

The Psychological Effect of Virtual Learning on Mothers During the Pandemic with their Children

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Abstract

Background: Pandemic outbreak causes various effects on different parts of our lives: the learning process. One of the ways to continue education is virtual learning which replaces traditional ways. It is a mixture method between face-to-face teaching and an online approach [1].

Aim: To improve mothers' mental health who deal with their children during virtual learning during a pandemic.

Method: A cross-sectional study was undertaken at Riyadh's Prince Sultan Military Medical City's Al-Wazarat healthcare center. During the outbreak, three hundred eight mothers were given a self-administered questionnaire that assessed sociodemographic variables, homeschooling data, and the Hospital Anxiety and Depression Scale (HADS).

Results: A total of 308 mothers participated, and the vast majority 292 (98%) of them were Saudi. Almost all 306 (99.4%) of the participants reported spending time with their children during online learning. Class room-based schooling was the preferred schooling style by 209 (68.08%) of the mothers. In addition, 43 (14%) were borderline anxiety, and a similar percentage was borderline depression. The prevalence of anxiety and depression was 191 (62%) and 222 (72.1%), respectively. Multivariate logistic regression showed that classroom-based schooling was the significant risk factor for anxiety and depression with OR=86.761, 95%CI (30.467-247.067), and 53.005 95%CI (14.855-189.128), respectively, and a P-value of <0.001.

Conclusion: Depression and anxiety were highly prevalent among mothers with children in homeschooling during the COVID-19 pandemic. Class room-based schooling was the only significant risk factor for anxiety and depression. At the same time, old age was a significant protective factor from depression among the participated mothers. This study highlights the recognition of the importance of mental health screening among women who have children studying online.

Recommendation: Measures need to be implemented to decrease the prevalence of depression and anxiety among mothers who take care of their children during online learning, such as decreasing the number of mothers' working hours and asking the father to support the mother and helping them during educational processes.

Keywords: Virtual Learning; Pandemic; Depression Anxiety; Mothers; Children

Literature Review

Pandemic outbreak causes various effects on different parts of our lives: the learning process. One of the ways to continue education is virtual learning which replaces traditional ways. It is a mixture method between face-to-face teaching and an online approach [1]. Online education becomes a choice across all educational ages. But it has a lot of difficulties for several families and their children. These difficulties start from a technical issue to be socially engaged with the community [2]. It becomes one of the contributor factors to cause anxiety and distress to many families. The level of anxiety will be more obvious in parents who work outside the home for long hours as they will find it difficult to arrange between their work and their child's time, especially at online school [3].

Many studies were undertaken among parents and their children during a pandemic to assess their mental health and its relationship to virtual learning.

There is one study that has been done in China by Qiuyue Yang and others. In 2021, to assess the discrepancy between the social comparison of parents in compared to the stress that develops when parent teach their children and to differentiate educational methods used by parents to advocate their kids during online schooling. The study results suggest an affirmative relation between the social comparison of parents, which is on ascending pattern, and stress that develops when parent teach their children. However, a declination relation is found between the social comparison of parents, which is on descending pattern, and stress that develops when parent teach their children [4].

Another study was conducted in China in 2021 by Shu Cui and others to explore the background and behavior of students at elementary school and their parents regarding virtual schooling learning at the time of the pandemic. The study found that 90.7% of the students show high to moderate interest in virtual classes. Although, most of the students did unwell on electronic learning and their homework after school. Using a 10-point system, there was a good achievement (parents:7.35 and students:7.25) during the first half of this study. Although, the second part of the study shows a decrease in the efficiency with a significant change in the achievement compared to before parents show 7.21 while students were 7.23. Additionally,36.2% of parents reveal that handling

their children during online schooling causes them stress. While parents are dissatisfied with online schooling, 36% express their displeasure. 94.9 percent of parents and 93.5 percent of children want to see each other again in the classroom [5].

Another study was published in Switzerland in 2021 by Ariana Garrote and others. The study looks into how teachers and parents influenced students' online learning versus face-to-face learning in school. It is found in the study that the students' perceptions would be more on online schooling if they could study more independently and their parents were senseless anxious about virtual learning. Furthermore, if parents are concerned about the pandemic, students' perceptions will be affected. If teachers anticipated high school performance in online learning at the face-to-face learning level, the grades would be high [6].

Ozge Misirli and others did Whiles study in Turkey during 2021. To learn more about how parents felt about their children's experiences with remote education during the pandemic, as well as their history and perspectives on home learning during the pandemic. According to the author, students and parents found the distance teaching process difficult. It has been found that distance teaching practices were covered mainly in the core tutorial. Distance teaching is inappropriate for children in the younger age group and students with special needs. Additionally, parents' various complaints regarding their children, like social quarantine, lack of interaction, time spent in front of the screen, increased, and distance education, established a heavy load on parents. Finally, the parents stated that their children require self-organizing learning skills and technological socialization during distant instruction [7].

Another study was published in Lombardy, by Marina Picca, in 2021. The study is aimed to explore the impact of quarantine on preschool and school-age children concerning behaviors and daily life with a particular focus on homeschooling and digital device use. The study found that parents expressed lifestyles, emotional, and sleep changes. After modification with distance working of parents and the time spent on-screen during the pandemic [8].

Another study was conducted on seven European countries: the UK, Sweden, Spain, Belgium, the Netherlands, Germany, and Italy by Lisa B Thorell and others during 2021. The study aims to know parents' experience regarding virtual learning during pandemics in families who live across Europe with or without a kid

with a mental health disease. Many parents noticed the negative effects of virtual learning on themselves and their children, and others found virtual learning had bad quality, with limited support from schools. Parents from many nations were limited in contact with professors, which left them with a heavy responsibility for managing virtual learning. Parents notice increased anxiety levels, social detachment, internal conflict, and increased alcohol/drug-using. Negative experiences were more common among families with kids who have a mental illness [9].

In 2021, Claudia Calvano and others published a study in Germany. The goal of this study was to [1]. collect data on pandemic-related stress, parental pressure, stress in general, parents' personal and mental health, and bad childhood experiences [2]. identification of risk factors for increased negative childhood experiences [3]. providing qualitative data on the experiences of the parents. The study found 50% of parents revealed being anxious by social isolation, schools' closure, and child care facilities. Moreover, 9.7% of parents have high anxiety symptoms, and 12.3% are depressed. 29.1% of children witnessed family violence during the pandemic, and 42.2% experienced increased verbal abuse. These families noticed more stress and lost their jobs, especially at a younger age [10].

One study has been done in China by Chuanmei Dong and others. In 2020, To assess junior students' awareness of virtual schooling and evaluate families' beliefs and attitudes Towards virtual schooling during the quarantine. The study found that major families (92.7%) noticed that their kids had good training. Also, (84.6%) of parents used it for less than 30 mins for every session and found that virtual schooling is less beneficial than classical teaching for kids during the quarantine [11].

One study was conducted in Indonesia in 2020 to study the connection between faith, teacher's support, families support, and educational stress grades, as well as the engagement of families, mentors, and schools with educational stress grades. The study reports an obvious relation between faith, mentors, schools, and families to the level of educational stress [12].

Another study was published in Odisha in 2020 by Scholar R to discover if any factors contribute to psychological stress and its relation to virtual learning during quarantine. The result found that the major cause worsens stress levels when there is limited time to submit homework [13].

Whiles study was done in Pakistan by Farooq F during 2020, which aims to express the challenges teachers and students face when dealing with virtual learning during pandemics. The study found that there should be a collaboration with different departments to facilitate using resources, which will help figure out a solution for these challenges [14].

Another study was published in China by Ying Zhao. In 2020, to evaluate the outcome of virtual learning and the organization of this educational process. The authors found that virtual learning should be continued to overcome what happened during isolation from the pandemic. Also, some protection instructions should be established to keep them healthy [15].

Another study conducted in Turkey by Aslihan Ozturk Eyimaya during 2020 explores the connection between children's time on screen and parenting practices during a pandemic. They found that the time children spend on-screen increased during a pandemic, and parents' attitudes positively linked with time spent on screen by their kids [16].

Another study, conducted among parents during a pandemic in China by Wu M and others in July 2020, was published in China. The authors discovered that depression and anxiety were present in 6.1 percent and 4.0 percent of households, respectively. Furthermore, the study discovered that families in central China had much better mental health as compared to those in non-central China. Furthermore, the mental health of families of third-level students was much lower as compared to the students in secondary, intermediate, and elementary school. The results were significantly higher in families with multiple disagreements than in peaceful families. There are plenty of risk factors that affect mental health, such as marriage, happiness, and the previous mental history of families [17].

A study conducted during 2020 among pediatric and adults with ADHD in French During the quarantine by Bobo E and others found that 34.71 % of pediatrics exacerbates their condition, 34.33 % report no alteration from the baseline 30.96 % were in good health. The results enhance their kids' condition toward restlessness and enhanced self-respect. Also, found that family perception is improved toward ADHD manifestation in their kid's learning disability [18].

While a study published in July 2020 by Morelli M evaluated the impact of pandemic isolation on family members' health in Italy, the screening was performed on 854 families in Italy, 797 were females, and 57 were males. This study found families who struggle to cope with pandemic isolation have more pressure, which leads to more issues with their kids. Residency on spot areas of infection or standards of the living area does not impact parents and their kid's health [19].

In the Netherlands, Loes H. C. Janssen and other studies during 2020 aim to explore if pandemic isolation causes any positive and negative impact on parents and adult attitudes. It also found that parents show an increased negative attitude during quarantine compared to the non-quarantine period. While on adult, there was no change in negative attitude and a positive attitude [20].

Parents' mental health and anxiety affect the learning process, building a relationship with parents from another family, financial issues, and family worries, which was seen in the interesting study conducted in the academic medical center in Boston by Elyse R. Park in 2019 to assess the health of parents - especially regarding anxiety and flexibility. The study found that children's parents are under high stress with multiple stressors such as changing learning [21].

In another study published in china in 2020 by Ying Zhao and others, the author evaluated the effect and appropriate measure to initiate online learning. The study found that 76% of those who fill the surveys consider virtual learning as a reasonable option. Additionally, 69% of parents reported that their children spend 3 hours or more per day in front of a screen, while 82% of college students spend fewer than two hours per day outside. Parents constituted the majority of respondents, with 95% expressing concern over their children's vision. According to the parent-rated Strengths and Difficulties Questionnaire results, 17.6% of the students were suspected of having physiological or emotional difficulties (SDQ). The Self-Assessment Anxiety Scale (SAS) results for parents and teachers revealed a higher level of uneasiness than normal [22].

Whiles a study was done in Germany by Verena Letzel and others during 2020, the author studied the effect of virtual schooling during the pandemic. The study found that the effect of online

learning is not limited to the educational field only but extends to involve multiple fields like the social field, psychological field, and equality issue on education [23].

In the U.S, Stephen P Becker and others study 2020 the homeschooling practices and complexity during lockdown orders during the pandemic in teenagers with and without (ADHD).

The authors found that 22% of families bear the financial expense to support homeschooling, and 59% of services offered by schools were received before the pandemic and continued during homeschooling. Compared to youth without ADHD, those with ADHD had fewer routines and had more difficulty. Parents of ADHD teenagers were less confident in their ability to handle homeschooling, & a lot of challenges in supporting homeschooling and communication between school and home. In addition, 31% of parents of teenagers with ADHD who receive an individualized tutorial or academic facilities said homeschooling is very difficult, compared to 18% of parents of teenagers with ADHD who do not receive an individualized tutorial or academic facilities, and 4% of parents of teenagers who do not receive either an individualized tutorial or academic facilities or ADHD. There are many challenges faced by an adolescent with ADHD during a pandemic: fewer adolescent actions, higher negative impact, and greater difficulty in concentrating [24].

Another study conducted in Jordan by Sawsan Abuhammad during 2020 aimed to analyze posted content in Facebook groups on Jordan and explore parents' perceptions of the distance learning challenges their children during the pandemic.

The study found a total of 248 participants and threads, which were thematically categorized for further analysis. The selected topics and answers revealed four main issues: (1) individual issue, (2) technical issue, (3) logistical issue, and (4) accounting issue [25].

A study conducted during 2020 done in Poland by Teresa parczewska presents parents' perceptions and background about homeschooling during the contagion, as well as the ways to deal with challenging circumstances, considering social and demographic aspects.

It was discovered that a greater number of respondents said the current situation is challenging and that the duties associated with

homeschooling are beyond their capacities. Besides, Parents were anxious about their children’s future as they saw themselves as not qualified [26].

Another study was done in Poland by Maria Trzcińska-Król in 2020. The study evaluates the motivation of the child, their attitudes, any progressions on their performance, and if they face any difficulties or limitations during homeschooling as per their parents’ observation. According to the research findings, the problem limits children’s self-study; it can’t be overcome, and homeschooling produces strong emotions in them [27].

So, Does children’s virtual learning cause any psychological effects on the mothers during the pandemic?

This study aimed to: 1- To determine the prevalence of anxiety, stress, and depression among mothers who take care of their children on virtual learning during a pandemic. 2- To identify risk factors of anxiety, stress, and depression among mothers who take care of their children on virtual learning during a pandemic.

Methods

- **Study area:** The study was conducted at the Al-Wazarat Health Centre (WHC), Prince Sultan Military Medical City, Riyadh.
- **Study design:** A cross-sectional survey was used to collect data for this study, and it was disseminated from June 2021 to September 2021.
- **Study population:** This study included mothers who visit Al-Wazarat Health Centre (WHC), Prince Sultan Military Medical City, Riyadh, Saudi Arabia.

Sample method

The sample size was estimated based on estimating the prevalence from a previous similar study by using the following procedure

$$Sample\ Size = \frac{Z^2 p(1-P)}{\delta^2}$$

Z: represents the confidence level, 95% confidence level is the standard choice, and for this level, Z = 1.96

P: the expected prevalence from the data [8].

δ: Error tolerance

$$Sample\ Size = \frac{(1.96)^2(0.24)(0.76)}{(0.05)^2}$$

=280

+10% no response rate so that sample size will be 280+28=308

Based on the equations above, the sample size required is 308 mothers.

Data collection tool

The mothers who took part in the study completed a self-administered questionnaire. After the initial design, the face validation of the questionnaire began. Through the feedback from 3 family medicine consultants after that, the face validity of the questionnaire was established. A pilot study of 10 mothers who fill the questionnaire to ensure validation. After two weeks, the questionnaire was distributed again.

There are three sections of the questionnaire. The first section was sociodemographic. The second section was details about homeschooling (number of children, level of education of children, type of school, experience in using computer or iPad, speed of the Internet if the father helps the mother during homeschooling, and preferred schooling style. The third section was Hospital Anxiety and Depression Scale (HADS) is a short screening scale for anxiety and depression that assesses individuals’ anxiety and depressive symptoms over the previous two weeks. The overall score ranges from 0 to 21, with 0-7 indicating no depressed or anxious symptoms (normal), 8-10 indicating borderline abnormal symptoms (borderline case), and 11-21 indicating abnormal symptoms (case).

Ethical consideration

- Full Consent obtained from mothers before entering the study
- the Confidentiality of the patient information was Insured
- Data collected from this study was only used for this research.
- IRB approval was taken before the start of the study.

Data analysis

Statistical Package for Social Studies was used to examine the data (SPSS 22; IBM Corp., New York, NY, USA). Percentages were used to express categorical variables. For categorical variables,

the Chi-square test and Fisher’s exact test were used. Univariate & multivariate logistic regression was used to assess the risk factor of Anxiety and Depression among mothers who take care of their children on virtual learning during a pandemic. Statistical significance was defined as a p-value of less than 0.05.

Results

In the current study, 308 mothers took part, the vast majority 292 (98%) of them were Saudi, the age group 35-40 years old had the largest number 69 (22.4%), and 254 (83.3%) were married. More than half 180 (58.4%) of the participated mothers have a university educational level, 246 (80.4%) are working, and 131 (53.3%) work for ≥12 hours. Almost all 306 (99.4%) of the participants reported spending time with their children during online learning, and more than half 180 (59.4%) reported that working hours don’t conflict with the time of homeschooling. A 133(43.6%) said that they spend 1-3 hours with the child on the screen. Data is shown in table 1.

		Number	%
Age	≤ 25	19	6.2
	25-30	62	20.1
	30-35	66	21.4
	35-40	69	22.4
	40-45	51	16.6
	≥ 45	41	13.3
Nationality	Saudi	292	98.0
	Non-Saudi	6	2.0
Marital status	Married	254	83.3
	divorced	37	12.1
	widow	14	4.6
Level of education of the mother	illiterate	10	3.2
	primary education	3	1.0
	intermediate education	11	3.6
	secondary education	79	25.6
	university education	180	58.4
	Postgraduate education	25	8.1
Level of education of the father	illiterate	6	1.9
	primary education	9	2.9
	intermediate education	12	3.9
	secondary education	88	28.6
	university education	134	43.5
	Postgraduate education	59	19.2

Do you work	Yes	246	80.4
	No	60	19.6
For How many hours do you work	≤ 4 hours	10	4.1
	4-6 hours	78	31.7
	6-12 hours	27	11.0
	≥12 hours	131	53.3
Do you spend time with your child during online learning	Yes	306	99.4
	No	2	.6
Do your working hours conflict with the time of home-schooling?	Yes	123	40.6
	No	180	59.4
How many hours do you spend with a child on screen?	≤ 1 hour	46	15.1
	1-3 hours	133	43.6
	≥ 3hours	126	41.3

Table 1: Socio- demographic characteristics of the participants (n = 308).

Almost two-thirds of the studied sample 193 (62.87%) has ≥ 3 children, 186 (60.39%) have children in the primary education level, and most of them 250 (81.67%) are studying in Saudi schools. The highest percentage 138 (44.81%) of the participants said they are very skillful in using the computer, and 182 (59.09%) said that the internet speed is excellent. More than half of the mothers reported that fathers’ help during homeschooling is little or even very little. Class room-based schooling was the preferred schooling style by 209 (68.08%) of the mothers, as presented in table 2.

		Number	%
How many children do you have?	1	48	15.64
	2-3	66	21.50
	≥3	193	62.87
Level of education of the daughters	primary education	186	60.39
	intermediate education	98	31.82
	secondary education	71	23.05
	university education	38	12.34

Level of education of the sons	primary education	145	47.08
	intermediate education	105	34.09
	secondary education	58	18.83
	university education	26	8.44
which school does your child study at?	Saudi school	250	81.97
	International school	11	3.61
	Special school	44	14.43
Are you experts in using a computer or iPad?	Very skillful	138	44.81
	skillful	108	35.06
	Basic	41	13.31
	poor	15	4.87
	very poor	6	1.95
How would you describe the speed of your Internet?	poor	15	4.87
	good	111	36.04
	excellent	182	59.09
Does the father help you during the time of homeschooling?	always	25	8.20
	Sometime	73	23.93
	undecided	46	15.08
	little	80	26.23
	Very little	81	26.56
Which schooling style do you prefer?	Online class at home	98	31.92
	Classroom-based schooling	209	68.08

Table 2: Homeschooling details.

The current research results revealed that anxiety and depression are highly prevalent among mothers with children in homeschooling at 191 (62%) and 222 (72.1%), respectively. In addition, 43 (14%) of the studied sample were borderline anxiety, and a similar percentage were borderline depression. As shown in table 3.

	Anxiety		Depression	
	Number	Prevalence (%)	Number	Prevalence (%)
Normal	74	24.0	43	14.0
Borderline abnormal	43	14.0	43	14.0
Abnormal	191	62.0	222	72.1

Table 3: Prevalence of anxiety and depression among mothers who take care of their children on virtual learning during the pandemic.

Anxiety by participants' characteristics is shown in table 4. The significant differences are observed as per the study results between normal mothers and those with anxiety (both borderline abnormal and abnormal) in terms of fathers' educational level and working status, with a P-value of <0.001 in both. The percentage of working women in the normal group was significantly higher than at 69 (93.24%) vs 177 (76.29%), respectively. The number of hours spent with the child on screen differed significantly between the two groups, where the highest percentage 42 (56.76%) of normal mothers spent ≥3 hours. In contrast, the highest percentage 111 (48.05%) of abnormal one spent 1-3 hours, with a P-value of 0.006. In addition, the two groups (normal and abnormal) differed significantly in terms of their experience using the computer (P 0.024). The number of children was significantly higher in the abnormal group. Alternatively, no significant differences were found between the two groups regarding age, nationality, marital status, educational level, working hours, time spent with the child during online learning, and the number of children, since all P values were >0.05.

		Normal (n = 74)		Borderline abnormal and Abnormal (234)		P value
		Number	%	Number	%	
Age	≤ 25	5	6.76	14	5.98	0.804
	25-30	16	21.62	46	19.66	
	30-35	12	16.22	54	23.08	
	35-40	17	22.97	52	22.22	
	40-45	15	20.27	36	15.38	
	≥ 45	9	12.16	32	13.68	

Nationality	Saudi	71	98.61	221	97.79	0.665
	Non-Saudi	1	1.39	5	2.21	
Marital status	Married	67	90.54	187	80.95	0.115
	divorced	4	5.41	33	14.29	
	widow	3	4.05	11	4.76	
Level of education of the mother	illiterate	4	5.41	6	2.56	0.360
	primary education	0	0.00	3	1.28	
	intermediate education	1	1.35	10	4.27	
	secondary education	15	20.27	64	27.35	
	university education	48	64.86	132	56.41	
	Postgraduate education	6	8.11	19	8.12	
Level of education of the father	illiterate	1	1.35	5	2.14	<0.001*
	primary education	1	1.35	8	3.42	
	intermediate education	0	0.00	12	5.13	
	secondary education	15	20.27	73	31.20	
	university education	28	37.84	106	45.30	
	Postgraduate education	29	39.19	30	12.82	
Do you work	Yes	69	93.24	177	76.29	0.001*
	No	5	6.76	55	23.71	
For How many hours do you work	≤ 4 hours	4	5.80	6	3.39	0.338
	4-6 hours	20	28.99	58	32.77	
	6-12 hours	11	15.94	16	9.04	
	≥12 hours	34	49.28	97	54.80	
Do you spend time with your child during online learning	Yes	73	98.65	233	99.57	0.423
	No	1	1.35	1	0.43	
9- Does your working hours conflict with the time of homeschooling?	Yes	23	31.51	100	43.48	0.070
	No	50	68.49	130	56.52	
How many hours do you spend with the child on screen?	≤ 1 hour	10	13.51	36	15.58	0.006*
	1-3 hours	22	29.73	111	48.05	
	≥ 3hours	42	56.76	84	36.36	
How many children do you have?	1	9	12.16	6	2.58	0.004*
	2-3	22	29.73	77	33.05	
	≥ 3	43	58.11	150	64.38	

Level of education of the daughters	primary education	40	54.05	146	62.39	0.278
	intermediate education	24	32.43	74	31.62	
	secondary education	20	27.03	51	21.79	
	university education	12	16.22	26	11.11	
Level of education of the sons	primary education	36	48.65	109	46.58	0.084
	intermediate education	18	24.32	87	37.18	
	secondary education	11	14.86	47	20.09	0.622
	university education	10	13.51	16	6.84	
Which school does your child study at?	Saudi school	59	79.73	191	82.68	
	International school	2	2.70	9	3.90	
	Special school	13	17.57	31	13.42	
Are you experts in using computers or iPad?	Very skillful	26	35.14	112	47.86	0.024*
	skillful	26	35.14	82	35.04	
	Basic	18	24.32	23	9.83	
	poor	3	4.05	12	5.13	
	very poor	1	1.35	5	2.14	
How would you describe the speed of your Internet?	poor	2	2.70	13	5.56	0.202
	good	22	29.73	89	38.03	
	excellent	50	67.57	132	56.41	
Does the father help you during the time of homeschooling?	always	7	9.59	18	7.76	0.999
	Sometime	14	19.18	59	25.43	
	undecided	15	20.55	31	13.36	
	little	21	28.77	59	25.43	
	Very little	16	21.92	65	28.02	
Which schooling style do you prefer?	Online class at home	68	93.15	30	12.82	<0.001*
	Classroom-based schooling	5	6.85	204	87.18	
* Significant P-value						

Table 4: Anxiety by characteristics of the participants.

For depression, the normal group and borderline abnormal and abnormal group differed significantly by age, working status where the prevalence of depression was higher among workers at 205 (77.95%) vs. 58 (22.05%) on the non-workers with a P-value of 0.008, and schooling style, where the depression prevalence was higher among the classroom-based schooling at 205 (77.65%) vs

59 (22.35%) of the online class, with a P-value of <0.001. other than this, there were no significant differences between the two groups by the other studied characteristics. Data is shown in table 5.

Univariate logistic regression for the risk factor of anxiety among mothers who take care of their children on virtual learning during

		Normal (43)		Borderline abnormal and Abnormal (n = 265)		P value
		Number	%	Number	%	
Age	≤ 25	3	6.98	16	6.04	0.006*
	25-30	7	16.28	55	20.75	
	30-35	5	11.63	61	23.02	
	35-40	8	18.60	61	23.02	
	40-45	16	37.21	35	13.21	
	≥ 45	4	9.30	37	13.96	
Nationality	Saudi	41	100.00	251	97.67	0.323
	Non Saudi	0	0.00	6	2.33	
Marital status	Married	41	95.35	213	81.30	0.065
	divorced	2	4.65	35	13.36	
	widow	0	0.00	14	5.34	
Level of education of the mother	illiterate	3	6.98	7	2.64	0.568
	primary education	0	0.00	3	1.13	
	intermediate education	2	4.65	9	3.40	
	secondary education	10	23.26	69	26.04	
	university education	23	53.49	157	59.25	
	Postgraduate education	5	11.63	20	7.55	
Level of education of the father	illiterate	1	2.33	5	1.89	0.374
	primary education	1	2.33	8	3.02	
	intermediate education	1	2.33	11	4.15	
	secondary education	8	18.60	80	30.19	
	university education	19	44.19	115	43.40	
	Postgraduate education	13	30.23	46	17.36	
Do you work	Yes	41	95.35	205	77.95	0.008*
	No	2	4.65	58	22.05	
For How many hours do you work	≤ 4 hours	2	4.88	8	3.90	0.534
	4-6 hours	13	31.71	65	31.71	
	6-12 hours	7	17.07	20	9.76	
	≥ 12 hours	19	46.34	112	54.63	
Do you spend time with your child during online learning	Yes	43	100.00	263	99.25	0.740
	No	0	0.00	2	0.75	
9- Does your working hours conflict with the time of homeschooling?	Yes	13	30.95	110	42.15	0.170
	No	29	69.05	151	57.85	
How many hours do you spend with the child on screen?	≤ 1 hour	7	16.28	39	14.89	0.142
	1-3 hours	13	30.23	120	45.80	
	≥ 3hours	23	53.49	103	39.31	

How many children do you have?	1	3	6.98	12	4.55	0.211
	2-3	9	20.93	90	34.09	
	≥ 3	31	72.09	162	61.36	
Level of education of the daughters	primary education	23	53.49	163	61.51	0.740
	intermediate education	19	44.19	79	29.81	
	secondary education	15	34.88	56	21.13	
	university education	9	20.93	29	10.94	
Level of education of the sons	primary education	26	60.47	119	44.91	0.092
	intermediate education	10	23.26	95	35.85	
	secondary education	11	25.58	47	17.74	
	university education	4	9.30	22	8.30	
Which school does your child study at?	Saudi school	34	79.07	216	82.44	0.462
	International school	1	2.33	10	3.82	
	Special school	8	18.60	36	13.74	
Are you experts in using a computer or iPad?	Very skillful	14	32.56	124	46.79	0.299
	skillful	17	39.53	91	34.34	
	Basic	8	18.60	33	12.45	
	poor	2	4.65	13	4.91	
	very poor	2	4.65	4	1.51	
How would you describe the speed of your Internet?	poor	1	2.33	14	5.28	0.671
	good	15	34.88	96	36.23	
	excellent	27	62.79	155	58.49	
Does the father help you during the time of homeschooling?	always	3	6.98	22	8.40	0.981
	Sometime	9	20.93	64	24.43	
	undecided	7	16.28	39	14.89	
	little	12	27.91	68	25.95	
	Very little	12	27.91	69	26.34	
Which schooling style do you prefer?	Online class at home	39	90.70	59	22.35	<0.001*
	Classroom-based schooling	4	9.30	205	77.65	
* Significant P-value						

Table 5: Depression by characteristics of the participants.

the pandemic is shown in table 6. When compared to postgraduate educational level, fathers' educational level was determined to be a major risk factor for anxiousness, fathers with university educational level and those with secondary or less educational level are at more than three and five folds increased risk of anxiety with OR of 3.660 and 5.573, respectively. Compared to working mothers, nonworking mothers have a more than the fourfold increased

risk of anxiety (OR 4.28, 95%CI(1.647-11.164), and P-value of 0.003). Classroom-based schooling was a highly significant risk factor for anxiety with an OR of 92.480, 95% CI (34.510-247.825), and a P-value of<0.001. After multivariate logistic regression, all these significant associations became statistically nonsignificant except for the classroom-based schooling, with OR=86.761, 95%CI (30.467-247.067), and a P-value of<0.001, as shown in table 7.

	Odds Ratio	95% CI		P-value
		Lower	Upper	
Level of education of the father				
Secondary or less	1.642	.524	5.152	.395
university education	1.297	.434	3.878	.642
Postgraduate education**	1.000			
Do you work				
Yes**	1.000			
No	2.670	.686	10.384	.157
Number of hours spent with a child on screen				
≤ 1 hours	1.033	.277	3.859	.961
1-3 hours	2.401	.947	6.090	.065
≥ 3hours**	1.000			
experts in using computer or iPad				
Very skillful	.949	.331	2.717	.922
skillful	.608	.199	1.858	.383
Basic or less **	1.000			
preferred schooling style				
Online class at home**	1.000			
Classroom-based schooling	86.761	30.467	247.067	<0.001*
* Significant p value				
** Used as a reference				

Table 7: logistic regression for the risk factor of anxiety among mothers who take care of their children on virtual learning during a pandemic.

The univariate logistic regression for the risk factor of depression among mothers who take care of their children on virtual learning during the pandemic is shown in table 8. Old age (40-45 years) was a significant protective factor with an OR of 0.236, 95%CI (0.072-0.777), and a P-value of 0.017. In contrast, nonworking and classroom-based schooling were significantly associated with 5.80 and 33.87 folds increased risk of depression compared to working mothers and online classrooms, with P values of 0.017 and <0.001,

respectively. However, after multivariate regression analysis, only classroom-based schooling remained a significant risk factor for mothers taking care of children during the pandemic. At the same time, old age was a significant protective factor. Data is shown in table 9.

	Odds Ratio	95% CI		P-value
		Lower	Upper	
Age				
≤ 25	0.577	0.116	2.878	0.502
25-30	0.849	0.232	3.108	0.805
30-35	1.319	0.333	5.226	0.694
35-40	0.824	0.232	2.929	0.765
40-45	0.236	0.072	0.777	0.017*
≥ 45**	1.000			
Do you work				
Yes**	1.000			
No	5.800	1.362	24.700	0.017*
preferred schooling style				
Online class at home**	1.000			
Classroom-based schooling	33.877	11.632	98.664	<0.001*
* Significant p value				
** Used as a reference				

Table 8: Logistic regression for the risk factor of depression among mothers who take care of their children on virtual learning during a pandemic.

	Odds Ratio	95% CI		P-value
		Lower	Upper	
Age				
≤ 25	.440	.063	3.057	0.407
25-30	.982	.225	4.278	0.981
30-35	1.237	.262	5.832	0.788
35-40	.816	.191	3.484	0.784
40-45	.081	.016	.404	0.002*
≥ 45	1.000			

Do you work				
Yes**	1.000			
No	3.879	.727	20.701	0.113
preferred schooling style				
Online class at home**	1.000			
Classroom-based schooling	53.005	14.855	189.128	<0.001*
* Significant p value				
** Used as a reference				

Table 9: Logistic regression for the risk factor of depression among mothers who take care of their children on virtual learning during a pandemic.

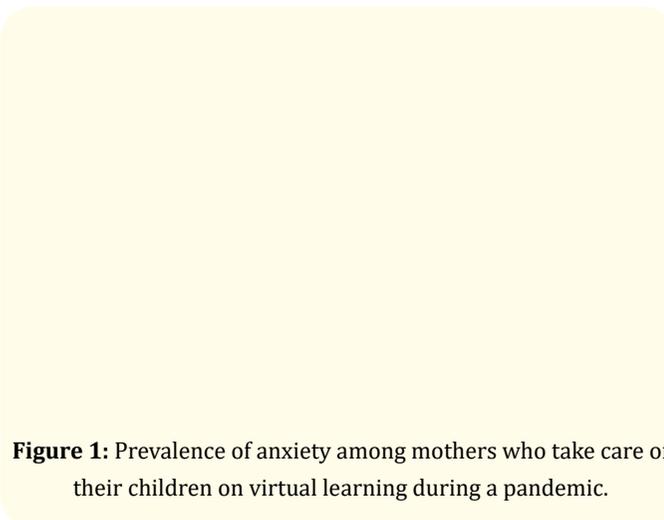


Figure 1: Prevalence of anxiety among mothers who take care of their children on virtual learning during a pandemic.

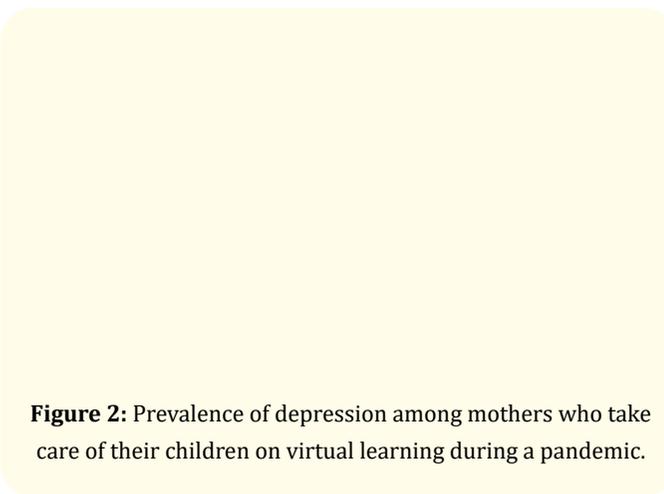


Figure 2: Prevalence of depression among mothers who take care of their children on virtual learning during a pandemic.

Discussion

The novel outbreak of the ongoing pandemic is one of the unforeseen event that has affected almost every country of the world including Saudi Arabia. In order to combat the virus, the governments have imposed the decision of closing the schools and educational institutes to keep the children at home but the impact for the wellbeing of families was hardly considered. Our study looks at the impact of the Pandemic on the health of mothers with schooling children. The results revealed that anxiety and depression are highly prevalent among mothers with children in homeschooling. After multivariate logistic regression, classroom-based schooling was the only significant risk factor for anxiety. In contrast, age and classroom-based schooling were the significant risk factors for depression among the participated mothers.

While many studies have been conducted to assess the impact of the pandemic on the general population [28] and the impacts of the lockdown on the relationship between children and parents and their wellbeing [29-32], data on the psychological impact of the COVID-19 lockdown on mothers with school-aged children is limited, which make comparing our results difficult. The lockdown followed the ongoing pandemic might be creating traumatic environment for mothers, who are highly anxious about the health of their family members, the isolation of their children from peers and teachers, as well as their daily commitments & management of homeschooling [33,34].

Previous research has shown that the restrictions related with quarantine affect the health of adults [35, 36], which is consistent with the current study findings. Furthermore, another COVID-19-related stressors, such as the parent’s relationship with their child’s academics, were linked to higher felt stress in parents with children under the age of 18 in United States [2]. As a result, our findings add to the current body of evidence that the epidemic have an adverse impact on the mental health of mothers [37,38], particularly those who live with children.

A recently published study in Germany showed that 50% of the participated parents reported being anxious by social isolation, schools’ closure, and child care facilities. Moreover, 9.7% of parents have high anxiety symptoms, and 12.3% are depressed [10]. Such anxiety and depression prevalence is considered far lower than those reported in our study at 62% and 72.1%, respectively. Another study showed that handling children during online

schooling causes stress among 36.2% of the participated parents and that 94.9% of parents and 93.5% of students hope to return to the classroom [5]. This study is consistent with ours in that classroom-based schooling is the preferred one.

In a study that assessed the factors that contribute to psychological stress and its relation to virtual learning during the quarantine, it was found that the major cause leads to worsening of stress levels when there is limited time to submit homework [13]. Unfortunately, such a factor was not addressed in the current study. Even after multivariate regression, classroom-based schooling was the only factor that remained significantly associated with anxiety and depression in the current study. This could be explained by students gathering in classes and school during the COVID pandemic increase the risk of infection.

One study conducted in Turkey explored the connection between the time children spend on screen and parenting practices during a pandemic. They found that the time children spend on-screen increased during a pandemic, and parents' attitudes positively linked with time spent on screen by their kids [16]. However, we found in our research that 43.6% of mothers spend 1-3 hours with the child on the screen during online schooling, and 59.4% do not have any conflict with the time of homeschooling.

One of the ways of overcoming such serious time of distress is that the children and their parents are wholly supported by the healthcare practitioners as well as academic settings. Even though, social isolation & quarantine are effective pandemic management strategies, these events could have long-term effects on health of people. On the other hand, the public institutions as well as media tend to emphasize on physical health for the reason to suggest containment and prevention steps of disease, hence leaving the effect on the mental health of people unaddressed. Undeniably, one could combat the novel pandemic as well as restore the post-pandemic society through improving the mental health; there is a dire need of monitoring the well-being of children and parents, due to the fact that the issues on this site may have enduring effects.

According to a recent survey, 36 percent of mothers of children who learnt online had a tough time assisting their children with Internet as well as technology for online instruction, in comparison to only 21 percent of fathers [39]. The current study showed that most of the participated mothers are either very skillful or skillful

in using computers or iPad. Despite that this previous study [39] showed that fathers are more skillful in using such technologies, the rate of their help during their children's online schooling is very low.

There is an immense need of addressing some limitations of the current research. Firstly, this cross-sectional design study investigates only the association and not the temporal causality between variables. A long-term study of the impact of quarantine and subsequent effects on mothers and children would aid in a better understanding of the phenomena.

Conclusion

Depression and anxiety were highly prevalent among mothers with children in homeschooling during the COVID-19 pandemic. Class room-based schooling was the only significant risk factor for anxiety and depression. At the same time, old age was a significant protective factor from depression among the participated mothers. This study highlights the recognition of the importance of mental health screening among women who have children studying online.

Recommendation

Measures need to be implemented to decrease the prevalence of depression and anxiety among mothers who take care of their children during online learning, such as decreasing the number of mothers' working hours and asking the father to support the mother and helping them during educational processes. This study can be used as a tool to develop training programs for both health care workers and women on the importance of mental health and the importance of virtual learning on it. Also, this study indicates the need for further research into the actual quantitative magnitude of online learning on mental health among individuals.

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