

Doctoral dissertation (abstract)

The Influence of Parent-Infant Joint Exercises
on the physical and psychological health of mothers and infants
—Focusing on Children's Sleep and Mothers' Mood—

International Graduate School of Advanced Studies

J. F. Oberlin University

Yasuho Ogane

Background and Objectives

In recent years, social recognition of the importance of child-rearing support has increased. However, the issue of child abuse during infancy has also been highlighted (Ministry of Health, Labour and Welfare, 2021). In particular, problems related to infant crying and sleep (“Asahi Shimbun,” July 19, 2020, morning edition) impose a significant burden on caregivers and may negatively affect parent–child relationships. Therefore, it is important to implement approaches that reduce the burden of childcare and support the development of mother–infant relationships.

Previous studies have reported that physical contact between mothers and infants influences maternal feelings toward the infant (Hosoi, 2011; Okumura & Matsuo, 2011), infants’ emotional stability (Yoshida & Funato, 2021), and infant sleep (Field & Hernandez-Reif, 2001; Ikejiri et al., 2021). Exercise has also been shown to influence mothers’ postpartum depressive symptoms (Poyatos-Leon et al., 2017) and weight management (Sampselle et al., 1999), as well as infant sleep (Bucko et al., 2021). As an activity integrating these elements, Parent-Infant Joint Exercises involve caregivers and infants moving their bodies together while maintaining physical contact. Parent-Infant Joint Exercises have been suggested to positively influence infants’ motor development (Thahir & Tang, 2019) and mothers’ psychological health (Mitani & Tanaka, 2012). However, few studies have comprehensively examined the specific effects of Parent-Infant Joint Exercises on infant sleep and the underlying psychological and physiological aspects.

Therefore, this research focuses on mothers caring for infants and their infants, given that the risk of child abuse is highest during infancy. The purpose of this research is to clarify the effects of Parent-Infant Joint Exercises on the physical and psychological states of both mothers and infants, particularly on infant sleep, and to empirically examine their effectiveness as a method of child-rearing support.

Structure of the Research

To clarify the multifaceted effects of Parent-Infant Joint Exercises on mothers and infants, four studies (Studies 1–4) were conducted. In Research 1, an intervention group that performed Parent-Infant Joint Exercises was compared with a control group that did not perform the exercises. Differences between the groups were examined in terms of mothers' multidimensional well-being, maternal attachment, the daily health of mothers and infants, and infants' states before and after the exercises.

In Research 2, specific movements within Parent-Infant Joint Exercises that elicited infant laughter were identified through impression ratings based on video recordings of the exercises and comparison movements. In addition, satisfaction levels of both mothers and infants were examined.

In Research 3, the effects of Parent-Infant Joint Exercises on infants' sleep were examined. Furthermore, within-group comparisons based on temporal changes across Parent-Infant Joint Exercises and the process of putting the infant to sleep were conducted to examine changes in infants' physiological indices, Body Motion, maternal feelings toward the infant, and mother and infant mood.

In Research 4, an intervention group that performed Parent-Infant Joint Exercises was compared with a control group in a resting condition. The proportion of infants falling asleep, infants' physiological indices, Body Motion, maternal feelings toward the infant, and mother and infant mood were examined. In addition, the relationship between mother and infant mood was analyzed for each group.

Through these four studies, the effects of Parent-Infant Joint Exercises on both mothers and infants during infancy were comprehensively examined.

Research 1: Effects of Parent-Infant Joint Exercises on Mothers and Infants

In Research 1, the basic effects of Parent-Infant Joint Exercises on the physical and psychological health of mothers and infants were examined. Mothers and their infants were assigned to an intervention group that performed Parent-Infant Joint Exercises for one month and a control group that did not perform the exercises. Using questionnaire data, between-group comparisons were conducted for mothers' multidimensional well-being, maternal attachment, and the daily health of mothers and infants. In addition, within-group comparisons were conducted in the intervention group regarding infants' states before and after the exercises on the days when the exercises were performed.

The results indicated that frequent engagement in Parent-Infant Joint Exercises reduced infants' daily crying. Furthermore, immediately after the exercises, infants showed increased levels of "security/relaxation," "enjoyment," and "happiness," and positive responses were observed. On the other hand, no significant differences were found in some of the measures of mothers' multidimensional well-being, maternal attachment, and the daily health of mothers and infants.

Research 2: Identifying Types of Parent-Infant Joint Exercises that Infants Enjoy

In Research 2, we focused on the characteristics of specific movements included in Parent-Infant Joint Exercises and identified the movements that elicited positive responses in infants. Mothers and their infants were recorded on video while performing Parent-Infant Joint Exercises and comparison movements (holding the infant still in their arms), and these were evaluated and compared through impression ratings by nursery teachers. In addition, satisfaction levels of both mothers and infants before and after the intervention were examined using questionnaire data.

The results indicated that two movements in Parent-Infant Joint Exercises elicited

infant laughter: vertical rocking in a standing posture and high lifting in a standing posture. Furthermore, it was shown that satisfaction levels of both mothers and infants increased after performing Parent-Infant Joint Exercises.

Research 3: Effects of Parent-Infant Joint Exercises on Mothers' Moods and Infants' Sleep

In Research 3, the effects of Parent-Infant Joint Exercises on mother and infant mood and infants' sleep were examined. Changes in maternal feelings toward the infant and mother and infant mood were assessed using questionnaire data before and after Parent-Infant Joint Exercises and after the process of putting the infant to sleep. In addition, infants' heart rate variability indices (LF, HF, and LF/HF) and Body Motion were measured using heart rate sensors before Parent-Infant Joint Exercises, during Parent-Infant Joint Exercises, and during the process of putting the infant to sleep. Furthermore, infants' sleep states were assessed using heart rate sensors and video recordings.

As a result, 83.3% of infants fell asleep between the end of Parent-Infant Joint Exercises and 10 minutes after the start of the process of putting the infant to sleep. In terms of Body Motion, levels were highest during Parent-Infant Joint Exercises, followed by during the process of putting the infant to sleep, and lowest before Parent-Infant Joint Exercises, indicating that Parent-Infant Joint Exercises most strongly increased infants' Body Motion. On the other hand, no significant differences were found in infants' heart rate variability indices (LF, HF, and LF/HF). In addition, after Parent-Infant Joint Exercises, mothers' levels of affirmation/acceptance toward their infants increased, while levels of disaffirmation/rejection decreased. Furthermore, after Parent-Infant Joint Exercises, mothers' vitality, pleasure, and arousal improved, whereas after the process of putting the infant to sleep, infants' vitality and arousal

decreased, and stability increased in both mothers and infants.

Research 4: Comparison of mother and infant mood and infants' sleep between Parent-Infant Joint Exercises and resting conditions

In Research 4, in order to examine the characteristics of changes associated with Parent-Infant Joint Exercises in greater detail, an intervention group that performed Parent-Infant Joint Exercises and a control group in a resting condition were established. Using questionnaire data, changes in maternal feelings toward the infant and mother and infant mood were compared between before and after Parent-Infant Joint Exercises in the intervention group and before and after rest in the control group. In addition, regarding mother and infant mood, the relationship between mothers' and infants' moods was examined for each group.

Furthermore, infants' heart rate variability indices (LF, HF, and LF/HF) and Body Motion were compared using heart rate sensors before Parent-Infant Joint Exercises, during Parent-Infant Joint Exercises, before rest, and during rest. In addition, infants' sleep states in both groups were compared using heart rate sensors and video recordings.

As a result, the proportion of infants who had fallen asleep 10 minutes after the process of putting the infant to sleep was higher in the intervention group than in the control group. Furthermore, the results indicated that infants exhibited higher levels of Body Motion during Parent-Infant Joint Exercises than during the resting condition. On the other hand, no significant differences were found in infants' heart rate variability indices (LF, HF, and LF/HF). In addition, the results indicated that, compared with after rest, mothers' levels of affirmation/acceptance toward their infants were higher, their levels of disaffirmation/rejection were lower, and their vitality, pleasure, and arousal were higher after Parent-Infant Joint Exercises. Furthermore, in

the intervention group, mothers' and infants' moods tended to change in the same direction over the period from after Parent-Infant Joint Exercises to after the process of putting the infant to sleep, whereas in the control group, this tendency was limited over the period from after rest to after the process of putting the infant to sleep.

General Discussion

In this research, Parent-Infant Joint Exercises, in which mothers and infants engage in exercise while maintaining physical contact, were focused on as a method of childcare support, and the effects of Parent-Infant Joint Exercises on the physical and psychological states of both mothers and infants were examined from multiple perspectives.

The results suggested that Parent-Infant Joint Exercises may influence infants' emotional responses, sleep states, and Body Motion, while also bringing about positive changes in mothers' psychological states and maternal feelings toward the infant. Furthermore, Parent-Infant Joint Exercises may function as an activity that promotes interaction between mothers and infants and provides opportunities for sharing emotional experiences between them.

These findings suggest that Parent-Infant Joint Exercises during infancy may contribute to reducing daily childcare difficulties and lowering the risk of abuse by promoting infants' emotional stability and sleep, as well as improving mothers' psychological states. Therefore, Parent-Infant Joint Exercises may be a useful practical approach for supporting child-rearing during infancy.