefore, many mothers, being swayed by their children's freewheeling behaviors and attitudes, experience a high level of stress,³⁶ and are likely to have negative feelings toward the children due to a feeling of lack of control over them³ at this age. As mothers rearing children aged 1 to younger than 3 years were particularly prone to many factors associated with parenting stress in a previous study comparing the mothers of children aged 0 to 3 years,³² the level of parenting stress is likely to be higher among the mothers of 1- and 2-year-olds compared with 0-year-olds. Based on these findings, the presence/absence of siblings of the

child and his/her age may influence parenting stress in the mothers of infants.

The results of the artwork production self-evaluation revealed that mothers in both Groups A and B highly rated all evaluation items, possibly representing their high motivation for such production. Among the 7 items, the rate of answering "Very satisfied" for <satisfaction with the workshop> was significantly higher in Group A, whereas the rate of answering "Very confident" for <confidence in one's work> was significantly higher in Group B. Many mothers in Group A were very satisfied with the workshop, indicating that their motivation to participate in it had been high. Their high motivation, possibly because more than half of the mothers in this group were repeaters who had participated in the workshop at least once in the past, unlike Group B, where first-time participants accounted for more than 90%. The high repeater rate among mothers in Group A may have resulted from their high artwork production self-evaluation prior to participation in this event. As another point, spending much time on housework and parenting, and having no time for oneself have also been shown to influence parenting stress, as parenting mothers may have no time for themselves,³⁷ and desired to find such a time³⁸ in previous studies. At the same time, the importance of having time to be alone to reduce parenting stress in mothers^{39, 40} and a low rate of perceived parenting stress among mothers who have hobbies⁴¹ have also been reported. In a large-scale Japanese survey involving the elderly,⁴² the rate of having favorable psychological aspects was higher among participants with hobbies than among those without hobbies. As a common strategy to cope with stress, the effectiveness of having time to devote to hobbies and other favorite activities has also been demonstrated.⁴³ Based on this, it is likely that the rate of those considering artwork production in the workshop as a hobby or time for oneself was high in Group A, where nearly half of mothers had participated in it at least once in the past. This may have been associated with the low level of parenting stress among the mothers in this group, who engaged in artwork production alone.

On the other hand, the rate of highly rating confidence in one's work was higher in Group B with many first-time participants. Some mothers in Group A with a higher repeater rate may have evaluated their present works by comparison with their past works. In contrast, mothers in Group B may have found their works in line with their expectations despite their first participation. Moreover, in Group B, the level of parenting stress due to [appraisal of negative emotions] toward the child was lower among those with a higher score for <confidence

in one's work>. Keller²⁴ describes "The perception of control is one of the characteristic of confidence. When people believe that they have little or no control over a phenomenon, they experience stress-related emotions. As a method to promote the perception of control, it is necessary to help people understand what is expected of them and maximize the probability of success. In this regard, their confidence levels may increase when they are encouraged to set some goals and objectives for themselves". Based on these findings, mothers who are confident in their works created through collaboration with their children may also have a positive view on the artwork production process. Furthermore, as participants were allowed to produce artwork with a certain leeway while referring to samples, they may have gained confidence in their works, recognizing that they had completed the works with their own abilities and efforts. In addition, it is likely that the level of parenting stress due to [appraisal of negative emotions] toward the child was lower among mothers with a higher score for "confidence in one's work", because they had a good relationship with their collaborating children.

All participants highly evaluated their own artwork production, indicating that they recognized handprint artwork production as a beneficial and meaningful activity for mothers. When considering that everyday life events often cause stress in parenting mothers,⁹ artwork production as an unusual experience may help mothers find new aspects of themselves and their children. Handprint artwork where mothers use part of their children's body as a motif is characterized by providing an opportunity for the former to realize the latter's growth and promoting both parties' attachment to their work. Learning how to see one's relationship with the world using art and consequently gaining confidence in one's child and oneself¹⁶ may lead to a new realization of the mother-child relationship. Pieces of artwork provide an opportunity for the creators to become aware of their own emotions and abilities, and may also have a self-help effect through the process of affirming themselves. With regard to artwork production styles for mothers of children during infancy to the early or late preschool period, it is recommended that for those who find collaboration with their children stressful to participate in artwork production alone, and for those who can enjoy such collaboration to do it with their children. Participation in artwork production that allows mothers and children to freely express their ideas may increase mothers' confidence in their works, and thereby reduce their parenting stress.

This study has some limitations in terms of interpretation of the results. First, we did not conduct surveys

before/after artwork production; when conducting pre/post surveys, it is necessary to measure short-term changes, and, therefore, to use a scale that measures the level of parenting stress. Second, we did not compare Groups A and B in a common artwork production style. Such comparison is also required, as the style varied between the 2 groups using footprints and handprints, respectively. And third, we did not examine the relationships with factors other than the study items.

In conclusion, the results suggested that the child's age and presence/absence of his/her siblings influence parenting stress in the mothers of infants. The level of parenting stress, represented by the score for [appraisal of negative emotions] toward the child, was higher among the mothers of children in late infancy at the age of 3 to 5 years. Furthermore, there was a correlation between the level of parenting stress and score for <confidence in one's work> among the mothers who engaged in artwork production through collaboration with their children.

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