Working Version of Assessment Tool for Mothers' Child-Rearing Competence during Pregnancy and Postpartum Period

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The purpose of this study was to develop a working version of an assessment tool for mothers' child-rearing competence during pregnancy and the postpartum period (AT-Pg-/Post-MCCR). These tools should provide consistent contents of questionnaires for both periods to make comparisons easy and transitions clear. They had to be suitable for pregnant Japanese women and mothers in the early postpartum period, and be based on concepts of ego state, nurturance and social support.

Of 810 primiparous women in the last trimester of pregnancy at a maternal & women's hospital, two general hospitals and an university hospital in O. and H. prefectures, 395 gave their informed consent to take part in this study lasting from June, 2004 through March, 2005. For the postpartum period, 397 of 720 primiparas participated for 4-6 weeks after delivery. The rates of valid responses were 44.0% during pregnancy and 46.0% for the postpartum period questionnaire.

The Working Version of the AT-Pg-/Post-MCCR consisted of five sub-scales: I. Mother's gratification, acceptance and readiness for her pregnancy, labor and delivery experience, and adult ego state; II. Mother's acceptance and confidence to cope with the tasks of motherhood and infant care, mother's satisfaction with the tasks, and nurtural parent-ego or child-ego state; III. Mother's acceptance of and satisfaction with her life situation and circumstances; IV. Support for the maternal role from parents, friends and other family members; V. The quality of the relationship with husband, and mother's perception of the father's participation in child care and nurturance. Of the 161 questions of the Prenatal /Postpartum Self-Evaluation Questionnaires by Lederman(1981), 51 were adopted for the 90 items of the AT-Pg-/Post-MCCR after the addition of images, including those related to social and cultural backgrounds, in order to make them easy for pregnant Japanese women and mothers to understand and conceptualize. Thirty-nine questions were originally developed by us for nurturance and ego-state concepts for the AT-Pg-/Post- MCCR.

As a result, significantly or considerably strong and negative correlations were observed between the total or mean scores of the five sub-scales of the AT-Pg-/Post- MCCR and each of the items of the State Anxiety Scale (S-AS) and the Trait Anxiety Inventory (T-AS) of the State Trait Anxiety Inventory (STAI).

Next, the sub-scales I, III, IV, V of the AT-Pg-MCCR were selected by means of multiple regression analysis in order to establish their contribution to the prediction of mothers' anxi-

Key words

ety but using a different concept of anxiety (R = 0.719, R^2 = 0.511 for the S-AS, R = 0.716, R^2 = 0.507 for the T-AS). For the AT-Post-MCCR, the sub-scales I,II,III were selected as respective predictors of the S-AS (R = 0.774, R^2 = 0.596), and the sub-scales I, II, III,V for the T-AS (R = 0.755, R^2 = 0.565).

These results led to the conclusion that the AT-Pg-/Post-MCCR can be used to assess a mother's child-rearing competence during pregnancy and postpartum period because its validity and reliability were verified.

Introduction

Japan has experienced dramatic societal changes in the past few decades, such as urbanization that has led to an increase in nuclear families, women with high educational backgrounds, and so on[1]. Families and individuals in urban areas may become more isolated from neighbors and the overall community and this situation has led to an increase in the difficulties or inability of parents to cope with child rearing, or even a tendency to abuse their babies.

Many studies[2-7] on stress, anxiety, strain, and abuse associated with child rearing and the development of instruments to measure such problems have been reported during the preceding ten to twenty years. However, these instruments are not easy to use for a study, since they were developed based on different concepts and not necessarily with their reliability and validity confirmed.

The purpose of this study was to develop a working version of assessment tool for mothers' child-rearing competence during pregnancy and the postpartum period, which provide consistent content of questionnaires for both periods that are suitable for pregnant Japanese women and mothers, and are based on social support concepts[8-10].

Background of this study

The Prenatal Self-Evaluation Questionnaire (the Pre-SEQ) by Lederman[11-14] is composed of seven dimensions (78 items) (α = 0.75-0.92): (a) the pregnant woman's sense of well-

being for her baby and herself (10 items, α = 0.83); (b) acceptance of the pregnancy (14 items, α = 0.90); (c) identification with motherhood role (15 items, α = 0.79); (d) perception of her preparation for labor (9 items, α = 0.80); (e) fear of pain, helplessness and loss of control during her labor and delivery (10 items, α = 0.75); (f) perception of her relationship with her own mother (10 items, α = 0.92); and (g) perception of her relationship with her partner (10 items, α = 0.82).

The Postpartum Self-Evaluation Questionnaire (the Post-SEQ) has eight dimensions (82 items) (α = 0.74-0.90): (a) the mother's perception of the quality of her relationship with her partner (12 items, α = 0.90); (b) perception of the father's participation in child care (11 items, α = 0.87); (c) gratification from her labor and delivery experience (10 items, α = 0.87); (d) satisfaction with her life situation and circumstances (10 items, α = 0.73); (e) confidence in her ability to cope with tasks of motherhood (14 items, α = 0.74); (f) satisfaction with motherhood and infant care (13 items, α = 0.78); and (g) social support from friends and family for the maternal role (12 items, α = 0.84). A sufficiently high Cronbach's alpha for each of the sub-categories indicates high intercorrelations among the sub-scales.

For the Postpartum-SEQ (the Post-SEQ), Halman[15] reported that the correlation coefficients for pregnancy subscales as well as for motherhood subscales (0.60--0.08) were generally not very high among subfecund primiparous women. We speculat that the reason for these low values is that the two scales were constructed with different dimensions and

items. The findings by Halman do not necessarily hold true even for the Pre-SEQ, much less for the Post-SEQ, so that we could not confirm the reported validity or reliability.

On the other hand, Halman[15] confirmed the reliability of these inventories by measuring items at given time periods, given clinical places, for different parities, and so on. The instruments measure adaptation or fear and anxiety of pregnant women and child-rearing mothers, with high scores indicating a high level of fear, conflict or anxiety.

Okayama[16] developed the Japanese version of the Prenatal Self-Evaluation Questionnaire (J-PSEQ), which shows a considerably high correlation coefficient of 0.37-0.64 for the S-AS, and of 0.35-0.62 for the T-AS. As for internal consistency, which should be r = 0.25-0.72, the correlation coefficients of nine items were shown to be less than r = 0.40, signifying weak correlations and therefore insufficient validity and reliability of the instrument. These results suggest that there is a definite need for a fundamental review of the J-PSEQ.

Methods

Subjects

Of 810 primiparous women in the last trimester of pregnancy at a maternal & women's hospital, two general hospitals and an university hospital in O. and H. prefectures, 395 gave their informed consent to take part in this study lasting from June, 2004 through March, 2005. For the postpartum period, 397 of 720 primiparas participated for 4-6 weeks after delivery. The rates of valid responses to questionnaire were 44.0% for pregnancy and 46.0% for the postpartum period.

The subjects' mean age was 29.7 years (SD=4.5), which was consistent with the national standard[1] for a woman delivering her first child. As for the subjects' background, subjects with high-school education, including vocational school, accounted for 34.9%, and those with a junior college education or beyond accounted for 42.0% of the group. Some 27.0% of the subjects were engaged in paid work, and 46.8% were annually earning between 3 million and 5 million yen. The percentage of subjects who were members of nuclear families was 88.0% and it was 65.9% for those living in a condominium or apartment.

Informed consent was obtained from all participants before they joined the study. For the subjects whose informed consent had been obtained, the authors provided further explanation of the questionnaire at the outpatient clinic of the five hospitals.

After filling out the questionnaires at home according to the explanations, the subjects sent them to the university anonymously by mail, or dropped them into the collecting boxes placed in each hospital.

The ethical considerations of this study were approved by the ethical committee of the medical school at K University.

The explanation for the subjects comprised:
1) Confirmation that participation in the study was voluntary, and that the subjects were free to refuse to participate or discontinue participation.
2) Confirmation that the subjects understood that nonparticipation in this study would have no detrimental effect on medical services provided to the subjects.
3) Assurance that the authors would take all possible precautions to protect the subjects' privacy.

Definitions

We defined the terms used in this study as follows.
1. Child-rearing competence (a) Direct competence to maintain an appropriate attitude for human relationships or behavior as a caregiver.(b) Indirect competence to carry out tasks by making the best use

of supporters, sustainers or surroundings[17].

2. Nurturance   A mental attitude suitable for affection and nursing, as well as skill for child-rearing, which means being able to assist in the baby's development by providing nutrition, support and encouragement[17].

3. Ego state   Ego state refers to the components of personality. The first part is "the parent in me" , which has developed as a result of what one was told by one's parents during childhood and by watching or listening to one's parents. The second part is "the child in me" is the part of one's affirmative or emotional personality which has been developed by learning the ways to respond to one's parents effects thorough the process reflecting them affirmatively or emotionally. The third part is "the adult in me", which represents a calm and intellectual personality which has developed by learning the ways to respond to others rather than one's parents by gathering information and making use of resources[18].

Measurements

An assessment tool for mothers' child-rearing competence during pregnancy and the postpartum period (the AT-Pg-/Post-MCCR)

Since the Pre-/Post-SEQ is in the form of a multi-dimensional questionnaire based on the concept of social support, we evaluated its suitability for assessment of mothers' maternal adaptation. After a thorough discussion, we decided to adopt part of the 161 questions of the Pre-/Post-SEQ with modifications. The aim of these modifications was to simplify the contents of the items and reduce their number for each dimension to make the contents of the prenatal and postpartum questionnaires more consistent as well as more suitable for pregnant Japanese women and mothers.

We then developed "An Assessment Tool for Mothers' Child-Rearing Competence during Pregnancy and Postpartum Period (the AT-Pg-/Post-MCCR)" which consisted of five sub-scales for each scale, three categories for each subcategory, and six items for each category (90 items for each tool) to produce a working version.

We applied the concepts of ego states, nurturance and social support for assessing a mother's child-rearing competence, which may correlate negatively with the degree of mothers' anxiety during both pregnancy and the postpartum period[9-15]. The five sub-concepts of the AT-Pg-/Post-MCCR were: I. Mother's gratification, acceptance and readiness for her pregnancy, labor and delivery experience, and adult ego state; II. Mother's acceptance and confidence to cope with the tasks of motherhood and infant care, mother's satisfaction with the tasks, and nurtural parent-ego or child-ego state; III. Mother's acceptance of and satisfaction with her life situation and circumstances; IV. Support for the maternal role from parents and from friends and other family members; V. The quality of the relationship with husband, and mother's perception of the father's participation in child care and nurturance.

Thirty-nine questions were originally developed by us for nurturance and ego-state concepts for the Pre-/Post-MCCR. Examples of characteristic items regarding the adult ego state in sub-scale I are, "When something unexpected occurs, I react calmly by gathering information, etc. to make a decision" and "I easily get angry when things don't occur as I thought they would." Examples for the nurtural parental-ego state in sub-scale II are, "I like having children around me" , and "People say I'm good to have around." Of the 161 questions of the Pre-/Post-SEQ, 51 were adopted for the AT-Pg-/Post-MCCR after the addition of images, including those related to social and cultural backgrounds, in order to make them easy for pregnant Japanese women and mothers to

understand and conceptualize including questions related to social and cultural backgrounds (Table 1).

Responses to each question were measured on a 4-point Likert-type scale ranging from "not at all" to "very much so." Some items were scored reversely, and item response scores were then totaled for each scale. Higher scores indicated more positive responses. The consistency rate in a pilot test for 90 items with their subscale concepts was nearly 100% for six specialists of maternal nursing.

Data analyses

Validity

The consistency rate of each of the 90 draft items in terms of content validity was first confirmed by six maternal nursing specialists.

For predictive validity, the coefficient of determination as a predictor of the STAI during pregnancy and the postpartum period was calculated by means of multiple regression analysis with such variables as the total and subscale scores of the AT-Pg-/Post-MCCR.

As for criterion-related validity for the AT-Pg-/Post-MCCR, the STAI by Spielberger[19] was generally used as a measure for degree of anxiety because of its high validity and reliability. The Japanese State Trait Anxiety Inventory (the J-STAI)[20] was also used in this study. The validity and reliability of the Spielberger's STAI, on which the J-STAI State-Trait is based, have proven to be high[19]. Alpha coefficients of the J-STAI estimated in this study were also sufficiently high: 0.910-0.907 for S- AS, and 0.926-0.907 for T- AS.

Reliability

We performed a pilot test with 23 pregnant women in order to determine whether there were any questions to which subjects could not respond because they were difficult to understand. We also confirmed the reliability of the responses on the Likert-type scale by calculating the mean score, SD, distribution

and so on. The pilot test results showed that there were no questions the subjects could not answer and no unreliable data.

Stability of the AT-Pg-/Post-MCCR was evaluated by test-retest reliability during the pilot test for each of the 23 pregnant women and women in early postpartum period with twelve to sixteen days intervals.

This was followed by calculation of Cronbach's alpha of the AT-Pg-/Post- MCCR in order to confirm their internal consistency reliability, after the contents of the 90 common items, including the concepts of each subscale, had been checked by six maternal nursing specialists.

Differences with p-values smaller than 0.05 were considered to be statistically significant. Statistical software SPSS14.0 was used for the data analysis in this study.

Results

1. Validity of the AT-Pg-/Post-MCCR

For content validity, we first determined that the consistency rate for the 90 draft items for each of the draft subscale concepts was nearly 97% among the six maternal nursing specialists. All items of the AT-Pg-/Post-MCCR were assessed as satisfactory for obtaining subjects' responses, since there were no questions that could not be answered by the respondents in the pilot study, nor were there any unreliable data.

As for criterion-related validity, the Pearson correlation coefficients between the S-AS and the T-AS were determined for both pregnancy (r = 0.769: p < 0.001) and the postpartum period (r = 0.790: p < 0.001). Significantly and negatively strong or considerably strong correlations between the S-/T-AS on the one hand, and the total and mean scores of five subscales of the MCCR for both pregnancy (r = -0.696 - -0.413: p < 0.001) and the postpartum period (r = -0.750 - -0.380: p < 0.001) on the other, were also indicated. Furthermore, sig-

Table 1 Subscales and questions asked within the working version of AT-Pg- and Post-MCCR

No.	Questions
	I . Mother's gratification, acceptance and readiness for her pregnancy, labor and delivery experience, and adult ego state;
1	When I imagine my child's birth, I am filled with happiness.
16	I wish I weren't pregnant (or didn't have a child).
31	I think the experience of pregnancy helped me grow.
46	I have prepared myself well for labor pains. (I regret the way I handled my labor pains and childbirth experience this time.)
61	My pregnancy this time around was a constant source of stress for me.
76	The discomfort I experienced since becoming pregnant, including morning sickness, was within a bearable scope for me. (My childbirth remains as one of my most uncomfortable and frightening experiences ever.)
2	I can feel the child within me growing stronger day by day. (I can see how my child is growing every day.)
17	I think my child will be born healthy (or is growing up well).
32	I worry a lot about the problems my baby might face.
47	I think my labor pains and childbirth will go normally.
62	I am confident that my childbirth will be (was) totally normal.
77	I'd like to breast feed as much as possible.
3	When something unexpected occurs, I react calmly by gathering information, etc., to make a decision.
18	When something happens, I can easily get help from people around me.
33	I easily anger when things don't occur as I thought they would.
48	I think the pain and stress of labor will be more than I can bear.
63	I try to see things in a positive light.
78	It's hard to snap out of it when something bad or sad happens to me.
	II . Mother's acceptance and confidence to cope with the tasks of motherhood and infant care, mother's satisfaction with them the tasks, and nurtural-parent-ego or child-ego state;
4	I talk to the child within me. (I was looking forward to taking care of my child.)
19	I like having children around me.
34	I praise and cajole children and people younger than me.
49	People say I'm good to have around.
64	I don't think I adapt very well to changing situations.
79	I can't stop thinking about the baby to come; what he or she will look like, be like, etc.
5	I find it motivating to raise a child.
20	I think it's hard finding a balance between taking care of children and my other responsibilities and activities.
35	I don't think it's all that interesting to take care of a baby.
50	I think my child will be a burden to me.
65	I worry that my child won't bond (hasn't bonded) with me.
80	I think I will be able to raise a child normally.
6	When children are crying, I think I understand why. (I know why.)
21	I think I understand what needs to be done for the sake of my children.
36	I worry that I won't be able to provide my children with what they need.
51	I enjoy cooking and cleaning.
66	I don't think I'll be able to bathe my child or change diapers. (I can't do those things very easily.)
81	I'm worried I'll become neurotic over child-raising.
	III: Mother's acceptance in and satisfaction with her life situation and circumstances;
7	My child might be a financial burden on our household. (My child is a financial burden.)
22	Should something happen, there are ways to get financial assistance or another income.
37	I am not worried that we will have enough income for the things we need.
52	I am confident I can keep to a budget, even if our income goes down a little.
67	I worry about how we will live on our current income.
82	I think it will be hard to save enough money to raise our child to adulthood.
8	Where we live now, I worry that a crying child would disturb our neighbors.
23	There is no one nearby who could help out in a sudden emergency.
38	We live in a place we're used to.

No.	Questions
53	I talk with other mothers who have children the same age as mine.
68	I worry about raising a child in the neighborhood we live in now.
83	Our current home is too small for all of us to live in.
9	It would be better if I could keep working or going to school, with someone else looking after my child.
24	I think it will be hard for me to balance household chores, work and child-raising.
39	I think there won't be much time (it's frustrating/hard to find time) for myself when taking care of the baby.
54	I am exhausted every day.
69	Our lifestyle seems to be one of ease.
84	My current lifestyle seems to be stuck in a rut.
	IV. Support for the maternal role from parents, friends and other family members;
10	My mother was happy when I got pregnant (when my child was born).
25	My mother has helpful advice.
40	My mother and I tend to argue when we see one another.
55	When I lose confidence in myself, my mother reassures me.
70	My mother encourages me to do things my way.
85	My mother criticizes the decisions I make.
11	I want to raise my child as I was raised.
26	I don't think the way my parents raised children will serve as a model (reference) for me.
41	I am glad I was born to my parents.
56	I wish my parents had done things differently when they were bringing me up.
71	When I look at my parents, child-raising seems to be a constant pain, and no fun at all.
86	I want to be like my mother (or father).
12	When there is something about being a mother that I don't understand, there are friends or family members I can talk to.
27	I have friends and family who encourage me to raise my children my way.
42	I can count on help from friends and family when my child needs it.
57	I have friends and family who admire my child.
72	I have friends and family who think I am a good mother.
87	I have friends and family who can show me how to fulfill my role as a mother.
	V. The quality of the relationship with husband, and mother's perception of the father's participation in child care and nurturance.
13	When I am confused, my husband understands me (or calms me down).
28	I find it hard to talk to my husband about how our lives together will change after my pregnancy (childbirth).
43	My husband bears the burden for my feelings and problems.
58	My husband is critical of me as a wife and mother.
73	There are problems in the life my husband and I share.
88	My conversations with my husband become arguments.
14	My husband talks with me about our coming child.
29	My husband was happy that I got pregnant (gave birth).
44	My husband pats my belly and talks to the child. (My husband holds the child happily and plays with the child.)
59	I think my husband will (does) ignore the child, even when the child is crying.
74	I think my husband doesn't like children. (My husband hates the sound of the child's crying.)
89	My husband is looking forward to holding the new baby. (He willingly bathes the children and changes their diapers for me.)
15	My husband helps with household chores when needed.
30	My husband will (does) share in taking care of our child.
45	My husband seems to prefer to spend time at work or with his hobbies than with me and the child.
60	My husband disappoints me, even when I need him.
75	I think my husband will (does) share in child-raising.
90	My husband feels that child-raising is not his responsibility.

NB: Text within the parentheses is directed at new mothers. All other text is for both expecting and new mothers.

The numbers in the left column indicate the order of appearance in the questionnaire.

Table 2 Correlation and Intercorrelation among STAI and subscale scores of the working version of AT-Pg- and Post-MCCR

A. Pregnancy	α	1)	2)	3) (1)	(2) I	II	III	IV	V
1) State Anxiety	0.914		0.769***	-0.696***	-0.626***	-0.516***	-0.516***	-0.552***	-0.413***
2) Trait Anxiety	0.907			-0.673***	-0.649***	-0.548***	-0.562***	-0.461***	-0.428***
3) Pg- MCCR									
(1) Total score	0.941				0.814***	0.822***	0.749***	0.780***	0.591***
(2) Sub-scales I	0.784					0.712***	0.503***	0.493***	0.352***
II	0.810						0.552***	0.520***	0.366***
III	0.801							0.446***	0.270***
IV	0.907								0.353***
V	0.894								
B. Postpartum Period									
1) State Anxiety	0.930		0.790***	-0.750***	-0.708***	-0.667***	0.642***	-0.472***	-0.380***
2) Trait Anxiety	0.926			-0.720***	-0.695***	-0.647***	0.609***	-0.432***	-0.405***
3) Post-MCCR									
(1) Total score	0.942				0.834***	0.827***	0.803***	0.740***	0.625***
(2) Sub-scales I	0.780					0.697***	0.612***	0.535***	0.410***
II	0.837						0.599***	0.542***	0.345***
III	0.816							0.471***	0.398***
IV	0.896								0.283***
V	0.875								

α : Reliability coefficient. correlation matrix for Pearson correlation coefficient: *** $p<0.001$

nificantly strong or considerably strong correlations were found between the overall and each of the sub-scale scores of the AT-MCCR in both pregnancy (r = 0.822 - 0.591: p < 0.001), and the postpartum period (r = 0.834 - 0.625: p < 0.001). Additionally, considerably strong or weak correlations were found between each sub-scale of the AT-Pg-MCCR (r = 0.712 - 0.270: p < 0.001), and the AT-Post-MCCR (r = 0.697 - 0.283: p < 0.001) (Table 2).

For predictive validity, the predictor variables for the S-/T-AS of both pregnancy and the postnatal period were subjected to multiple regression analysis with such variables as the total and sub-scale scores of the AT-Pg-/Post-MCCR. The calculations yielded a multiple correlation coefficient of R = 0.719, an ad-

justed coefficient of determination of R^2 = 0.511 of the AT-Pg-MCCR for the S-AS, and of R = 0.716 and R^2 = 0.507 for the T-AS. As a result, the AT-Pg-MCCR sub-scale's I, III, IV, V were selected as the predictor variables for both the S-/T-AS, which were the criterion variables.

For the AT-Post-MCCR, R = 0.774 and R^2 = 0.596 for the S-AS, and R = 0.755 and R^2 = 0.565 for the T-AS were determined. Sub-scales I, II, III for the S-AS and sub-scales I, II, III, V for the T-AS were selected as the respective predictor variables.

The highest standard partial regression coefficient was obtained in sub- scale I for both the AT-Pg-/Post-MCCR and also for both the S-AS and the T-AS (β =-0.428, F = 260.091; β =-0.362, F = 229.196 : p < 0.001), fol-

Table 3. Multiple regression analysis of the working version of AT-Pg-and Post-MCCR sub-scales for STAI scores

1. Pg-MCCR

	R	R^2	Sub-scales	β	F-value	γ
1) State Anxiety	0.719	0.511	I	-0.362	229.196***	-0.383
			III	-0.187	116.522***	-0.218
			IV	-0.237	157.342***	-0.270
			V	-0.152	94.073***	-0.195
2) Trait Anxiety	0.716	0.507	I	-0.428	260.091***	-0.439
			III	-0.280	175.242***	-0.316
			IV	-0.090	122.076***	-0.105
			V	-0.100	93.309***	-0.130

2. Post-MCCR

	R	R^2	Sub-scales	β	F-value	γ
1) State Anxiety	0.774	0.596	I	-0.371	365.491***	-0.368
			II	-0.249	180.903***	-0.259
			III	-0.266	241.597***	-0.302
2) Trait Anxiety	0.755	0.565	I	-0.366	340.596***	-0.347
			II	-0.235	156.310***	-0.238
			III	-0.209	211.159***	-0.229
			V	-0.090	120.040***	-0.122

Note: R = multiple correlation coefficient; R^2 = adjusted coefficient of determination; β = standardized partial regression coefficient; γ = partial correlation coefficient.
***p<0.001

lowed by sub-scale III (β =-0.280, F = 175.242; β =-0.187, F = 116.522 : p < 0.001) (Table 3).

2. Reliability of the AT-Pg-/Post-MCCR

Stability determination of the AT-Pg-/Post-MCCR by test-retest reliability in the pilot test for 23 pregnant women and women in early postpartum period with twelve to sixteen days interval yielded the following ratios; r = 0.79 and 0.81 for Factor I; r = 0.74 and 0.78 for factor II; r = 0.76 and 0.77 for factor III; r = 0.69 and 0.70 for factor IV; r = 0.71 and 0.79 for factor V; r = 0.74 and 0.77 for overall factor I-V (p < 0.001) (Table 4).

The set of descriptive statistics for all scores of the 395 subjects were considered to warrant further analysis in this study. The mean scores were calculated as 37.0 (SD = 9.3) for state anxiety, 39.6 (SD = 9.7) for trait anxiety during pregnancy, and 40.4 (SD = 10.6) for state anxiety and 42.9 (SD = 11.0) for trait anxiety in the postpartum period.

For the AT-Pg-/Post-MCCR, the mean total score for the AT-Pg-MCCR was 286.5 (SD = 25.6), and the mean score for the five sub-scales was 57.3 (SD = 5.1). The highest sub-scale score was 63.5 (SD = 5.4) for factor V, followed by 59.9 for factor IV (SD = 8.6), and the lowest score was 53.4 for factor I (SD = 6.5). The mean total score for the AT-Post-MCCR was 289.6 (SD = 28.2), and the mean

Table 4 Stability of the working version of AT-Pg-and Post-MCCR based on test-retest reliability

Pregnancy	
Subscale	r
I	0.79
II	0.74
III	0.76
IV	0.69
V	0.71
I ~ V overall	0.74
Postpartum period	
Subscale	
I	0.81
II	0.78
III	0.77
IV	0.70
V	0.79
I ~ V overall	0.77

· r: Pearson's coefficient
· all values were significant at p<0.001

score for the five sub-scales was 57.9 (SD = 5.6). The highest sub-scale score was 63.4 for factor V (SD = 7.1), and the lowest score was 53.0 (SD=7.8) for factor III (Table 5).

Cronbach's alpha values were α = 0.914, 0.930 for the S-AS and α = 0.907, 0.926 for the T-AS. For the AT-Pg-MCCR, α = 0.907-0.784 for each of the sub-scales and α = 0.941 for the overall items. The corresponding values for the AT-Post-MCCR were α = 0.896-0.780 and α = 0.942 (Table 2).

Discussion

We developed the working version of the AT-Pg-/Post-MCCR based on the Pre-/Post-SEQ by Lederman in order to create an assessment tool that would be more appropriate for pregnant Japanese women and mothers and based on the concepts of ego states, nurturance and social support for assessing a

Table 5. Descriptive data for the working version of AT-Pg-and Post-MCCR subscales and STAI Scores

		n	Range	Mean	SD
A. Pregnancy					
1) State Anxiety		383	20-73	37.0	9.3
2) Trait Anxiety		392	21-74	39.6	9.7
3) Pg- MCCR					
	Total score	343	184-339	286.5	25.6
	Average score	343	36.8-67.8	57.3	5.1
	Sub-scales I	343	34-71	53.4	6.5
	II	381	33-72	55.2	6.4
	III	387	27-69	54.2	7.2
	IV	389	21-72	59.9	8.6
	V	375	46-72	63.5	5.4
B. Postpartum Period					
1) State Anxiety		389	20-76	40.4	10.6
2) Trait Anxiety		397	21-76	42.9	11.0
3) Post-MCCR					
	Total score	340	188-364	289.6	28.2
	Average score	340	37.6-69.2	57.9	5.6
	Sub-scales I	388	39-71	57.5	6.6
	II	382	29-70	54.7	7.1
	III	395	28-71	53.0	7.8
	IV	384	26-72	59.9	8.5
	V	387	33-72	63.4	7.1

mother's child-rearing competence. We also designed the working version of the assessment tools for each of the paired subscales and items applicable to pregnancy and the postpartum period, which were mostly of the same construction in order to simplify longitudinal comparisons.

Our fundamental consideration was that the AT-Pg-/Post - MCCR should be able to assess a mother's child-rearing competence during both pregnancy and the postpartum period by establishing a certain degree of validity and reliability.

High content validity of the AT-Pg-/Post-MCCR was established among the six mater-

nal nursing specialists. All items of the AT-Pg-/Post-MCCR questionnaires were deemed satisfactory, since there were no questions our subjects could not answer.

Each sub-scale of the AT-Pg-/Post-MCCR was confirmed to possess sufficiently high criterion-related validity because of their considerably high negative correlation coefficient with the STAI for both pregnancy and the postpartum period.

Predictive validity of all sub-scales of the Pg-/Post-MCCR was assessed by multiple regression analysis, which showed them to be predictors of the STAI scales for both pregnancy and the postpartum period. As a result, all sub-scales of the MCCR were selected as the respective predictor variables for mothers' anxiety in both of pregnancy and the postpartum period. Furthermore, the sub-scales I, "Mother's gratification, acceptance and readiness for her pregnancy, labor and delivery experience, and adult ego state" and III, "Mother's acceptance of and satisfaction with her life situation and circumstances were selected as the common predictor variables with the highest partial regression coefficient obtained for both scales of the STAI in both the pregnancy and the postpartum period. We speculate that the reason for these high coefficients is that these sub-scales consisted of direct questions concerning pregnancy, labor and delivery, such as those related to adult ego state, which also constituted a unique factor of the tools used in this study. These sub-scales may therefore make a more meaningful contribution as predictors of anxiety than direct questions such as those concerning gratification, readiness, or acceptance, which are related to the mother's current perceptions and feelings.

Sub-scale V, "The quality of the relationship with husband and mother's perception of the father's participation in child care and nurturance", was selected as the third common predictor of anxiety in both pregnancy and the

postpartum period, except for the S-AS in the postpartum stage. This sub-scale was considered to contribute directly to multilateral assessment of the mother's child-rearing competence. This sub-scale was also thought to make an indirect contribution since such dimensions as the fathers' nurturance are continually shaped not only by the relationship of the parents but also by the husband's work and social environment. Sub-scale IV, "Support for the maternal role from parents, friends and other family members" contributed to mothers' anxiety only during pregnancy. Sub-scale II, "Mother's acceptance and confidence to cope with the tasks of motherhood and infant care, mother's satisfaction with these tasks, and nurtural/parent-ego or child-ego state" also contributed to mothers' anxiety, but only in the postpartum period. Our interpretation of the results described here was that sub-scale IV reflects the basic importance of social support from parents, friends and other family members for prevention of anxiety during pregnancy[9,10]. However, after delivery such social support had less effect on the new mothers' anxiety during the child-rearing period, so that the anxiety became much stronger and tangible than during pregnancy. The content of sub-scale II, on the other hand, is thought to have a direct influence on the mother's postpartum anxiety, since the mother's nurtural parent-ego or child-ego state is continually shaped not only by the parental relationship but also by the mother's life environment. Therefore, the influence of the factors of the mother's nurtural parent-ego or child-ego state may grow increasingly stronger from pregnancy to postpartum.

For content validity, an additional set of descriptive statistics for all scores of the 395 subjects was judged appropriate.

The correlation coefficients of each of the sub-scales and the overall scale of the working version of the AT-Pg-/Post-MCCR were evaluated by test-retesting as mostly stable and

reliable. In addition, the reliability of the AT-Pg-/Post-MCCR was confirmed because of a sufficiently high coefficient alpha as well as high internal consistency for the working version of the AT-Pg-/Post-MCCR and their subscales. .

These results lead us to conclude that the AT-Pg-/Post-MCCR can be used to assess a mother's child-rearing competence during pregnancy and the postpartum period because its validity and reliability were verified.

Conclusion

In this study, we developed a working version of an assessment tool, the AT-Pg-/Post-MCCR, for mothers' child-rearing competence based on the concepts of ego states, nurturance and social support, each with five subscales (90 items), and verified their reliability and validity. The results indicate that with this tool we may be able to assess mothers' child-rearing competence during pregnancy

and the postpartum period, which are the periods for adaptation to motherhood.

Further study is needed to reexamine subscales and specific items in order to ensure higher validity and reliability of the AT-Pg-/Post-MCCR. The number of items of these two tools also needs to be reduced by rearranging them while maintaining the validity and reliability confirmed in this study.

Acknowledgments

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