

Original article

An Analytical Model / Emotional Intelligence Quotient and QOL in Mothers with Infants in Japan

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Abstract

Objective: The purpose of this study was to examine the relationship between the emotional intelligence quotient and health-related quality of life using structural equation modeling.

Methods: A self-administered questionnaire survey was conducted among 1,911 mothers who visited the Health Center for an infant medical examination. A hypothetical model was constructed using variables of the emotional intelligence quotient, social support, coping, parenting stress, and perceived health competence.

Result: There were a total of 1,104 valid responses (57.8%). Significant standardized estimates were obtained, confirming the goodness of fit issues with the model. The emotional intelligence quotient had a strong impact on physical and psychological quality of life, and showed the greatest association with coping. This study differed from previous studies in that, due to the inclusion of social support and explanatory variables in coping, an increase in coping strategies was more highly associated with emotional intelligence quotient levels than with social support.

Conclusion: An enhanced emotional intelligence quotient should be considered a primary objective to promote the health of mothers with infant children.

Key words: emotional intelligence quotient, health-related quality of life, mothers

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Introduction

In Japan, a decline in the physical and mental health of mothers is being observed, with an increasing number of

infant abuse cases¹. Maternal and child health approaches in Japan have been mainly focused on improvement of social factors, such as health checkups, advice from public health nurses, financial support, and special programs for mentally handicapped children. On the other hand, Bandura's social cognitive theory² stresses the importance of personal factors including emotional response management, self-control, and self-efficacy for self-directed health-related behaviors of mothers, in addition to such social factors.

In Western countries, approaches focusing on such personal factors have been promoted, with a view to reducing parenting stress. In a randomized comparative study³ conducted to examine the effect of group coaching for mothers with parenting stress, such coaching was effective in reducing problem behaviors of a child perceived by the mother, while improving her self-esteem and spousal relationship and alleviating her depression and stress.

In recent years, self-control, one of the components of the emotional intelligence quotient (EQ), has been indicated as a factor closely associated with parenting stress in Japanese mothers⁴.

In recent years, the emotional intelligence quotient⁵ has been increasingly focused on as a factor closely associated with parenting stress in Japanese mothers⁴. Thus, enhancing their EQ may improve the physical and mental health of such mothers. The EQ consists of the following 3 concepts: intrapersonal management, interpersonal management, and situation management. It refers to the ability to control one's behavior, without being affected by sudden emotional distress. EQ has also been considered an important personal factor associated with coping and health status⁶ and is improved by coaching⁷.

However, up to now, the effect of EQ on the level of parenting stress and the health status of mothers of infants has not yet been closely examined in Japan.

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In this study, we developed a path diagram regarding the association between the EQ and health-related quality of life (QOL) and measured its goodness of fit, based on structural equation modeling, in order to clarify the effect of EQ on the health of mothers of infants. The following five observed variables that might be strongly correlated with the mother's health-related QOL improvement process were included in the path diagram: EQ⁸⁾, social support⁹⁾, coping¹⁰⁾, parenting-related stress¹¹⁾, and perceived health competence²⁾.

Methods

Participants

Among mothers undergoing health assessments for infants aged 4 months, 1 year and 6 months, 2 years and 6 months, and 3 years and 6 months, performed by the Health Center of A City in Osaka Prefecture, a total of 1,911 mothers who visited the center within the 4-month period between May and August 2010 were studied. In A city, the number of children aged 4 and younger was approximately 9,000, accounting for 4.9% of the total population; this is slightly higher than the national mean of 4.3%.

Data collection

A self-administered questionnaire was provided to all mothers at the reception counter for assessments, with documents outlining the study. Subsequently, a group meeting was held to provide them with an oral explanation of the objective of the study and the 2 methods of responding to the questionnaire: 1) filling out the questionnaire while waiting for their assessment and immediately submitting it in a provided envelope one per mother and 2) filling out the questionnaire at home and submitting it by mail. Based on Kihara's calculation method¹²⁾, the sample size was set at 1,000 to ensure a sufficient number of valid responses in consideration of the overall response rate and possible number of invalid responses.

Measurements

As basic attributes, the following items were measured: 1) age, health status, occupation, educational background, main caregiver during the daytime, and number of family members living together for mothers and 2) sex, age in months, and health status for children.

The health-related QOL¹³⁾ is a comprehensive scale applicable to all subjects. In addition to this, the standard-version of the SF-36v2 confirmed with regard to reliability and validity, and Japanese population-based standard values were used based on criteria established by the Medical Outcomes Trust. SF-36v2 consists of 36 items for 1-month health measurements, and the following 8 subscales: 1)

physical functioning, 2) role limitations-physical, 3) bodily pain, 4) general health, 5) vitality, 6) social functioning, 7) role limitations-emotional, and 8) mental functioning. These subscales are scored in 2 summary scoring categories, physical and mental health, with subscales 1) to 4) being classified into the former, and subscales 5) to 8) being classified into the latter. Higher scores indicate more favorable health conditions. The approval of iHope International for use of this scale was previously obtained.

To measure the EQ, an emotional intelligence scale developed by Uchiyama *et al.*⁵⁾ consisting of 63 items in interpersonal, intrapersonal, and situation management domains, was used. Each domain consists of 21 subitems, adopting a 5-level answering method, with 0 representing "definitively no"; and 4 representing "definitively yes." Scores for the 3 domains are simply added to calculate the total score. Higher total scores represent higher EQs. The Cronbach's alpha for this scale has been reported to be 0.89 to 0.96.

Parenting stress was measured using a scale developed by Tanaka¹⁴⁾, consisting of 10 items, and adopting a 4-level answering method, with 1 representing "never" and 4 representing "frequently." Higher total scores represent higher levels of parenting stress. The Cronbach's alpha for this scale has been reported to be 0.86¹⁴⁾.

Social support has been classified into emotional and instrumental support¹⁵⁾. In this study, the former was measured to evaluate the availability of those providing support to the participants, using a scale developed by Munetaka¹⁶⁾, consisting of 10 items and adopting a 2-level answering method, with 0 representing "unavailable" and 1 representing "available." The latter was measured by evaluating the availability of the following services or support, which has been reported to be closely associated with parenting stress¹⁷⁾: taking care of the child whenever necessary, assisting with parenting and housekeeping activities, and providing consultation regarding parenting. A 2-level answering method was adopted in this scale, with 0 representing "unavailable" and 1 representing "available." The total score for emotional and instrumental support ranged from 0 to 13, with higher scores representing higher availability of such support.

Coping as a factor positively correlated with parenting stress⁴⁾ and health¹⁸⁾ was measured using a scale developed by Ozaki¹⁹⁾ consisting of 5 problem- and 3 emotion-focused coping items, and adopting a 4-level answering method, with 0 representing "never" and 3 representing "all the time." Higher scores represent better coping with stress.

Perceived health competence was measured using a Japanese scale, developed by Togari *et al.*²⁰⁾ as an index of the ability to change health-related habits and behaviors, and consisting of 8 items related to health management. A

5-level answering method was adopted, with 1 representing “disagree” and 5 representing “agree.” The total score was calculated, with higher total scores representing higher levels of perceived health competence. Cronbach’s alpha for this scale has been reported to be 0.86.

Analytical methods

Participant attributes, as well as the normality of scores of the study scales, were initially confirmed based on their distributions. Subsequently, the Pearson product-moment correlation coefficient and multicollinearity between the health-related QOL and each factor were confirmed. The goodness of fit of the study model was measured using the GFI (goodness of fit index), AGFI (adjusted goodness of fit index), and RMSEA (root mean square error of approximation), with a selection criterion set as follows: GFI and AGFI ≥ 0.9 ; and RMSEA < 0.1 . Lastly, the standardized indirect effect of the EQ on the physical and mental QOL was calculated. For these analyses, Dr. SPSS II and Amos 19 for Windows were used.

Ethical considerations

This study was conducted with the approval (E889) of the Ethics Committee at the Faculty of Medicine, Kyoto University. Participants were provided with written and verbal informed consent.

Results

The questionnaire sheet was distributed 1,911 women, of which a total of 1,157 women (response rate: 60.5%) responded: 721 immediately, and 436 by mail. The number of responses by assessment was as follows: 3 months, 287 (response rate: 60.2%); 1 year and 6 months, 284 (57.8%); 2 years and 6 months, 266 (58.5%); and 3 years and 6 months, 320 (67.1%). Among these respondents, 49 with missing values in any questionnaire items and 4 receiving psychiatric or psychosomatic treatment were excluded. As a result, the total number of valid responses was 1,104 (valid response rate: 57.8%).

The attributes of mothers and children are shown in Table 1. Mothers’ ages ranged from 19 to 49, with a mean age and standard deviation of 32.8 ± 4.7 ; the number of mothers aged 30 and over was the highest (758, 68.7%). Regarding the occupational situation, housewives accounted for the majority (741, 67.1%). Women who graduated from college, 307, comprised the largest group with regard to educational background (27.8%). The economic situation was poor (66.8%). Nuclear families accounted for the majority (947, 85.8%). The number of children ranged from 1 to 5; 2 (491, 44.5%) and 1 (430, 38.9%) accounted for the majority. The

main caregiver during the daytime was the mother in 777 cases (70.4%).

The child’s age in months ranged from 3 to 45, with a mean and standard deviation of 24.6 ± 14.6 . The numbers of males and females were 562 (50.9%) and 542 (49.1%), respectively.

Table 2 shows the correlation matrix for factors. The following explanatory variables showing significant positive correlation with health-related quality of life (QOL) were included perceived health competence, EQ, social support, child’s age in months, and economic situation for physical QOL and perceived health competence, EQ, social support, coping, and economic situation for mental QOL. Those showing a significant negative correlation included parenting stress and child’s health status for physical QOL and parenting stress, child’s age in months, and his/her health status for mental QOL. There were no variables with multicollinearity.

Figure 1 shows the results of diagram-based analysis. Regarding the development of an analytical model, the following items were considered as observed variables: EQ, perceived health competence, social support, coping, parenting stress, and health-related QOL. Furthermore, the attributes of educational background, occupational situation, child’s age in months and health status, and economic situation, as factors associated with parenting stress^{11, 15)} were included as explanatory variables of parenting stress. As a result, all estimated values in the diagram were shown to be valid: Recognition of social support and coping were enhanced by promoting the EQ; promotion of coping alleviated parenting stress; and alleviation of parenting stress increased the mental QOL. Similarly, an enhanced EQ led to higher levels of perceived health competence, and higher levels of perceived health competence increased the physical and mental QOL. All standardized estimates in all directions in the path diagram described above were statistically significant. Furthermore, the goodness of fit of the analytical model was satisfactory, with the following values: 0.941 for GFI, 0.902 for AGFI, and 0.089 for RMSEA. The standardized indirect effect coefficient of the EQ was 0.104 for physical QOL and 0.231 for mental QOL.

Discussion

This study focused on the EQ as a personal factor playing an important role in self-directed behavioral changes, and verified the goodness of fit of an analytical model consisting of factors that have been reported to be closely associated with the health-related QOL.

To eliminate sample selection bias, infant health assessment facilities with a visit rate of 95% or more were studied,

Table 1 Basic attributes of the mothers and children (n=1,104)

Items			
Mother	Age (years) ¹⁾	32.8 ± 4.7	
		19 or younger	3 (0.3)
		20 to 29	264 (23.9)
		30 to 39	758 (68.7)
		40 to 49	79 (7.2)
	Occupation	Housewife	741 (67.1)
		Full-time worker	120 (10.9)
		Part-time worker	125 (11.3)
		Others	20 (1.8)
		Work leave	98 (8.9)
	Educational background	Junior high school	60 (5.4)
		Senior high school	301 (27.3)
		Vocational school	219 (19.8)
		College	307 (27.8)
		University/graduate school	217 (19.7)
	Economic situation	Unfavorable	167 (15.1)
		Relatively unfavorable	571 (51.7)
	Relatively favorable	349 (31.6)	
	Favorable	17 (1.5)	
Family structure	Nuclear	947 (85.8)	
	(Reprinted as “single-mother”)	(21)	
	Three-generations	157 (14.2)	
Number of children	1	430 (38.9)	
	2	491 (44.5)	
	3	150 (13.6)	
	4 or more	33 (0.3)	
Health status	Periodically visiting the hospital	130 (11.8)	
	Not periodically visiting the hospital	974 (88.2)	
Main caregiver during the daytime	Mother	777 (70.4)	
	Nursery school	307 (27.8)	
	Grandfather/mother, or others	20 (1.8)	
Child	Age (months) ¹⁾	24.6 ± 14.6	
	Sex	Male	562 (50.9)
		Female	542 (49.1)
	Health status	Favorable	1,050 (95.1)
		Receiving treatment	48 (4.3)
	Others	6 (0.5)	

Values are shown as numbers with percentages (n [%]). ¹⁾ Mean ± SD.

and the questionnaire was distributed to and collected from all mothers visiting them. Although the response rate was sufficient to ensure the necessary number of samples, the overall rate was not high (60.5%). In addition to this, the response rate markedly varied among assessments (1 year and 6 months, 57.8%, and 3 years and 6 months, 67.1%). Furthermore, the number of children aged 4 and younger in the study city was slightly higher than the national mean, suggesting that the samples of this study may have been influenced by the child's age and differences in parenting attitudes. On comparison of the mothers' basic attributes in this

study with the results of a national survey²¹⁾ and studies on the EQ⁵⁾, health-related QOL¹³⁾, and parenting stress⁸⁾, differences were slight, showing similarities between samples of the present study and the general population.

The results of diagram analysis based on structural equation modeling provided significant standardized estimates. The slightly low RMSEA index may be explained by the presence of observable variables without including latent variables²²⁾.

On the other hand, the results of this study support the hypothesis that the EQ may be a significant index for im-

preceding studies have suggested that higher EQs may represent a higher ability to control emotional responses, and a feeling of emotional response management may have a positive impact on physical and mental health²³.

Characteristically, the EQ was shown to markedly influence the physical and mental QOL; it was particularly closely associated with coping. The influence of the EQ on the physical QOL was indirect, rather than direct, with perceived health competence as a parameter. Similarly, the influence of EQ on the mental QOL was indirect rather than direct and was mediated by perceived health competence, social support, and coping. The result showing that EQ had the highest relation with coping is consistent with a report defining the EQ as the ability necessary to solve interpersonal and social problems occurring in diverse environments²⁴.

In short, the results of this study suggest that it may be necessary to enhance mothers' EQs in the following 3 respects:

1) While parenting stress markedly influences the mental QOL, its alleviation depends on the amount of coping strategies, which is increased by the EQ; in some previous studies^{15, 25, 26} regulating factors related to parenting stress, such as social support and economic situation, the EQ was confirmed to be the most closely associated with coping. Such a result may be explained by the necessity of enhancing the EQ to clarify one's role and lifestyle and to promote self-control even in the presence of stress²⁷.

2) The recognition and utilization of social support are promoted by enhancing the EQ; this may be explained as a mechanism in which they are promoted by the influence of high-level interpersonal relationship management and positive psychological processes as constructs of the EQ²⁸.

3) The EQ influences the physical and mental QOL, which are mediated by perceived health competence, i.e., the ability necessary for health-related habits and behavioral changes. Levels of self-efficacy, goal-setting ability, self-recognition, and recognition of others may be increased by enhancing the EQ, consequently leading to self-directed health-related behaviors, creating feelings of self-growth, and resulting in an increase in the QOL²⁹. Perceived health competence has been reported to be significantly correlated with health-related habits, such as smoking, exercise, and eating habits²⁰. It is also considered to be a useful index for ability evaluations, conducted as a public health approach in communities and workplaces. In line with this, the results of this study may provide a basis for the development of EQ-based health-promoting approaches.

This study examined methods to promote health and improve the QOL, with a focus on self-directed health management in mothers. The EQ is a concept developed in

Western countries with cultural backgrounds based on education aiming to promote the self-directedness and self-definition of duties. In contrast, in Japan, interdependence has been given priority without actively providing such education. The theoretical structure developed in this study suggests the possibility of promoting and maintaining health by enhancing the EQ, while highlighting the importance for mothers to regulate their emotional responses in terms of health promotion and QOL improvement.

Implications for practice

It may be necessary to analyze the association between the EQ and health-related QOL in a broader area, while examining appropriate intervention approaches. It is possible to improve the EQ through coaching-style education and learning experiences⁷. On the other hand, as coaching skills are obtained through training, irrespective of occupation, programs providing such training are likely to be increasingly adopted in diverse health educational environments in the future.

Limitations of this research

This study was conducted in a single city located in the southern area of Osaka Prefecture to compare participant attributes, such as age, educational background, economic situation, and child's age in months, with the national means. As a result, sampling validity was confirmed, as respondents appropriately represented sample groups. On the other hand, considering the higher rate of three-generation families in the study area than that of the national mean, it may be difficult to generalize the results of this study, although no association between family structure and parenting stress has been observed.

Conclusion

Despite continuous improvements in the social environment, the health status of mothers of infants is becoming worse. In this study, an analytical model was developed, and its validity was verified, with a focus on the EQ as a personal factor to examine its influence on the mothers' health-related QOL. As a result, the significance of the EQ in terms of health promotion and QOL improvement was confirmed. Further studies are necessary to examine appropriate health-promoting activities by analyzing behavioral changes, based on the EQ as a personal factor, in addition to social factors. It may also be necessary to shift health care from specialized top-down guidance and education to approaches promoting self-efficacy.

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