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The Relationship Between Maternal Anxiety Due to the COVID-19 Pandemic and Children's Anxiety Following School Reopening in the Post-pandemic Era

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ABSTRACT

Despite a reduction in infection and mortality rates, anxiety related to COVID-19 remains prevalent among families, particularly affecting mothers, even in the post-pandemic period. Maternal mental health issues can potentially compromise various aspects of child development. This study aimed to examine the correlation between maternal anxiety related to COVID-19 and the anxiety levels of their children following the reopening of primary schools in the post-pandemic era. This analytical cross-sectional study involved 305 mother-child pairs. Data collection instruments included demographic questionnaires and assessments of COVID-related anxiety and manifest anxiety levels. Statistical analyses were conducted using independent t-tests, one-way analysis of variance, and multivariate regression. The findings indicated that children's manifest anxiety was predicted by maternal anxiety related to COVID-19 (B = 0.907, P<0.001). Furthermore, significant associations were identified between the mean difference in mothers' COVID anxiety scores and their educational attainment and occupation, as well as their children's education and age, residential area, and husbands' education and occupation (P<0.001). Conversely, no significant differences were observed in maternal COVID anxiety scores concerning maternal age, spouse age, and child gender. In conclusion, based on the study's findings, it is recommended that nurses and psychologists provide educational interventions for mothers requiring psychological support.

Keywords: Anxiety; Mother; Child; Reopening of Schools; Post-COVID-19

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Introduction

The COVID-19 pandemic has manifested through various strains, posing challenges in discovering definitive treatments [1, 2]. Currently, it affects 231 countries, with over 13,000 new cases and approximately 100 deaths reported daily [3]. Despite widespread vaccination efforts, fear and anxiety persist due to the unknown nature of the virus [4].

During the initial phase of the outbreak, nations implemented quarantine measures due to the absence of vaccination and limited understanding of the virus [5]. Although disease control and reduction in infection rates were effective, these measures resulted in societal disruptions, including the closure of educational and recreational facilities [6]. Consequently, individuals experienced psychological distress and heightened social isolation [5, 6].

During quarantine, individuals experience a range of mental health issues, including emotional disorders, anxiety, depression, panic, aggression, irritability, and sleep disturbances [7]. Families also grappled with disrupted social support, fear of losing loved ones, suicidal ideation, post-traumatic stress symptoms, and obsessive thoughts and behaviors [8, 9]. School closures and home quarantine heightened physical and mental health risks for students, with factors such as fear of infection, decreased physical activity, social isolation, and limited space for activities contributing to lasting effects on children's mental well-being [10].

Moreover, the COVID-19 pandemic resulted in various challenges for children, including physical, mental, and developmental setbacks, learning disruptions, and school dropout risks [11, 12]. After 18 months of distance learning in Iran, in-person education resumed in September 2021, with health protocols implemented by the Ministries of Education and Health [13]. However, the emergence of the Omicron variant, particularly affecting younger children, coupled with vaccine limitations, heightened vulnerability among children [14-16]. The rapid spread of Omicron in schools, facilitated by asymptomatic infections and non-adherence to health measures, exacerbated the situation further [11, 17, 18].

Consequently, returning to school triggered mental and emotional challenges for families, particularly mothers [19]. Anxiety stemming from illness exacerbates the risk of mental disorders among families and children [20, 21] and it is a common phenomenon during pandemics [22-24]. Despite declining case numbers, anxiety persists among families in the post-pandemic era [25]. Women, in particular, experience higher rates of severe anxiety [26]. The occurrence of natural disasters and severe anxiety-inducing situations heightens the risk of mental and emotional complications in mothers, impacting the cognitive, physical, and emotional development of their children [26, 27].

During pandemics like COVID-19, individuals commonly experience heightened anxiety. This anxiety may still be present in families, especially mothers, in the post-COVID era with widespread vaccination and reduced infection rates. Since, there is limited research on this topic, this study aimed to investigate the relationship between maternal COVID-induced anxiety and anxiety levels in first- to third-grade children attending Borujerd elementary schools in 2022, following school reopening in the post-COVID era.

Materials and Methods

This analytical cross-sectional study enrolled 305 pairs of mothers and children from elementary schools in Borujerd, Lorestan, Iran. The sample population consisted of First- to third-grade students.

Sample size calculation

Based on Shirzadi et al.'s study [28], with a 95% confidence level (α = 0.05), 90% study power, and a correlation coefficient of 0.43 (r = 0.43), the estimated sample size was 204 individuals. Considering cluster sampling and a design effect of 1.5, the final sample size of 305 pairs of mothers and children was determined.

Participants were required to demonstrate literacy and writing skills, possess full cognitive awareness of time and location, a child not being a twin, and absence of psychiatric disorders. Additionally, both parents were required to be present along with the child. Individuals with chronic or incurable illnesses such as rheumatoid arthritis, diabetes, or cancer were ineligible for participation, as well as those with hearing impairments. Parental addiction was also a reason for exclusion from the study. Participants were excluded if a crisis occurred during the study for either the mother or child, if they refused to participate in an interview, or if they did not complete the questionnaires properly.

Sampling method

The sampling process employed a multi-stage approach, combining cluster, stratified, and simple random sampling methods. Cluster sampling involved randomly selecting three elementary schools from each educational district in Borujerd city. Each class within these selected schools was then considered a cluster. Simple random sampling was used to select students from each class, ensuring proportional representation based on the total number of students in each school. This process involved assigning a number to each student in the class list and then

randomly selecting numbers to ensure equal chances of inclusion. Sampling was conducted from May to June 2022.

Instruments

To gather demographic data, mothers answered a 10-item questionnaire covering the child's gender, age, place of residence, level of education, and parents' occupations.

To measure anxiety in adults related to the COVID-19 pandemic, Alipour et al. developed and validated the Corona Disease Anxiety Scale (CDAS) in Iran. This questionnaire comprises 18 items categorized into psychological symptoms (items 1–9) and physical symptoms (items 10–18). Responses are rated on a 4-point Likert scale (0 = never, 1 = sometimes, 2 = most of the time, 3 = always), with scores for each item summed to obtain a total score ranging from 0 to 54. Higher scores indicated elevated anxiety levels. The reliability of this tool was assessed using Cronbach's alpha, yielding values of 0.879 for the first factor, 0.861 for the second factor, and 0.919 for the entire questionnaire. Additionally, Gutman's two values were calculated as 0.882 for the first factor, 0.864 for the second factor, and 0.922 for the entire questionnaire. The concurrent validity of this questionnaire was established by correlating it with the General Health Questionnaire-28 (GHQ-28). The results revealed significant correlations ($p <0.01$) between the Corona anxiety questionnaire and the General Health Questionnaire-28 total score, anxiety component, physical symptoms, impairment in social functioning, and depression, with coefficients of 0.483, 0.507, 0.418, 0.333, and 0.269, respectively [29]. Mothers completed this questionnaire in a self-reported format as part of the current study.

Furthermore, the Reynolds and Richmond Revised Children's Manifest Anxiety Scale (RCMAS) was utilized to assess children's manifest anxiety [30]. This instrument has been adapted and validated for measuring children's observable anxiety in Iran, targeting individuals aged 7 to 18 years. Comprising 37 items, it aims to evaluate children's manifest anxiety. Each affirmative response is scored one point, while negative responses receive zero point. Higher scores indicate greater manifest anxiety and vice versa. The validity and reliability of this questionnaire have been confirmed in Iranian studies. Taghavi and Alishahi reported a test-retest validity of 0.67 [31], while Mofrad et al. reported a validity of 0.83.

Additionally, Mofrad et al. obtained a test-retest reliability of 0.87 for patients and 0.81 for the standard group [32]. In the present study, the tool's reliability was assessed using a test-retest method, yielding a coefficient of 0.84. Due to the age of the research participants and the questionnaire's comprehension requirements for elementary school students, the researcher conducted a structured interview with the children.

Data collection method

The data collection process involved visiting the schools to select eligible participants and contacting the mothers through school principals. Mothers and children were enrolled in the study upon eligibility with inclusion criteria. Written informed consent was obtained from the mothers, while oral consent was obtained from the children. Questionnaires were administered in a serene, well-ventilated environment with open doors and windows, adhering to social distancing protocols. All participants, including the interviewer, wore masks. The mothers and children completed the demographic questionnaire, the coronavirus anxiety questionnaire, and the children's manifest anxiety questionnaire in this conducive setting.

Data analysis

Data analysis was performed after collecting information and entering it into SPSS software version 26. Descriptive statistics were utilized to describe the data, including the calculation of central and dispersion indices for quantitative variables and frequency and percentage for qualitative variables. The normal distribution of data was assessed based on the Kolmogorov-Smirnov test. Further analysis was performed using independent t-tests, one-way analysis of variance (ANOVA), and multivariate regression. The significance level for the tests was set at $p<0.05$.

Results

The study findings revealed that the mean score (standard deviation) of COVID-19-induced anxiety in mothers was 31.95 (17.67).

Table 1 presents the comparison of mothers' average COVID anxiety based on their children's demographic characteristics. The results showed that the mean COVID anxiety score was significantly ($P<0.05$) higher in mothers with first-grade children and younger children. However, there was no significant difference between the two genders .

Table 2 compares the average COVID anxiety levels among mothers based on their demographic characteristics and those of fathers. Statistical analysis showed that the mean COVID anxiety score was significantly ($P<0.001$) higher in mothers with higher education, employed, urban residents, and spouses with higher education and employed, but the mean COVID anxiety score was not significant in terms of maternal and spouse age ($P>0.05$).

Table 1. Comparison of the mean COVID-19 anxiety scores among mothers based on child demographic characteristics

Characteristics		N (%)	COVID-19-induced anxiety Mean (S.D)	df	Statistics	P value
Child's gender	Boy	155 (50.8)	1.69 (0.99)	303	1.56	0.118*
	Girl	150 (49.2)	1.86 (0.96)			
Child's education	First class	100 (32.8)	1.92 (0.91)	2	4.84	0.009**
	Second class	100 (32.8)	1.88 (0.99)			
	Third class	105 (34.4)	1.54 (1.00)			
Child's age	8 years ≥	211 (69.2)	1.94 (0.90)	303	2.35	0.016*
	8 years<	94 (30.8)	1.67 (1.02)			

* Independent T-test; ** Analysis of Variance (ANOVA) test

Table 2. Comparison of the mean COVID-19 anxiety scores among mothers based on parent demographic characteristics

Characteristics		N (%)	COVID-19-induced anxiety Mean (S.D)	df	Statistics	P value
Mother's age	≤ 35 years	161(52.8)	32.73 (17.03)	303	0.81	0.41*
	> 35 years	144(47.2)	31.08 (18.37)			
Mother's education	Elementary	51(16.7)	9.02 (8.28)	5	84.05	<0.001**
	Guidance	31(10.2)	11.61 (12.08)			
	High school	25(8.2)	23.52 (17.69)			
	Post-diploma	68(22.3)	41.80 (10.90)			
	Bachelor	114(37.4)	40.20 (11.57)			
	Masters and above	16(5.2)	41.31 (8.37)			
Mother's job	Housewife	260(85.2)	30.21 (18.22)	303	4.25	<0.001*
	Employed	45 (14.8)	41.98 (9.08)			
Place of residence	Urban	215 (70.5)	41.28 (10.77)	303	24.72	<0.001*
	Rural	90 (29.5)	9.65 (8.63)			
Spouse's age	≤ 37 years	156(51.1)	33.12 (16.77)	303	1.18	0.23*
	> 37 years	149(48.8)	30.71 (18.53)			
Spouse's education	Elementary	29(9.5)	60.90 (3.98)	5	74.02	<0.001**
	Guidance	46 (15)	11.31 (12.03)			
	High school	27(8/8)	28.33 (18.62)			
	Post-diploma	36(11.8)	37.75 (15.26)			
	Bachelor	143(46.9)	40.79 (10.90)			
	Masters and above	24(7.9)	43.29 (7.78)			
Spouse's job	Unemployed	7(2.3)	16.43 (14.30)	3	39.22	<0.001**
	Self-employed	148(48.5)	34.36 (16.75)			
	Employee	82(26.9)	41.74 (9.53)			
	Other	68(22.3)	16.49 (16.58)			

* Independent t-test; ** Analysis of Variance (ANOVA) test

Table 3. Results of multivariate regression analysis for predicting manifest anxiety

Predictor variables	B	Std.Error	Standardized Coefficients Beta	t	P value
COVID-19 anxiety	0.26	0.01	0.90	17.41	**<0.001**
Child's education	0.03	0.02	0.09	1.23	0.21
Child's age	-0.06	0.02	-0.19	-2.54	0.01
Mother's education	0.02	0.01	0.15	2.11	0.03
Mother's job	-0.02	0.02	-0.02	-0.93	0.35
Place of residence	0.09	0.05	0.14	1.78	0.07
Spouse's 's education	-0.008	0.01	-0.04	-0.69	0.49
Spouse's job	0.01	0.01	0.04	1.35	0.17

R = 0.87, R^2= 0.76, ADJ.R^2= 0.75

According to the multivariable regression analysis presented in Table 3, while controlling for other variables such as the child's education and age, mother's education and occupation, place of residence, and spouse's education and occupation, a one standard deviation increase in mothers' COVID anxiety scores was associated with a 0.907 standard deviation increase in children's anxiety scores (B = 0.907, P<0.001).

Discussion

This study aimed to explore the relationship between maternal anxiety due to COVID-19 and the anxiety levels of their children following the reopening of elementary schools in Borujerd during the post-COVID era.

Findings reveal a significant association between children's manifest anxiety and maternal COVID-19-related anxiety, even when controlling for other variables. Specifically, heightened maternal anxiety was correlated with increased manifest anxiety in their children. This observation aligns with previous research by Shirzadi et al. and Perry et al. [28, 33]. Persistent concerns regarding the COVID-19 virus and its repercussions perpetuate a sense of pervasive threat and a lack of control among mothers, leading them to perceive their surroundings as inherently dangerous. Consequently, they experience heightened tension and an ongoing anticipation of contracting the virus. Mothers engaged in continuous disinfection and hygiene measures may inadvertently divert attention away from their children's needs, fostering a diminished sensitivity to familial dynamics. Given the reciprocal nature of maternal and child emotions, maternal anxiety precipitates feelings of unease and vulnerability in children, hindering the development of a secure parent-child relationship [28].

The difference in maternal COVID-related anxiety scores based on their children's gender was found to be statistically insignificant. This indicates that mothers exhibited similar anxiety levels, irrespective of their children's gender. Stojanov et al. investigated the risk of postpartum non-psychotic mood and anxiety disorders during the COVID-19 pandemic. Similarly, they concluded that maternal COVID-related anxiety did not correlate with their children's gender [34]. These findings parallel the outcomes of our study. It can be inferred that during the COVID-19 period, the association between these variables lacks significance, diminishing their relevance [35]. Consequently, it is imperative to address and manage maternal anxiety surrounding COVID-19 transmission as their children went back to schools in the post-pandemic era using suitable strategies.

The discrepancy in maternal COVID-related anxiety scores based on the age and educational level of their children was found to be statistically significant. Specifically, mothers with younger and less educated children exhibited higher anxiety levels. Dollberg et al.'s investigation on COVID-19, child behavioral problems, and maternal anxiety and mental health revealed an inverse correlation between mothers' COVID-related anxiety and their children's age and education, aligning with our findings. Mothers in this region perceive their children to face more challenges in both internal and external behaviors, heightening their sensitivity and anxiety [36]. Conversely, Yildiz et al. examined the impact of the COVID-19 pandemic on the anxiety of mothers with children requiring special care in Turkey. They observed that maternal anxiety increased with the age of the children, contradicting our results [37]. The discrepancy between this study and ours could potentially stem from variations in the health status of the children under study (requiring intensive care) and the assessment tool utilized to measure COVID-related anxiety.

There was no significant correlation between the difference in maternal COVID-related anxiety scores and their age or that of their spouses. Consistently, Ariapooran et al. and Effati-Daryani et al. reported similar findings [38, 39]. The COVID-19 pandemic and its ramifications are regarded as a crisis affecting the broader population, where in demographic factors such as the ages of mothers and fathers may not exert a notable influence [38].

The difference in maternal COVID-related anxiety scores was significant for educational attainment. Notably, mothers with higher educational levels, as well as their husbands, reported higher levels of perceived anxiety related to COVID-19. This observation aligns with the findings of Hocaoglu et al. and Effati-Daryani et al. [39, 40]. Individuals with advanced education tend to monitor progress more closely, accessing various informational sources such as media and scientific literature, leading to a heightened awareness of the severity of the COVID-19 situation, and therefore, exacerbating their anxiety [39]. However, Seyednouri et al., who examined the link between personality traits and COVID-19 anxiety in mothers of children with emotional and behavioral disorders, found that educational level was not significantly linked to COVID-19 anxiety [41]. This differs from the findings of the present study. This

disparity may stem from their focus on children with emotional and behavioral disorders and the smaller sample size. Additionally, there was a significant correlation between mothers' COVID-related anxiety scores and their employment status as well as that of their spouses. Employed mothers and their husbands reporting higher anxiety. This finding is consistent with the findings of Mohamed et al. and Hocaoglu et al. [40, 42]. Working parents often leave their children unattended for extended periods, increasing concerns about their children's safety and susceptibility to contracting COVID-19 while alone at home [42].

A significant correlation emerged between the difference in COVID-induced anxiety scores among mothers and their residence, with urban mothers exhibiting higher average anxiety scores compared to their rural counterparts. This observation is congruent with Lelisho et al.'s investigation on pervasive anxiety disorder among mothers engaged in perinatal services during the COVID-19 pandemic. Unlike rural settings, urban environments typically entail denser populations and less adherence to social distancing measures, heightening concerns about COVID-19 transmission [43]. Conversely, Mohamed et al. reported higher anxiety levels among rural mothers in their study examining maternal fear and anxiety during the COVID-19 outbreak concerning their children's health, diverging from our findings [42]. This inconsistency may stem from differences in sample size between the studies.

Moreover, our study underscores that even in the post-COVID era, maternal anxiety persists, particularly among working mothers with higher education levels residing in urban areas, impacting their children, particularly those of lower educational attainment and age. Consequently, psychological interventions focused on alleviating maternal anxiety, especially in school settings, are imperative.

Strengths and limitations and future research

Despite the two years passage of the COVID-19 crisis and the significant reduction in infection and mortality rates between 2022 and 2023, driven by widespread vaccination efforts, the findings of this study underscore the persistent presence of anxiety within families. The ever-evolving nature of the virus, characterized by diverse manifestations and symptoms, coupled with instances of unexplained deterioration and fatalities in individuals without underlying health conditions, underscores the ongoing need for vigilance regarding the mental and psychological well-being of families. Continuous education initiatives targeting both mothers and children remain crucial. However, it's essential to consider the limitations of this study. Firstly, the focus was solely on assessing the level of COVID-19 anxiety among mothers in Borujerd city and children aged from first to third grade in elementary schools. Because of this, the results may not apply to other groups of mothers and children from different places, as cultural and geographical factors may affect how diseases spread and how people deal with them in different areas. Thus, future research endeavors should aim for broader geographic representation to enhance the generalization of results. Furthermore, the study encountered challenges related to parental and child non-cooperation, necessitating efforts to reassure participants about confidentiality and the relevance of the research in alleviating COVID-19-related anxiety. Additionally, some parents expressed concerns about the potential transmission of the virus. To address these concerns, interviews were conducted in private rooms, adhering to social distancing guidelines, with both parties wearing masks, and ensuring proper ventilation by keeping doors and windows open. Such measures were implemented to mitigate potential limitations and enhance the validity of the study outcomes.

Conclusion

The findings of this study indicate that mothers with higher levels of education, employment status, and urban residency, as well as those with children of younger age and lower educational attainment, exhibit elevated anxiety levels regarding COVID-19. Therefore, it is recommended that school health nurses and clinical psychologists maintain a consistent presence in schools, given the limited availability of teachers to address parental mental health concerns due to their teaching responsibilities. Through regular counseling sessions, these professionals can engage with mothers, employing appropriate strategies to manage and alleviate their anxiety.

Additionally, the study underscores the predictive relationship between maternal anxiety and children's anxiety levels. This highlights the importance of establishing effective communication between family health nurses, school health nurses, and children's nurses to monitor and address maternal mental health issues, particularly anxiety. By fostering awareness and employing timely nursing interventions to manage maternal anxiety, the transmission of anxiety from mothers to children—vital contributors to the future of families and society—can be mitigated.

Authorship contribution statement

All authors have reviewed and approved the final version of the manuscript. F GH conceived and

designed the study. HG conducted the study and collected the data; RM performed the data analysis and interpretation; and FV, MH guided the study design.

Ethical Consideration

The research obtained approval from the Ethics Committee of Lorestan University of Medical Sciences (ethics code: IR.LUMS.REC.1401.005).

Declaration of Competing Interest

The authors have no conflict of interests related to this article

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Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Generative AI

The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript, nor for the creation of tables, or their corresponding captions.

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