

Infant-rearing experiences of parents during the COVID-19 pandemic in South Korea: a mixed-methods approach

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Received: October 16, 2023

Revised: November 29, 2023

Accepted: December 31, 2023

Purpose: This study aimed to identify the infant-rearing experiences of parents during the coronavirus disease 2019 (COVID-19) pandemic and provide foundational data for the development of infant-rearing support programs during pandemic situations. **Methods:** Convergent mixed methods were used to better understand the research outcomes by converging both quantitative and qualitative data. A total of 149 parents with infant-rearing experiences during the pandemic responded to a self-report survey, and 10 parents participated in the interviews. Data were analyzed using Colaizzi's method, descriptive statistics, t-test, one-way analysis of variance, the Scheffé test, Pearson correlation coefficients, and hierarchical regression. **Results:** Analysis of qualitative data yielded the following three categories: five theme clusters, ten themes, and thirty-nine sub-themes. The factors influencing infant-rearing behavior were nuclear family ($\beta=.34$, $p<.001$) and rearing stress ($\beta=-.39$, $p<.001$). The explanatory power of the regression equation was 26.6%. **Conclusion:** Infectious disease disasters, such as the COVID-19 pandemic, can quickly alter infant-rearing conditions, causing heightened parental anxiety. This may affect infant-rearing behaviors and hinder healthy infant development. Future research should develop a comprehensive tool to measure holistic health-related parenting behaviors across the different stages of child development. Additionally, pediatric nurse practitioners can play an active role in educating parents, supporting parenting, and promoting healthy infant development in their communities, making pediatric nurse practitioners a highly relevant and necessary healthcare profession during infectious disease disasters. Thus, there is a need to improve institutions and build infrastructure at the national level to support them.

Keywords: Infant; Child rearing; Infant care; COVID-19

INTRODUCTION

The world has endured immense suffering due to the outbreak of coronavirus disease 2019 (COVID-19) in December 2019. The World Health Organization (WHO) declared it a global pandemic. The COVID-19 pandemic has triggered global responses, including border closures, quarantine mea-

asures, social distancing, and disruptions in education and caregiving services. Their effects have been far-reaching across society and the economy [1,2].

The prolonged COVID-19 pandemic has had various adverse effects on parents raising infants. With the escalation of the pandemic, numerous directives affecting everyday life, such as social distancing, have been introduced. Owing to

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the pandemic, many parents who spent more time at home with their infants experienced physical and psychological challenges [3]. Social distancing and online education caused by the pandemic have drastically changed the family environment, emphasizing the role of parents. Consequently, parents who must combine work, family life, and childcare at home are more likely to become physically exhausted. In addition, fear of coronavirus infection and psychological pressure have amplified the anxiety and stress associated with rearing. In addition, the COVID-19 pandemic led to an increase in childcare costs with the implementation of high-intensity social distancing measures at the end of March 2020 [4]. Moreover, many nursery schools have begun to close, resulting in increased stress and responsibility for parents who have to care for their infants at home [5].

The rearing quality is crucial in infants [6]. The growth, development, and health of infants are influenced not only by pre-birth biological and genetic factors but also, to a greater extent, by the physical, social, and emotional rearing environment after birth. Unlike in the past, when caregiving practices were naturally transmitted within extended families, today's families are mainly nuclear and lack clear parental role models. This is particularly challenging during infancy, as inexperienced parents without prior childcare experience often face numerous challenges while assuming these roles [7]. Therefore, parents require support and access to desirable infant-rearing models. Although numerous childcare experts are available, the nursing profession is the most accessible to parents of infants in medical institutions and local communities. Pediatric nurse practitioners (PNPs), with their extensive knowledge and skills in child development and healthcare, are best suited for supporting parental roles and recommending effective childcare policies [8].

In the context of the COVID-19 pandemic, prior research on parental caregiving experiences has primarily focused on quantitatively exploring the negative impact of maternal child rearing rather than that of both parents [9,10]. Qualitative research has also been conducted, but it has primarily focused on specific populations, such as mothers of children with disabilities and working mothers' families [11,12]. Despite the unprecedented and disastrous nature of the COVID-19 pandemic, various perspectives and experiences related to infant rearing during the crisis must be examined. However, research that simultaneously investigated the quantitative and qualitative aspects of rearing parents with infants during the pandemic is lacking. The application of

the mixed method allows the researcher to examine a phenomenon from multiple perspectives and thus pursue a broader view of the research concept. Furthermore, combining qualitative and quantitative research methods can combine the strengths of both methods while simultaneously compensating for their weaknesses. Therefore, the results derived from the mixed methods can help generate a substantive theory by providing a holistic view of the phenomenon and additional insights into its various components [13].

Therefore, this study aimed to analyze parents' infant-rearing experiences during the COVID-19 pandemic by applying a convergent mixed-methods approach, which can complement the limitations of previous studies conducted with a single method of quantitative or qualitative research. Additionally, we aimed to provide foundational data to support the development and enhancement of specialized infant-rearing support programs, including infant health management, while considering situational contexts. The findings of this study will undoubtedly assist parents in rearing infants effectively and healthily, even during infectious disease disasters.

METHODS

Ethical statements: This study was approved by the Institutional Review Board (IRB) of Sahmyook University (No. SYU 2022-12-003-001). Informed consent was obtained from all participants.

1. Study Design

In this study, we employed a convergent mixed-methods design to identify the infant-rearing experiences of parents with infants during the COVID-19 pandemic (Figure 1). This design involves the collection and analysis of both qualitative and quantitative data, with the subsequent comparison and interpretation of the results [14]. This method enhances the comprehension of phenomena by using both quantitative and qualitative data. The reporting of this study was based on the Consolidated Criteria for Reporting Qualitative Research (COREQ) reporting guidelines [15] and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines [16].

2. Participants and Data Collection

In this study, we planned and implemented qualitative

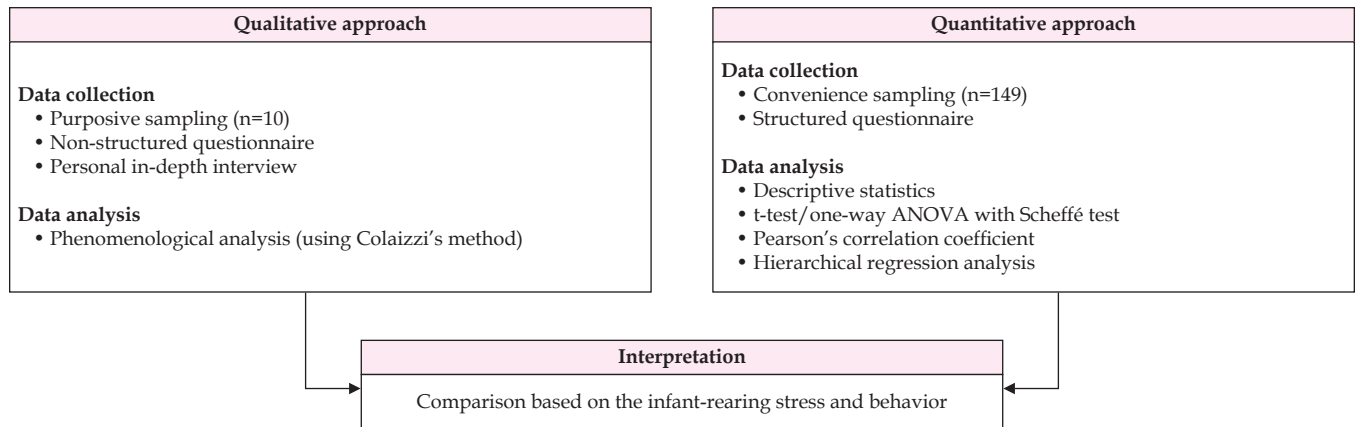


Figure 1. The research design of Infant-rearing experiences of parents during the COVID-19 pandemic: convergent model of a mixed-method.

and quantitative data collection while considering the purpose of a convergent mixed-method design. Participants were recruited by contacting the same five nursery schools in Seoul and Gyeonggi for both qualitative and quantitative studies. We attempted to control for exogenous factors that could affect the results of this study by blinding each participant to participate in a qualitative interview or quantitative survey. To collect qualitative data, we designed interview questions to understand parents' experiences of rearing infants during the COVID-19 pandemic. To collect quantitative data, we used a questionnaire. Details of the qualitative and quantitative data collection are as follows.

1) Qualitative study

We used purposeful sampling to obtain data from parents currently raising infants born between 2020 and 2022 during the COVID-19 pandemic, who could provide comprehensive insights into their infant-rearing experiences. We contacted five nursery schools in Seoul and Gyeonggi provinces to recruit parents of infants attending these schools. The participants were informed of the purpose of the study and volunteered to participate. Foster parents, multicultural households, and parents of children with rare medical conditions were excluded because their experiences differed significantly from their research focus. We selected ten participants, reaching a point of saturation where no new insights about the phenomenon emerged during the interviews. This number of participants was considered appropriate because the objective was to uncover the essence of their experiences. Data were collected from February 8, 2022, to June 30, 2023, via individual, in-depth interviews. Each participant underwent one to two hours of interview. Informed consent was

obtained from all participants before the interviews were recorded to prevent data loss. We received training in qualitative research methodologies and have extensive experience in this field. To collect qualitative data, we asked participants the following questions: "What was your experience of rearing an infant during the COVID-19 pandemic?" "What were some of the challenges of rearing an infant during the pandemic?" "What have been some of the good experiences of rearing an infant during the pandemic?" "What do you think is important in rearing an infant during an infectious disease disaster like the COVID-19 pandemic, and why?"

2) Quantitative study

For quantitative data, parents of infants born between 2020 and 2022 during the COVID-19 pandemic were conveniently sampled from five nursery schools in Seoul and Gyeonggi Province. After explaining the purpose of the study, we administered the survey to willing participants. The data were collected from June 15 to June 30, 2023. The criteria for selecting and excluding study participants were the same as those used for qualitative research participants. Based on our calculations from prior research by Kim and Chae [17], the minimum sample size required for multiple regression analysis with five explanatory variables—an effect size of 0.15, a significance level of 0.05, and a power of 0.95—was determined to be 138 using G*Power. We planned to recruit 152 participants, adding 10% to account for the dropout rate. However, only 149 volunteered to participate. This met the target number of participants; therefore, we collected quantitative data from 149 participants.

The following instruments were used to collect data:

(1) Rearing behavior

Rearing behavior refers to the behavior of parents in various situations while rearing their children [18]. In addition, the MeSH term defines “child rearing” separately from “parenting.” It differs from “parenting” in that in child rearing, the emphasis is on the act of training or bringing up the child and the interaction between the parent and child, while parenting emphasizes the responsibility and qualities of exemplary behavior of the parent [19].

In this study, the Infant and Toddler Health Promotion Behavior Scale developed by Kim et al. [20] was modified and supplemented to measure infant-rearing behavior, which reflects the meaning of child rearing based on the definition of the MeSH term. The scale comprises 30 items organized into seven subdomains: safety, emotional support, activity/rest, disease prevention, appropriate clothing, nutrition, and cleanliness/hygiene. The revised Infant-Rearing Behavior Scale was validated for content validity by a group of eight experts. The item-level content validity (I-CVI) of the scale ranged from .75 to 1.00. One item had an I-CVI of .75, which did not meet Lynn’s suggested criterion of .78; therefore, we revised the item. The scale-level content validity was .97, indicating that the scale is a valid measure of infant care behaviors. On this 4-point Likert scale, higher scores indicate higher levels of infant-rearing behavior. In the study by Kim et al. [20], Cronbach’s α was .88; in this study, it was .92.

(2) Rearing stress

Rearing stress refers to the psychological and physical tensions experienced as a result of the difficulties and challenges arising from the performance of the parental role in raising children [21].

In this study, we used the Korean version of the Parenting Stress Index, Fourth Edition Short Form, which is a shortened version of Abidin’s [22] Parenting Stress Index, Fourth Edition (PSI-4), standardized for the Korean context by Chung et al. [23]. The measurement tool in question is commercially distributed, and we purchased it through “Inpsyt,” the distributor, as the number of participants in this study. This index consists of 36 items on a 5-point Likert scale. It is composed of three subscales: Parental Distress, Parent-Child Dysfunctional Interactions, and Difficult Child. Higher scores indicate higher stress levels. In the study by Chung et al. [23], Cronbach’s α was .93, in this study, it was .90.

3. Data Analysis

Qualitative and quantitative data were analyzed simultaneously. The detailed analytical methods for each research method are as follows.

1) Qualitative study

The data were analyzed using Colaizzi’s method [24], a phenomenological research approach capable of extracting both individual participants’ experiences and common attributes of the overall shared experience. The analysis involved transcribing verbal statements and observational notes, reviewing recorded interviews for data consistency, and extracting significant statements. These were used to formulate universal meanings, identify themes, and derive categories. To ensure the reliability and validity of our findings, we follow Lincoln and Guba’s [25] evaluation criteria for truth value, applicability, consistency, and neutrality.

2) Quantitative study

The collected data were analyzed using IBM SPSS version 25.0 (IBM Corp.). The participants’ demographic characteristics were analyzed using frequencies, percentages, means, and standard deviations. Differences in infant-rearing behavior and stress based on demographic characteristics were analyzed using an independent t-test, one-way analysis of variance (ANOVA), and Scheffé’s post-hoc test. A correlation analysis was conducted to examine the relationships between the variables, and a hierarchical multiple regression analysis was performed to identify the factors influencing infant-rearing.

RESULTS

1. Qualitative Results

The study involved ten participants: six mothers and four fathers. Their average age was 36.00 (standard deviation=3.97), and two fathers and six mothers were primary caregivers, while the other two fathers provided secondary caregiving support to their spouses. The analysis of the participants’ experiences of rearing infants during the COVID-19 pandemic yielded three categories: five theme clusters, ten themes, and thirty-nine subthemes (Table 1). The three main categories that emerged from the analysis were “Infant-rearing stress,” “Infant-rearing behavior,” and “Infant-rearing

Table 1. Infant-rearing Experiences of Parents During the COVID-19 Pandemic

Subtheme (39)	Theme (10)	Theme cluster (5)	Category (3)
Avoidance of going out and contact with outsiders because of the fear of contracting COVID-19	Anxiety due to the risk of infection		
Concerns about infant infection risks within the family			
Increased depression resulting from social distancing			
Anger associated with social distancing		Confusion due to isolation	
Concerns about children’s developmental growth due to social distancing	Experiencing the unintended consequences of social distancing		
Difficulties caused by excessive isolation in childcare facilities			
Frustration experienced in the unique child-rearing environment produced because of an infectious disease			
A lack of public empathy for the developmental characteristics of infants	Public backlash against infection control guidelines as lacking consideration for infants		Infant-rearing stress
Feeling disheartened by cold social gazes			
Infant-rearing burden exacerbated by isolation and detachment			
Exhaustion from a lifestyle without infant-rearing breaks	Burnout		
Exhaustion from infant care leading to giving up on future family plans		Intensifying infant-rearing stress	
Loss of emotion control			
Despair and self-blame in the face of uncontrollable circumstances			
The father’s burden and helplessness regarding not being able to participate in infant-rearing because of a job	Loss of infant-rearing efficacy		
Experiencing infant-rearing conflicts among family members			
Greater closeness with a spouse			
A spouse who becomes the most reliable parenting partner	Family relationships growing stronger	Increased family cohesion	
Improvement in parent-child relationships resulting from increased time together			
Efforts to maintain a sense of connection with the outside world by continuously watching TV			
Gaining strength through communication in a parental support group	Maintaining social connections and changing attitudes		Infant-rearing behavior
A change in mindset regarding the response to infectious diseases		Proactive coping with changed rearing situations	
Efforts to normalize the wearing of masks in daily life			
Thorough hygiene practices to protect the infant	Efforts made for child’s infection prevention and nutrition management		
Efforts to take responsibility for the child’s nutritional status			

(Continued to the next page)

Table 1. Continued

Subtheme (39)	Theme (10)	Theme cluster (5)	Category (3)
Emotional distress of parents due to invasive examinations of infant	Vividly experiencing the vulnerable pediatric healthcare system	Recognizing the need for a new national response system and support policies tailored to the pandemic situation	Infant-rearing support needs due to the pandemic
Experiencing exhaustion resulting from the inability to alternate caregivers during hospitalization			
Becoming a victim as a result of an inadequate infectious disease response system			
A severe shortage of specialized pediatric hospitals			
Difficulties accessing hospital care and feeling neglected by hospitals			
Resignation regarding formal medical policies and healthcare services			
Distrust of uncertain information			
Difficulty obtaining professional infant-rearing information in the sea of overwhelming information			
Recognizing the need for father-specific infant-rearing education			
Recognizing the need for visitation-based rearing support to overcome social distancing			
The urgent need for specialized infant-rearing support policies tailored to the developmental stages of children			
Recognizing the need for healthcare support for infants with weakened immune systems			
The need for direct infant-rearing support services provided by medical professionals			
The need for nutritional support for the healthy development of infants			

support needs due to the pandemic.”

1) Infant-rearing stress

(1) Confusion due to isolation

Most participants experienced isolation and confusion during the pandemic. This was evident through two main themes: “Anxiety due to the risk of infection” and “Experiencing the unintended consequences of social distancing.” Participants experienced extreme anxiety owing to the risk of infection, especially in their infants. This fear leads to reduced outdoor activities and avoidance of visits from close relatives. Nationwide social distancing measures also present additional challenges. Reduced outdoor activities during the pandemic have affected infant development, leading to delays:

It was a time when I was worried about my in-laws, or my family, or someone coming to my house, and I think I was very

anxious that they might catch it. (Participant 9)

I wonder if language development is a little slower because he’s a corona baby and can’t go outside freely anymore... He tries to stay with mom... and I think he’s more shy. (Participant 4)

(2) Intensifying infant-rearing stress

Participants experienced increasing infant-rearing stress in the rapidly changing childcare environment because of the COVID-19 pandemic, which emerged in three main themes: “Public backlash against infection control guidelines as lacking consideration for infants,” “Burnout,” and “Loss of infant-rearing efficacy.” Participants faced public backlash and quarantine guidelines that lacked consideration for infants, leading to feelings of guilt despite sacrificing child rearing. The pandemic-induced social isolation and confinement have amplified the challenges of rearing infants, resulting in burnout due to the endless repetition of caregiving. Consequently, some of the participants had to alter their family

plans. Exhausted parents struggled to manage their emotions and experienced despair and self-blame during the pandemic, losing their sense of rearing efficacy, as exemplified below:

I'm a sinner at work, at these cafes and everywhere I go... We're sacrificing so much, we're raising the future members of society... Should we just look the other way? (Participant 9)

It was really tough. Because of COVID, it was even more challenging. Originally, we had planned for at least two children, but the thought of a second child completely disappeared. (Participant 7)

The moments when I couldn't regulate my emotions with the children linger as regrets, leaving me with feelings of guilt and disappointment in myself, as well as experiencing a decline in my rearing efficacy. (Participant 5)

2) Infant-rearing behavior

(1) Increased family cohesion

Participants experienced stronger family relationships than they did before the pandemic. This manifested in the main theme: "Family relationships growing stronger." Participants noted that the increase in working from home caused by social distancing increased the amount of time couples spent raising their infants together. They mentioned that co-rearing strengthened the trust between spouses and improved relationships, bringing them closer to their families:

I think I've become more of a family man than I was in my first year... I think it's because I'm now working from home because of COVID-19, so I'm spending more time with my kids. (Participant 2)

(2) Proactive coping with changed rearing situations

Participants faced isolation and challenges while raising infants during the pandemic. However, instead of being discouraged, they were proactive in overcoming them and coping. This manifested in two main themes: "Maintaining social connections and changing attitudes" and "Efforts made for child's infection prevention and nutrition management." The participants experienced profound isolation while rearing their infants during the pandemic. To maintain a connection with the outside world, they engaged in various efforts, such as keeping a TV on all day or seeking support from fellow parents. Participants struggled to prevent infant infections and enhance nutrition, feeling a deep responsibility for their children's health through good hygiene practices and wear-

ing masks. Additionally, parents whose infants were at home because of nursery school closures had concerns about providing meals throughout the day and fearing nutritional imbalances:

Since the start of COVID-19, I felt so lonely that I ended up turning on the TV almost every day. ... I just wanted to hear people talking, even if it was just their voices ... Doing that made me feel more connected to the outside world. (Participant 3)

Due to the corona, all the children at the nursery schools are wearing masks, so there is no infection or anything like that. ... Because my baby doesn't go to nursery school, I've had to take on a lot of the nutritional responsibility. I've been trying to balance his meals throughout the day. ... I also purchased baby supplements and fed him regularly. (Participant 1)

3) Infant-rearing support needs due to the pandemic

(1) Recognizing the need for a new national response system and support policies tailored to the pandemic situation

Participants personally experienced vulnerabilities in pediatric healthcare during the COVID-19 pandemic and recognized the need for new infant-rearing support for infectious disease disasters. Two distinct themes emerged: "Vividly experiencing the vulnerable pediatric healthcare system" and "Increase in demand for new infant-rearing support." Many participants struggled to access medical care for their children during the pandemic. They experienced worry and anger due to inadequate infectious disease response systems and frustration with excessive and inappropriate medical treatments for infants. Furthermore, the participants expressed the need for new support to address pandemic-induced challenges. This includes visits from healthcare professionals such as nurses and direct infant-rearing support:

The ambulance responders only contact hospitals with pediatric emergency rooms, but they often don't answer because of COVID. ... I just feel trapped in the hospital with no options. (Participant 8)

Having nurses or medical professionals come directly to check the baby's condition and provide basic infant-rearing skills in a professional manner would be helpful. (Participant 1)

Supporting the nutritional aspect during infancy would not only benefit the children's health but also provide assistance to parents who find it challenging to provide three meals a day during the pandemic. (Participant 10)

2. Quantitative Results

1) Differences in infant-rearing stress and rearing behaviors during the COVID-19 pandemic based on participant characteristics

During the COVID-19 pandemic, the level of infant-rearing stress among the participants averaged 2.3 ± 0.5 out of 5 points, while the level of infant-rearing behavior averaged 3.5 ± 0.3 out of 4 points (Table 2). Rearing stress varied significantly according to the general characteristics of the participants and their children, with significant differences observed based on monthly income ($F = 5.45, p = .005$) and the child's temperament ($F = 10.30, p < .001$). Significant differences in infant-rearing behaviors were observed based on family structure ($t = 4.41, p < .001$), with infant-rearing behaviors being significantly higher in nuclear families than in extended families. Based on Scheffé's post hoc analysis of variables associated with significant differences, rearing stress was higher when a household's monthly income was less than 3 million won than when it was over 5 million won. Additionally, higher stress levels were observed when a child's temperament was more difficult than when it was easy or moderate (Table 3).

2) The correlation between infant-rearing stress and rearing behavior

During the COVID-19 pandemic, infant-rearing stress among parents had a significant negative correlation with in-

fant-rearing behaviors ($r = -.39, p < .001$).

3) Factors influencing infant-rearing behavior

To identify the factors influencing the participants' infant-rearing behaviors during the pandemic, we conducted a hierarchical regression analysis of family type, average monthly income, and children's temperament, which differed significantly based on the participants' general characteristics. We use a first-stage regression model for our analysis. Rearing stress was added to the second-stage regression model, and a significant correlation was found (Table 4). The regression model was statistically significant in both model I ($F = 5.99, p < .001$) and II ($F = 9.92, p < .001$), with an explanatory power of 14.4% ($Adj R^2$) in model I and 26.6% ($Adj R^2$) in model II. The Durbin-Watson statistic was 2.06, which is close to 2, indicating that the assumption of independence of the residuals was not problematic. The variance inflation factor (VIF) was also small, with values below 10, indicating that multicollinearity was not a problem. Therefore, the regression model adequately explained the dependent variables.

DISCUSSION

Here, we discuss the results obtained in this study (a convergent mixed-method design) regarding infant-rearing experiences of parents during the COVID-19 pandemic. Qualitative and quantitative research findings on infant-rearing stress and behavior are compared and discussed.

The categories of infant-rearing stress that emerged from the qualitative findings of this study included "confusion due to isolation" and "intensifying infant-rearing stress" as theme clusters. Themes related to "confusion due to isolation" in the qualitative outcomes included "anxiety due to the risk of infection" and "Experiencing the unintended consequences of social distancing," which were related to "parent-child dysfunctional interactions" in the quantitative rearing stress sub-factor. In this study, the mean for this sub-factor was 1.8, similar to the mean of 1.98 in a study by Kim and Chae [17]. Pre-pandemic studies found that "parent-child dysfunctional interactions" averaged 1.63 [26], indicating that rearing stress was higher during the pandemic than before. The qualitative findings of this study showed that during the pandemic, participants tried to avoid going out and contacting outsiders as much as possible. They also expressed that their depression, anger, and anxiety about their infant child's growth and development increased as the pandemic pro-

Table 2. Descriptive Statistics on Rearing Stress and Behavior of Parents During the COVID-19 Pandemic (N=149)

Variables	Total	Item	Rank
	M±SD	M±SD	
Rearing stress (5 point liked scale)	83.5±16.3	2.3±0.5	
Parental distress	35.9±7.6	3.0±0.6	1
Parent-child dysfunctional interactions	21.5±5.6	1.8±0.5	3
Difficult child	26.1±7.1	2.2±0.6	2
Rearing behavior (4 point liked scale)	106.4±9.1	3.5±0.3	
Safety	28.9±2.7	3.6±0.3	2
Emotional support	14.2±1.7	3.5±0.4	4
Activity/Rest	10.4±1.3	3.5±0.4	4
Disease prevention	14.5±1.5	3.6±0.4	2
Appropriate clothing	11.0±1.2	3.7±0.4	1
Nutrition	10.5±1.3	3.5±0.4	4
Cleanliness/Hygiene	16.8±2.1	3.4±0.4	5

M, mean; SD, standard deviation.

Table 3. Rearing Stress and Behavior During the COVID-19 Pandemic according to General Characteristics (N=149)

Variables	Categories	n (%) or M±SD	Rearing stress			Rearing behavior		
			M±SD	t or F	p	M±SD	t or F	p
Parental characteristics								
Relationship with infant	Mother	119 (79.9)	84.1±15.9	0.98	.330	106.0±9.2	-1.04	.299
	Father	30 (20.1)	80.9±18.1			107.9±8.7		
Age (yr)	≤29	5 (3.4)	82.8±7.0	0.08	.927	110.6±6.6	1.36	.260
	30–39	121 (81.2)	83.7±16.4			105.8±9.3		
	≥40	23 (15.4)	82.3±17.7			108.4±8.3		
			35.8±4.5					
Educational level	≤High school	39 (26.2)	84.7±16.5	0.57	.572	104.9±8.8	-1.22	.226
	≥College	110 (73.8)	83.0±16.3			106.9±9.2		
Employment status	Working	124 (83.2)	83.0±16.6	-0.70	.485	106.5±9.0	0.45	.653
	Not working	25 (16.8)	85.6±14.8			105.6±9.4		
Occupational type	Service industry	13 (8.7)	84.4±11.8	1.05	.384	104.6±8.4	0.38	.825
	Office work	31 (20.8)	80.8±17.0			106.5±9.8		
	Professional	43 (28.9)	82.2±17.2			107.6±8.8		
	Homemaker	43 (28.9)	87.5±16.6			105.8±8.9		
	Other	19 (12.8)	80.8±15.1			105.9±10.0		
Family structure	Nuclear	136 (91.3)	83.0±16.3	-1.07	.288	107.3±8.6	4.41	<.001
	Extended	13 (8.7)	88.1±16.2			96.4±8.2		
Monthly income (10,000 KRW)	<300 ^a	25 (16.8)	90.9±21.6	5.45	.005 (a>c) ^{a)}	105.3±9.4	0.35	.708
	300–500 ^b	54 (36.2)	85.3±15.4			106.1±9.2		
	≥500 ^c	70 (47.0)	79.4±13.7			107.0±9.0		
Number of children	1	94 (63.1)	82.6±16.2	-0.86	.389	106.7±9.3	0.57	.571
	≥2	55 (36.9)	85.0±16.5			105.8±8.7		
Infant's characteristics								
Sex	Male	79 (53.0)	84.2±17.8	0.58	.562	106.2±8.9	-0.21	.833
	Female	70 (47.0)	82.6±14.6			106.6±9.4		
Age (yr)		1.7±0.8						
Health status	Unhealthy	6 (4.0)	81.3±12.8	0.61	.544	107.3±11.1	0.29	.752
	Moderate	8 (5.4)	89.5±21.2			104.1±9.4		
	Healthy	135 (90.6)	83.2±16.2			106.5±9.0		
Temperament	Difficult ^a	30 (20.1)	93.8±18.3	10.30	<.001 (a>b, c) ^{a)}	107.1±9.5	2.22	.112
	Moderate ^b	66 (44.3)	83.3±15.2			104.7±9.1		
	Gentle ^c	53 (35.6)	77.8±3.8			108.1±8.6		

^{a)}Scheffé test; M, mean; SD, standard deviation.

Table 4. Factors Influencing Infant-rearing Behavior During the COVID-19 Pandemic

Variables	Model I						Model II					
	B	SE	β	t	p	VIF	B	SE	β	t	p	VIF
(Constant)	98.27	2.52		38.96	<.001		115.6	4.2		27.51	<.001	
Family type ^{a)} (Ref: Extended)												
Nuclear	12.25	2.49	.38	4.91	<.001	1.05	10.77	2.33	.34	4.62	<.001	1.06
Monthly income (10,000 KRW) ^{a)} (Ref: ≥500)												
<300	-2.76	1.98	-.11	-1.40	.164	1.15	-0.28	1.90	-.01	-0.15	.882	1.24
300–499	-2.24	1.55	-.12	-1.45	.149	1.16	-0.73	1.46	-.04	-0.50	.620	1.22
Temperament ^{a)} (Ref: Easy)												
Difficult	-0.52	1.93	-.02	-0.27	.787	1.26	2.82	1.91	.13	1.48	.142	1.44
Moderate	-3.80	1.56	-.21	-2.44	.016	1.26	-2.60	1.46	-.14	-1.78	.077	1.30
Rearing stress							-0.22	0.04	-.39	-4.96	<.001	1.25
R ²	.173						.295					
Adj R ²	.144						.266					
F (p)	5.99 (<.001)						9.92 (<.001)					

^{a)}Dummy variable; B, unstandardized coefficients; β, standardized coefficients; SE, standard error; VIF, variance inflation factor; Durbin–Watson index: 2.06.

longed. Russell et al. [27] also reported high levels of depression among primary caregivers because of isolation while raising children during the COVID-19 pandemic. Examples of items measuring rearing stress related to "Dysfunctional parent-child interactions" in this study include "My child does not seem to learn as quickly as other children same age." and "It is difficult for me to feel as close and warm to my child as I had hoped" [20]. Taken together, these qualitative and quantitative findings suggest that the relatively high scores of "Dysfunctional parent-child interactions" among the participants in this study may be attributed to the isolation, depression, anger, and anxiety experienced by parents due to the disruption caused by the pandemic.

The themes pertaining to "Intensifying infant-rearing stress" in the qualitative results included "Public backlash against infection control guidelines as lacking consideration for infants," "Burnout," and "Loss of infant-rearing efficacy," all of which were related to "Parental distress" in the quantitative rearing stress sub-factor. The quantitative outcomes of parenting stress during the pandemic had a mean of 2.3 out of 5. No prior research has measured rearing stress alone in parents of infants during the pandemic using the same instrument. However, a previous study of mothers of infants and toddlers [17] found that rearing stress was similar to that found in the present study, with a mean of 2.41. Parental distress (mean = 3.03) was the highest among the sub-factors [17] and was highest in this study, with a score of 3.0. In a study conducted before the pandemic [28], the total score for rearing stress was 57.51, which was very low compared to the total score of 83.5 in this study. In addition, among the subdomains of rearing stress, "Parental distress" was found to have an average score of 2.74 [26], indicating that "Parental distress" increased more during the pandemic than before. The qualitative and quantitative results of this study were integrated to explore the factors that lead to an increase in parental distress. The participants in this study experienced isolation due to fear of infection risk and implementation of social distancing policies and were forced to bear the burden of rearing alone without social support. In addition, the rapidly changing rearing situation during the pandemic, in which parents must combine endless childcare with their existing daily routines [29], may have increased rearing stress compared to that before the pandemic.

The quantitative data in this study indicate that infant-rearing stress was significantly greater when the average monthly income was less than 3 million won than when it was

more than 5 million won. This finding might be related to the subtheme, "Infant-rearing burden exacerbated by isolation and detachment," in the qualitative data. Consistent with our qualitative findings, prior research [4,30] revealed a notable surge in infant and toddler care costs during the pandemic due to increased time spent at home by children, resulting in economic instability and a heightened childcare burden for numerous families. The findings of this study and Kim's [3] study, which reported an inverse correlation between household income and child-rearing stress during the pandemic, indicate that household economic insecurity is a source of parental distress and an important factor to consider when identifying child-rearing stress.

The quantitative results also showed that infant-rearing stress depends on the infant's temperament, with "Difficult child" being the second highest sub-factor. Kim [3] found that, in general, rearing stress was higher for families rearing infants than for those rearing toddlers. In addition, rearing stress was higher for families rearing infants than toddlers and for families rearing children with difficult temperaments during the pandemic. This is consistent with previous findings that infant temperament affects parenting stress and that mothers of difficult infants experience higher levels of stress [31]. Generally, child-rearing stress is higher for families that rear infants than toddlers [3]. Infants find it extremely difficult to communicate verbally with others and must rely entirely on their parents. Thus, infants with difficult temperaments have an impact on increased parenting stress not only during the COVID-19 pandemic but also in typical rearing situations.

Regarding the findings related to infant-rearing behavior, when examining the qualitative data, a theme cluster emerged that encompassed the themes of "Increased family cohesion" and "Proactive coping with changed rearing situations." Themes such as "Maintaining social connections and changing attitudes," "Family relationships growing stronger," and "Efforts made for child's infection prevention and nutrition management" were also observed. When examining the quantitative results related to the theme, "Efforts made for child's infection prevention and nutrition management," derived from the qualitative findings, effective rearing behavior was reported as relatively high, with an average score of 3.5 out of 4 on rearing behavior. The infant-rearing behavior measure tool used in this study assesses the extent to which participants engage in health-based rearing behaviors aimed at the healthy growth and development of their infants. The

results of this study showed that participants scored uniformly high across each sub-factor, indicating that they engage in balanced rearing behaviors for infant health. The qualitative results showed that participants reinforced rearing behaviors related to hygiene and nutrition, which were similar to COVID-19 prevention behaviors. Participants were willing to put up with the inconvenience of wearing masks at home to protect their infants from infection and provided them with high-quality, nutritious food to boost their immunity. These findings are consistent with previous studies on preventive behaviors against COVID-19 [32]. This previous study also indicated that mothers of infants practiced preventive measures more effectively than the other groups, reinforcing the results of our study. Kim's study [33], conducted before the pandemic, found that "Disease prevention" scored 3.37, "Nutrition" scored 2.89, and "Cleanliness/Hygiene" scored 3.29. Compared with the results of this study, the scores of rearing behaviors corresponding to these sub-factors increased during the pandemic to 3.6, 3.5, and 3.4, respectively. This suggests that to prevent their infants from contracting the coronavirus, parents strengthened the performance of rearing behaviors that could directly affect their health status.

Regarding the theme of "Maintaining social connections and changing attitude," derived from the qualitative results, participants transformed their responses to infectious diseases, overcoming initial anxiety in the early pandemic stages. They actively engaged in child rearing and enhanced their communication with their parents.

Additionally, concerning the theme "Family relationships growing stronger," the quantitative results revealed that rearing behaviors were higher for nuclear families. Paradoxically, social distancing measures resulted in increased rearing time, and qualitative findings showed that parents reported closer bonds with their children. The results showed that the increased time spent at home by all family members due to the pandemic led parents to make efforts to spend more time with their children [34].

A noteworthy aspect highlighted in the qualitative research findings of this study is the identification of "Infant-rearing support needs during the pandemic." The theme cluster, "Recognizing the need for a new national response system and support policies tailored to the pandemic situation," was identified in the qualitative findings. Related themes included "Vividly experiencing the vulnerable pediatric healthcare system" and "Increase in demand for new rearing support." The COVID-19 pandemic has revealed vul-

nerabilities in the pediatric healthcare system, causing parents to endure pain, mental exhaustion, and physical fatigue. Pandemic control measures did not adequately consider infants, leading to isolation and treatment issues [35]. Unlike adults, the medical needs of infants vary with their developmental stage. However, the pediatric healthcare system has recently been disrupted owing to a shortage of specialized medical personnel [35], which has made it difficult to provide differentiated care for infants. Taken together, these findings suggest that, to prepare for future pandemics, it is crucial to strengthen and improve the pediatric healthcare system. PNP's are the ideal healthcare professionals to address these shortages. PNP's are registered nurses with specialized training and clinical experience in caring for children. They are an invaluable group of nurses who can provide quality nursing care across the spectrum of healthcare, including community, primary, acute, and specialty care settings [36]. PNP's also have expertise in child development, health promotion, and disease prevention and can contribute to the healthy growth of children and the well-being of families through nursing care. Therefore, there is a need to train PNP's and build institutional infrastructure to enable them to play a dynamic role in communities where they are closest to parents and children in preparation for future disease disasters, such as the COVID-19 pandemic.

This mixed-methods study is meaningful because of its qualitative and quantitative comparative analyses of infant-rearing experiences of parents during the COVID-19 pandemic. Additionally, quantitative outcomes related to infant-rearing behaviors have drawn attention owing to their focus on infant health issues in infectious disease situations, setting them apart from other disciplines.

One limitation of this study is that the data were collected after the pandemic ended, requiring participants to recall their memories. Another limitation was that we were unable to examine differences in the timing of infant and toddler parenting experiences before, during, and after the pandemic for the same participants. The significant factors influencing rearing behaviors during the pandemic found in this study were identified as a result of the research; therefore, it was not possible to include them as exogenous variables in the initial design of the study. The factors that influenced rearing behaviors during the pandemic in this study (family structure, monthly income, and infant temperament) can be considered pandemic-related influencing variables and should be considered in future studies. In addition, there are limita-

tions to not considering specific contextual exogenous variables, such as the birth order of children or whether the couple works. In future studies, it is necessary to consider other exogenous variables that may affect rearing behavior and stress. Finally, since we studied both parents, we could not differentiate infant-rearing stress and behavior between mothers and fathers based on their characteristics.

CONCLUSION

Infectious disease disasters such as the COVID-19 pandemic rapidly change rearing situations and can lead to increased anxiety among parents, possibly affecting infant-rearing behaviors and impeding the healthy growth and development of infants. Therefore, it is necessary to examine health-based rearing behaviors from a nursing perspective. For this purpose, future research should develop a rearing behavior tool that includes all domains of holistic health and measures rearing behaviors specific to each developmental stage of the child. Providing health-based rearing behaviors also requires PNPs to play an active role in the community. If PNPs educate and support parents rearing infants in the community to engage in effective health-based rearing behaviors, they can reduce rearing stress and burden, and promote healthy growth and development of infants. Institutional support must also be provided to enable pediatric nurse practitioners to become effective facilitators of infant care.

ARTICLE INFORMATION

Authors' contribution

Conceptualization: all authors; Data collection, Formal analysis: all authors; Writing-original draft: all authors; Writing-review and editing: all authors; Final approval of published version: all authors.

Conflict of interest

No existing or potential conflict of interest relevant to this article was reported.

Funding

None.

Data availability

Please contact the corresponding author for data availability.

Acknowledgements

None.

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