

Emotional and Behavioral Problems among Egyptian Children and Adolescents During COVID-19 Lockdown

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Submission Date: 12-04-2021

Revision Date: 14-05-2021

Acceptance Date: 15-05-2021

Abstract

Background: Children and adolescents are vulnerable to mental health problems, which may be triggered by the effects of COVID-19 pandemic that enforced restrictions on daily living. **Objectives:** This study aims to determine the risk of emotional/behavioral problems among children and their associations with stressors and positive changes during the COVID-19 lockdown period. **Methods:** A cross-sectional study using an online survey was carried out in four Egyptian governorates from 20th July to 10th August 2020. The Strength and Difficulties Questionnaire (SDQ) was used to collect data from parents of children aging 4-17 years about the risk of having symptoms of emotional/behavioral problems among their children during the last 6 months. **Results:** Findings revealed that among 632 studied children, 274 (43.4%) were at risk of having emotional/behavioral problems (abnormal total difficulties score). Emotional symptoms and conduct problems were the most common problems (found in 39.1% and 39.4% respectively) followed by peer problems, hyperactivity, and prosocial behavior problems. High risk of emotional/behavioral problems was significantly associated with child age < 12 years, male gender, history of emotional or neurodevelopmental disorder, lack of online school learning, low father educational level, missing family/child occasions, being angry/afraid of infection, reduced family closeness, and lack of gratefulness for what they have. **Conclusion:** Children and adolescents face a high risk of emotional/behavioral problems during the COVID-19 lockdown. Parents can support their children's socioemotional well-being during lockdown periods by increasing closeness with family members, keeping connections with relatives/friends, sharing facts to minimize anger/fear, and engaging in home-schooling.

Keywords: *behavioral problems, children and adolescents, COVID-19, Strength and Difficulties questionnaire, Egypt*

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Introduction

The rapid spread of COVID-19 infection has triggered a worldwide public health emergency. At the time, we are writing in April 2021, more than 135 million people

have been infected around the globe and about 3 million people have died.¹ Meanwhile, the fight against the COVID-19 pandemic has continued to stop the

spread of infection and mitigate its consequences.

Generally, measures of hygiene and physical distancing are used in most countries to slow down the infection and flattening the curve to avoid the collapse of health care systems. These measures had included the closure of most businesses, schools, and universities, travel restrictions, impeding routine medical care, home confinement, and even enforced curfews.² Consequently, the current COVID-19 pandemic and related public health measures have led to major disruptions to families' lives, with different psychosocial pressures for children, young people, and their families over time.

Among the indirect effect of COVID-19 crisis is the increased risk of mental health problems among children and adolescents who are particularly vulnerable to emotional disturbances.³ Evidence from previous epidemics like Severe Acute Respiratory Syndrome (SARS) showed that the associated restrictions had negative consequences for the mental health of children and young people.^{4, 5} Shift to home-schooling and staying at home for long periods can lead to reduced physical activity, longer screen time, irregular sleep patterns, less favorable diets, and weight gain.⁶ Moreover, children are experiencing prolonged physical and social isolation from their peers, teachers, extended family, and social networks. Recent psychological research showed that social isolation can trigger several complications including emotional disturbances, sleep disorders, depressive syndromes, anxiety, stress, and burnout.⁷⁻⁹

Understanding the impact of COVID-19 pandemic on children's psychology has become a research priority and fundamental goal to effective action towards tailoring of response measures and

containing the spread of children's mental health problems. Population-level data about the risk and protective factors of COVID-19-related emotional/behavioral problems would help guide preventive actions and offer proper psychological support to mitigate the associated drawbacks of the pandemic on children's mental health.¹⁰ The aim of this study was to evaluate the risk of emotional/behavioral problems among Egyptian children and adolescents during the COVID-19 lockdown period and determine the effects of the associated stressors and positive changes of the crisis on children's mental health.

Methods

A cross-sectional, web-based online survey study was conducted in four Egyptian governorates; Minia, Beni-Suef, Cairo, and Giza which are among the large governorates with high population densities.

The survey was targeting parents of children aged 4-17 years to determine the risk of emotional/behavioral problems among Egyptian children during COVID-19 pandemic lockdown period (last six months). A sample size of 503 children was required to provide 95% statistical power at 5% significance level for logistic regression to detect a moderate effect size of 1.5 for a two-tailed test using G*Power 3.1 program (Faul et al. 2007).¹¹ We considered the previous prevalence of emotional and behavioral symptoms among 6-12 years old children as reported by parents in Egypt (20.6%) by Abd Elhamid et al. 2009. Finally, a total of 632 parental responses (91.3% from mothers and 8.7% from fathers) were collected and included in the analysis.

Data collection: A well-developed questionnaire was prepared and presented in an electronic Arabic form to be

Table 1. Characteristics of the studied children and adolescents and relationships with the total difficulties scores

Characteristics of children	Total n= 632 N (%)	Total difficulties N (%)			P-value
		Normal n= 274	Borderline n= 84	Abnormal n= 274	
Age (mean \pm SD)	8.12 \pm 3.34	8.70 \pm 3.67	7.15 \pm 2.57	7.85 \pm 3.10	<0.001
Preschool (4-5 years)	161 (25.5)	67 (24.5)	25 (29.8)	69 (25.2)	
Primary (6-11 years)	360 (57)	136 (49.6)	52 (61.9)	172 (62.8)	
Preparatory (12-14 years)	75 (11.8)	47 (17.2)	6 (7.1)	22 (8)	<0.001
Secondary (15-17 years)	36 (5.7)	24 (8.8)	1 (1.2)	11 (4)	
Sex					
Male	338 (53.5)	121 (44.2)	56 (66.7)	161 (58.8)	
Female	294 (46.5)	153 (55.8)	28 (33.3)	113 (41.2)	<0.001
Order					
First	406 (64.2)	158 (57.7)	61 (72.6)	187 (68.2)	
Second	121 (19.1)	67 (24.5)	11 (13.1)	43 (15.7)	0.023
Third or more	105 (16.6)	49 (17.9)	12 (14.3)	44 (16.1)	
Number of brothers/sisters					
No other	52 (8.2)	18 (6.6)	11 (13.1)	23 (8.4)	
One	283 (44.8)	128 (46.7)	38 (45.2)	117 (42.7)	0.335
Two or more	297 (47)	128 (46.7)	35 (41.7)	134 (48.9)	
Medical history					
No	569 (90)	265 (96.6)	74 (88)	230 (83.9)	
Chronic disease/disability	14 (2.2)	4 (1.5)	2 (2.4)	8 (2.9)	
Emotional/mental problem	23 (3.6)	4 (1.5)	3 (3.6)	16 (5.8)	<0.001
Neurodevelopmental disorder	26 (4.2)	1 (0.4)	5 (6)	20 (7.3)	
Frequency of outdoor activities					
Never/Rarely	474 (75)	210 (76.6)	65 (77.4)	199 (72.6)	
2/3 times per week	122 (19.3)	49 (17.9)	15 (17.9)	58 (21.2)	0.824
A lot of the time/daily	36 (5.7)	15 (5.5)	4 (4.8)	17 (6.2)	
Frequent indoor activities					
Online school learning					
No	299 (47.3)	110 (40.1)	38 (45.2)	151 (55.1)	
Yes	333 (52.7)	164 (59.9)	46 (54.8)	123 (44.9)	0.002
Exercise Games					
Most of the time	59 (9.3)	21 (7.7)	11 (13.1)	27 (9.9)	
Sometimes	332 (52.5)	155 (56.6)	51 (60.7)	126 (46)	0.014
Rarely/never	241 (38.2)	98 (35.7)	22 (26.2)	121 (44.1)	
Watching TV/electronic games					
Most of the time	483 (76.5)	202 (73.7)	63 (75)	218 (79.6)	
Sometimes	126 (19.9)	65 (23.7)	16 (19)	45 (16.4)	0.161
Rarely/never	23 (3.6)	7 (2.6)	5 (6)	11 (4)	
Reading, drawing, etc					
Most of the time	69 (10.9)	33 (12)	8 (9.5)	28 (10.2)	
Sometimes	363 (57.4)	170 (62)	57 (67.9)	136 (49.6)	0.002
Rarely/never	200 (31.7)	71 (26)	19 (22.6)	110 (40.2)	
Use of social media					
Most of the time	269 (42.6)	106 (38.6)	34 (40.5)	129 (47.1)	
Sometimes	164 (25.9)	81 (29.6)	23 (27.4)	60 (21.9)	0.233
Rarely/never	199 (31.5)	87 (31.8)	27 (32.1)	85 (31)	

administered on the Google online survey platform from July, 20th to August, 10th, 2020. The survey was uploaded and shared

through social media networks (Facebook, WhatsApp, and Telegram) to be completed by mothers, fathers, or caregivers of

Table 2. Characteristics of the studied families and relationships to the children's total difficulties

Characteristics of the families	Total n=632 N (%)	Total difficulties N (%)			p-value
		Normal n= 274	Borderline n= 84	Abnormal n= 274	
Mother age (Mean ±SD)	35.08±5.05	36.16±5.33	34.05±4.36	34.31±4.77	<0.001
20-39 years	506 (80)	202 (73.7)	72 (85.7)	232 (84.7)	
≥ 40 years	126 (20)	72 (26.3)	12 (14.3)	42 (15.3)	0.002
Mother education					
Primary/secondary	49 (7.8)	15 (5.5)	4 (4.8)	30 (10.9)	
University & above	583 (92.2)	259 (94.5)	80 (95.2)	244 (89.1)	0.031
Mother occupation					
Non-worker	165 (26.1)	64 (23.4)	16 (19)	85 (31)	
Clerk/business	80 (12.7)	35 (12.8)	9 (14.3)	30 (12)	0.151
Professional	387 (61.2)	175 (63.8)	56 (66.7)	156 (56.9)	
Father age (Mean ±SD)	38.99±5.94	40.08±6.43	38.12±4.74	38.17±5.59	<0.001
20-39 years	377 (59.7)	141 (51.5)	55 (65.5)	181 (66.1)	
≥ 40 years	217 (40.3)	133 (48.5)	29 (34.5)	93 (33.9)	0.001
Father education					
Primary/secondary	41 (6.5)	11 (4)	2 (2.4)	28 (10.2)	
University & above	591 (93.5)	263 (96)	82 (97.6)	246 (89.8)	0.003
Father occupation					
Non-worker	16 (2.5)	7 (2.6)	0 (0)	9 (3.3)	
Clerk/business	174 (17.8)	72 (26.4)	21 (25)	81 (29.8)	0.367
Professional	439 (69.8)	194 (71)	63 (75)	182 (66.9)	
Residence					
Urban	572 (90.5)	250 (91.2)	77 (91.7)	245 (89.4)	
Rural	60 (9.5)	24 (8.8)	7 (8.3)	29 (10.6)	0.711
Family status					
Married	613 (97)	268 (97.8)	82 (97.6)	263 (97.8)	
Divorced/Widow	19 (3)	6 (2.2)	2 (2.4)	11 (2.2)	0.429
Family income					
Not enough	73 (11.6)	32 (11.7)	6 (7.2)	35 (12.8)	
Routine expenses	269 (42.6)	109 (39.8)	38 (45.2)	122 (44.5)	0.442
Able to save	290 (45.8)	133 (48.5)	40 (47.6)	117 (42.7)	
Crowding (person per room)	1.47±0.52	1.49±0.55	1.42±0.53	1.47±0.49	0.574
Socioeconomic level					
Low/Middle	14 (2.2)	5 (1.8)	0 (0)	9 (3.3)	
High	618 (97.8)	269 (98.2)	84 (100)	265 (96.7)	0.170

study. The responding parent were asked to submit a separate questionnaire for every child aged 4-17 years. The online survey was developed and structured in five parts: (1) Demographic data and medical history of the child: including age, sex, order of birth, number of brothers/sisters, and history of chronic disease/disability or neurodevelopmental disorders (i.e. autism, attention-deficit/hyperactivity disorder, mental retardation,etc.).

(2) Socioeconomic level of the family was assessed by Fahmy and El-Sherbini scale¹² based on the education and job of the parents, crowding index (person/room), family income, and housing condition. (3) Types of indoor and frequency of outdoor activities of the child during COVID-19 crisis: Questions about children's indoor activities during the COVID-19 lockdown period were included such as exercise games, watching TV/electronic games,

Table 3. COVID-19 pandemic related stressors and positive changes reported by the Egyptian families and their relationships with the children's total difficulties

Stressors during COVID-19 pandemic	Total n= 632 N (%)	Total difficulties N (%)			P-value
		Normal n= 274	Borderline n= 84	Abnormal n= 274	
Front-line worker parent in COVID-19 crisis					
No	361 (57.1)	152 (55.5)	47 (56)	162 (59.1)	0.671
Yes	271 (42.9)	122 (44.5)	37 (44)	112 (40.9)	
Parent/relative/friend diagnosed with COVID-19					
No	455 (72)	208 (75.9)	62 (73.8)	185 (67.5)	0.084
Yes	177 (28)	66 (24.1)	22 (26.2)	89 (32.5)	
Parent/relative/friend dead of COVID-19					
No	601 (95.1)	262 (95.6)	79 (94)	260 (94.9)	0.825
Yes	31 (4.9)	12 (4.4)	5 (6)	14 (5.1)	
Discrimination/stigma due to COVID-19					
No	612 (96.8)	265 (96.7)	83 (98.8)	264 (96.4)	0.524
Yes	20 (3.2)	9 (3.3)	1 (1.2)	10 (3.6)	
Financial problems due to COVID-19 pandemic					
No	509 (80.5)	226 (82.5)	69 (82.1)	214 (78.1)	0.399
Yes	123 (19.5)	48 (17.5)	15 (17.9)	60 (21.9)	
Missing important family/child occasions					
No	232 (36.7)	120 (43.8)	28 (33.3)	84 (30.7)	0.005
Yes	400 (63.3)	154 (56.2)	56 (66.7)	190 (69.3)	
Child angry/afraid of COVID-19 infection					
Not at all	47 (7.4)	24 (51.1)	6 (12.8)	17 (36.1)	0.002
Little	250 (39.6)	129 (51.6)	24 (9.6)	97(38.8)	
Very much	335 (53)	121 (36.1)	54 (16.1)	160 (47.8)	
Positive changes during COVID-19 pandemic					
Increased closeness amongst family Members					
No	133 (21)	37 (13.5)	17 (20.2)	79 (28.8)	<0.001
To some extent	238 (37.7)	93 (33.9)	37 (44)	108 (39.4)	
Yes	261 (41.3)	144 (52.6)	30 (35.8)	87 (31.8)	
Increased connection with families/friends					
No	234 (37.1)	87 (31.8)	36 (42.9)	111 (40.7)	0.005
To some extent	253 (40.1)	105 (38.3)	33 (39.2)	115 (42.1)	
Yes	144 (22.8)	82 (29.9)	15 (17.9)	47 (17.2)	
Increased gratefulness for what family has					
No	54 (8.5)	15 (5.5)	9 (10.7)	30 (10.9)	0.001
To some extent	224 (35.5)	81 (29.5)	29 (34.5)	114 (41.6)	
Yes	354 (56)	178 (65)	46 (54.8)	130 (47.5)	

online learning.... etc.). (4) The Strengths and Difficulties Questionnaire (SDQ).¹³ The parent-report Arabic version form of SDQ (www.sdqinfo.org), validated by Alyahri & Goodman 2006¹⁴, was used to assess the emotional/behavioral problems among children aged 4-17 years. SDQ is a brief well-validated behavioral screening tool including 25 items measured on a 3-point Likert scale; 'Not True' is scored as

0, 'Somewhat true' is scored as 1 and 'Certainly True' is scored as 2 except in five items in which reverse scoring was required. The scale includes 5 subscales of 5 items each, namely emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behaviors. The score of each subscale ranged from 0-10 if all items were completed. The first four subscales (i.e., except prosocial behavior)

Table 4. Distribution of emotional/behavioral problems among the studied Egyptian children and adolescents during COVID-19 pandemic

SDQ Subscales	Total	Normal	Borderline	Abnormal
	no=632 Mean ± SD	range N (%)	range N (%)	Range N (%)
Total difficulties	15.14±6.44	0-13 274 (43.4)	14-16 84 (13.3)	17-40 274 (43.4)
Emotional symptoms scale	3.95±2.46	0-3 289 (45.7)	4 96 (15.2)	5-10 247 (39.1)
Conduct problems scale	3.14±1.97	0-2 265 (41.9)	3 118 (18.7)	4-10 249 (39.4)
Hyperactivity scale	5.03±2.56	0-5 358 (56.6)	6 83 (13.1)	7-10 191 (30.2)
Peer problems scale	3.02±1.80	0-2 263 (41.6)	3 140 (22.2)	4-10 229 (36.2)
Prosocial behavior scale	6.65±2.25	6-10 450 (71.2)	5 70 (11.1)	0-4 112 (17.7)

yield a total difficulties score (0-40). The SDQ scores were classified based on the original validation work in the United Kingdom into three-band categorization; normal, borderline, and abnormal, which were mentioned in table 4. These bandings were defined based on a population-based UK survey, attempting to choose cut points such that 80% of children scored 'normal', 10% 'borderline', and 10% 'abnormal'. (5) Stressors and positive changes of COVID-19 pandemic on the family: Considering studies about the impacts of similar previous health-related disasters, we identified important considerations to the family, both positive and negative, that may affect the children mental health. Stressors on the family included missing important family/child occasions, child angry/afraid of COVID-19 infection, one or both parents were a front-line worker during COVID-19 crisis, parent/relative/friend diagnosed or died of COVID-19, discrimination/stigma due to COVID-19 infection and financial problems due to COVID-19 pandemic. While, positive changes included increased closeness among family members, increased connection with other families/friends, and

increased gratefulness and appreciation for what the family has.

Statistical analyses: Data analysis was carried out using the IBM SPSS 25.0 statistical package software. The SDQ and its subscales showed high internal consistency (Cronbach's alpha value > 0.70). The Chi-square test was used to compare proportions. Analysis of variance (ANOVA) was used for comparison between independent groups for parametric data. Multivariate binary logistic regression was used to detect the predictors of emotional/behavioral problems among the studied children in which the total difficulties score and the five subscales of SDQ were classified into "abnormal" or "not abnormal" (i.e., borderline and normal combined). Statistical significance was set at *P*-value <0.05 throughout all analyses.

Ethical consideration

The study was approved by the Ethics Committee of the Faculty of Medicine, Minia University. At the beginning of the survey, each participant received an explanation about the study aim and confirmation for the confidentiality of data which will be used only for research

Table 5. Significant predictors of the total difficulties and mental health problems among the studied Egyptian children and adolescents during COVID-19 pandemic

	Total difficulties	Emotional symptoms	Conduct Problems	Hyperactivity	Peer Problems	Prosocial Behavior
Child age (≥ 12 years)	0.48 (0.29-0.79) 0.003	0.55 (0.34-0.88) 0.012	0.46 (0.28-0.75) 0.002	0.54 (0.30-0.96) 0.038		
Child gender (Male)	1.45 (1.03-2.03) 0.035			2.40 (1.66-3.46) <0.0001		1.91 (1.22-2.97) 0.004
Child order (First)						1.71 (1.05-2.76) 0.032
History of emotional or Neurodevelopmental disorder	3.46 (1.74-6.87) <0.0001	2.28 (1.23-4.24) 0.009	1.95 (1.05-3.62) 0.030		2.72 (1.47-5.02) 0.001	2.06(1.05-4.05) 0.036
Online school learning	0.64 (0.45-0.90) 0.010				0.68 (0.48-0.95) 0.026	
Frequent use of social Media			1.65 (1.17-2.34) 0.005	1.90 (1.31-2.75) 0.001		1.76 (1.14-2.71) 0.010
Mother age (≥ 40 years)				0.50 (0.29-0.86) 0.012		
Mother education University &above					0.48 (0.26-0.88) 0.018	
Father education University &above	0.32 (0.15-0.68) 0.002	0.43 (0.22-0.84) 0.014	0.48 (0.24-0.95) 0.036			
Front-line worker parent during COVID-19						1.70 (1.10-2.62) 0.017
Discrimination/stigma						3.53 (1.34-9.34) 0.011
Missing family/child occasion	1.55 (1.09-2.23) 0.016		1.50 (1.05-2.14) 0.027		1.61 (1.12-2.31) 0.010	
Child angry/afraid of infection	1.44 (1.02-2.04) 0.036	1.93 (1.38-2.69) 0.004			1.42 (1.02-2.01) 0.040	
Increased family closeness	0.61 (0.43-0.88) 0.008	0.65 (0.46-0.91) 0.013	0.66 (0.45-0.97) 0.033			0.51 (0.32-0.82) 0.005
Increased connection with families/friends			0.61 (0.38-0.98) 0.043	0.49 (0.31-0.78) 0.003		
Increased gratefulness for what family has	0.67 (0.47-0.95) 0.026		0.67 (0.47-0.95) 0.026		0.59 (0.42-0.83) 0.002	

The data were presented as adjusted OR (95%CI), p-value

purposes. Participants had to provide approval (Electronic informed consent) to participate in the study before they start to complete the survey. In addition, confidentiality and anonymity of the participating parents were strictly maintained through a code number on the questionnaire without asking for any identity, phones, or e-mail addresses.

Results

The mean age of the 632 studied children and adolescents was 8.12 ± 3.34 years. More than half (57%) of children were in primary school (6-11 years old), 53.5% were males, and 10% were previously suffering from health problems. Abnormal total difficulties scores were detected in 274 (43.4%) of the studied children and adolescents distributed per age stages as 69 (42.9%) preschool, 172 (47.8%) primary school, 22 (29.3%) preparatory school, and 11 (30.6%) secondary school children (Table 1).

Table 2 showed that the majority of the respondent mothers and fathers were in their twenties and thirties (80.1% and 57.9%, respectively) and has high education (92.2% and 93.5%, respectively). The total difficulties among children were significantly associated with age and education of both mother and father. The stressors and positive changes of COVID-19 pandemic affecting the studied families and relationships to the total difficulties were presented in Table 3. The risk of mental health affection is significantly higher if the family miss important family/child occasions, or the child feels very much angry/afraid of COVID-19 infection. On the other hand, positive changes such as increased closeness among family members, increased connection with other families/friends, and increased gratefulness for what the family has, were significantly associated with a lower risk of emotional/behavioral problems.

Table 4 revealed that emotional and conduct problems were the most common mental health problems, found in 39.1% and 39.4%, respectively, followed by peer problems (36.2%), hyperactivity (30.2%), and prosocial problems (17.7%). Multivariate analysis showed that abnormal total difficulties and emotional symptoms were independently associated with the child age (<12 years), history of emotional or neurodevelopmental disorder, low father's education, being angry or afraid of COVID-19 infection, and absence of family closeness. Besides, the risk of abnormal total difficulties increases in the male gender, lack of online school learning, missing family/child occasions, and lack of gratefulness for what they have. While hyperactivity was associated with the child age (<12 years), being a male, frequent use of social media, young mothers (< 40 years), and lack of

connection with other families/friends. The significant predictors of prosocial problems were male gender, being the first child, history of emotional or neurodevelopmental disorder, having a front-line worker parent during COVID-19, discrimination/stigma due to COVID-19 affection, frequent use of social media, and lack of family closeness (Table 5).

Discussion

The current study revealed a high rate of children and adolescents (43.4%) who were at risk for having mental health problems during the period of COVID-19 pandemic and lockdown as they fall under the abnormal total difficulties score category on SDQ. While previous research using the SDQ among children and adolescents in other countries like Germany, USA, and Pakistan have shown impaired psychopathology in about 10-15%.¹⁵⁻¹⁷ The higher rate of emotional/behavioral problems in the present study may refer to the negative effects of the current COVID-19 crisis and lockdown measures on children's psychology.

Regarding preschool and primary school children, the current study showed that 42.9 % and 47.8 % were at risk to develop emotional/behavioral problems, respectively. These rates were almost double the rates that have been reported by previous studies in among preschool children such as Minatoya et al. 2017¹⁸ in Japan who reported 20.4% and Santos et al. 2016¹⁹ in Brazil who disclosed 23.5% as the prevalence of overall behavior problems among preschool children. Moreover, Abd Elhamid et al. 2009²⁰ found that 20.6% of children aged 6-12 years were at risk of mental health problems in Egypt. On the other side, the prevalence of emotional/behavioral problems among adolescents was

approximately 30% in our study while previous research revealed a wide variation in the prevalence rates among Egyptian adolescents ranged from 18.5% by Mowafy et al. 2015²¹ to 45 % by Osman et al. 2019.²² The age prevalence estimations of behavioral problems during childhood and adolescence are variable and difficult to compare worldwide. This may be due to social, cultural, and economic diversity among different countries and the use of different methodological approaches to estimate. However, generally higher rates in the current study support the possible negative impact of COVID-19 pandemic and its associated lockdown measures on childhood mental health.

In the current study multivariate analysis, adolescents (≥ 12 years) had a lower risk of abnormal total difficulties, emotional, conduct, and hyperactivity problems than preschool and primary school children. This finding supports the results of COVID-19 Supporting Parents, Adolescents and Children in Epidemics (Co-SPACE) project which had started recently in UK to track the mental health of school-aged children (4-16 years) throughout COVID-19 crisis.²³ They stated that parents/care-providers of primary school children report an increase in their child's emotional, behavioral, and restless/attentional difficulties over a one-month period in COVID-19 lockdown while secondary school-age children report a reduction in their emotional difficulties, but an increase in restless/attentional behaviors. They also found higher levels of COVID-19-related worries and fears among younger children (4-10 years) than older children (11-16 years).^{9,23} Other precedent studies also found that adolescents in the 8th grade at a junior high school in Indonesia experienced normal rates of emotional/behavioral problems²⁴ and Saudi's students aged 6-

11 years had a higher risk of mental health problems than those aged 12-16 years.²⁵

This difference between age groups could be influenced by emotional and communication problems between parents and children. Also, adolescents' ability to control their emotions and a better understanding of actions that were agreed upon by families can prevent them from demonstrating negative behavior when they experience problems and pressure.²⁶

Like previous studies that reported that being a male was related to high scores on most mental health problems,^{20, 27, 28} the present study showed that males had a significantly higher risk of total difficulties, hyperactivity, and prosocial problems than females. On the contrary, other studies reported that female adolescents had a higher risk of emotional and prosocial behavior problems than males, while males have higher rates of conduct problems.^{22, 25} This discrepancy between studies may be affected by the characteristics of different age groups. Adolescent girls are more emotionally labile than boy peers while preschool male children may be more active and undisciplined than their female peers. Moreover, familial relationships and parental attitudes that differ according to the child gender may also play a role that should be examined in future studies.

Children and adolescents with existing mental health problems are important high-risk groups for emotional/behavioral problems during COVID-19 crisis and several studies including the current one supported this finding.²⁹⁻³¹ However, parents/care-providers of children with special educational needs and those with a pre-existing mental problem report a reduction in their child's emotional difficulties and no change in behavioral or restless/attentional difficulties in the Co-SPACE study²³ Our finding was explained

by COVID-19 crisis-associated stress and home confinement, as well as lack or delay in access to psychiatric health services which can be particularly detrimental and worsen the severity and outcome of mental disorders.²⁹

Concerning the indoor activities that children mostly perform during COVID-19 home confinement, the present study found that children who were engaged in online school learning programs had a lower risk of emotional/behavioral problems specifically peer problems. While children with frequent use of social media were more likely to have conduct problems, hyperactivity, and prosocial problems. The school has an important role in the child's life and online school programs not only deliver educational material and encourage physical activities, appropriate diet, and good sleep habits but also offer an opportunity for students to interact with teachers and classmates and obtain psychological counseling which can affect their mental health positively.⁶

Despite the negative effect of low socioeconomic level^{27,32,33} and overcrowded house³⁴ on children mental health that has been proved in several studies, they did not significantly affect the risk of emotional/behavioral problems in the present study. However, father education was associated with total difficulties, emotional and conduct problems and mother education affected peer problems. Several studies had reported that low parent education^{20,27} and specifically maternal education^{17, 18} were associated with higher risk to emotional/behavioral problems among children which may be attributed to the impact of parent education on the lifestyle of child development and the ability to provide a healthier environment at home³⁵ which, therefore, affect the child mental health.

Among the beneficial consequences of the current COVID-19 crisis is the increased closeness with family members and increased gratefulness for what the family has which were significantly associated with a lower risk of abnormal total difficulties. While the increased connection with other families/friends was associated with a lower risk of conduct problems and hyperactivity. These results support the previous literature that family and community social capital such as good family climate and neighborhood and social support coincides with reduced occurrence of mental health problems among children and adolescents.^{36, 37}

On the other side, pandemic-related stressors like having a front-line working parent during COVID-19 pandemic and stigma/discrimination experienced due to the disease were associated with a higher risk of prosocial behavior problems among the studied children. Furthermore, missing child/family social occasions due to COVID-19 lockdown was associated with higher risk of total difficulties, conduct, and peer problems. Children who were angry/afraid of COVID-19 infection were more likely to have emotional and peer problems which was consistent with previous findings.³⁷ Psychological studies had shown that social isolation and loneliness could trigger several complications in previously healthy children including emotional disturbances, sleep disorders, depression, anxiety, and stress especially in the absence of positive social relationships which are fundamental to promoting socioemotional wellbeing.^{7, 9} The study results emphasize that parenting programs targeted to the prevention of childhood mental health problems and support of school-based educational programs can assist to mitigate the associated drawbacks of the pandemic on children's mental health.¹⁰

This study is the first one that has investigated the risk of emotional/behavioral problems and its possible determinants among children and adolescents during the COVID-19 pandemic in Egypt and Arab countries. The strengths of this study included the use of a standardized SDQ questionnaire which allows comparisons with results from other countries and cultures. The use of an online survey decreased the possibility of interviewer bias, also most responses were reported from the mothers who are knowledgeable about other aspects of the child's life, including sociodemographic characteristics, diagnosed mental/developmental conditions, and educational and behavioral attitudes. Moreover, a previous study supports the use of SDQ for online data collection having a high internal consistency and a five-factor model with excellent fit.³⁸ On the other hand, some limitations of the study should be considered. The cross-sectional design did not allow the identification of causality between emotional/behavioral problems and the risk factors. Also, the reliance on parents as the only source of information about a child's emotional problems is another limitation as greater validity and reliability of estimates based on reports from multiple informants. Furthermore, SDQ is not a clinical assessment and may not be appropriate to diagnose disorders in individual children, but at a population level the prevalence of emotional disorders is likely to be accurate.³⁸

Conclusion

In conclusion, this study sheds light on the high risk of emotional/behavioral problems that children and adolescents might face during COVID-19 lockdown and emphasizes that the associated stressors and positive changes of the crisis can have

important effects on children's mental health. Parents can support their children's socioemotional wellbeing and help them to develop appropriate coping behaviors during COVID-19 crisis by supporting home-schooling, engaging in-home activities such as reading/drawing and online learning courses, explaining the situation, and sharing facts to minimize fears and anger, strengthening intra-family relationships, keeping connections with relatives/friends and protecting against discrimination.

References

1. Johns Hopkins University & Medicine. Coronavirus resource center. COVID-19 dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) [internet]. Available from: <https://coronavirus.jhu.edu/map.html>.
2. Witt A, Ordonez A, Martin A, Vitiello B, Fegert JM. Child and adolescent mental health service provision and research during the Covid-19 pandemic: challenges, opportunities, and a call for submissions. *Child and Adolescent Psychiatry and Mental Health*. 2020;14:19. doi:10.1186/s13034-020-00324-8.
3. Chanchlani N, Buchanan F, Gill PJ. Addressing the indirect effects of COVID-19 on the health of children and young people. *Can Med Assoc J*. 2020;192(32):E921-7. doi:10.1503/cmaj.201008.
4. Tsang HWH, Scudds RJ, Chan EYL. Psychosocial Impact of SARS. *Emerg Infect Dis*. 2004;10(7):1326-7. doi:10.3201/eid1007.040090.
5. Sprang G, Silman M. Posttraumatic stress disorder in parents and youth after health-related disasters. *Disaster Med Public Health Prep*. 2013;7(1):105-10. doi:10.1017/dmp.2013.22.
6. Wang G, Zhang Y, Zhao J, Zhang J, Jiang F. Mitigate the effects of home confinement on children during the COVID-19 outbreak. *The Lancet*. 2020;395(10228):945-7. doi:10.1016/S0140-6736(20)30547-X.

7. Mushtaq R, Shoib S, Shah T, Mushtaq S. Relationship between loneliness, psychiatric disorders and physical health ? A review on the psychological aspects of loneliness. *Journal of clinical and diagnostic research*. 2014;8(9):WE01-4. doi:10.7860/JCDR/2014/10077.4828.
8. Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspect Psychol Sci*. 2015;10(2):227-37. doi:10.1177/1745691614568352.
9. Loades ME, Chatburn E, Higson-Sweeney N, Reynolds S, Shafran R, Brigden A, et al. Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. *J Am Acad Child Adolesc Psychiatry*. 2020;59(11):1218-39 e3. doi:10.1016/j.jaac.2020.05.009.
10. Carbone SR. Flattening the curve of mental ill-health: the importance of primary prevention in managing the mental health impacts of COVID-19. *Mental Health & Prevention*. 2020;19:200185. doi:10.1016/j.mh.2020.200185.
11. Faul F, Erdfelder E, Lang AG, Buchner A. G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*. 2007;39(2):175-91. doi:10.3758/bf03193146.
12. Fahmy S. Determining simple parameters for social classifications for health research. *The Bulletin of the High Institute of Public Health*. 1983;13:95-108.
13. Goodman R. The Strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psychiatry*. 1997;38(5):581-6. doi:10.1111/j.1469-7610.1997.tb01545.x.
14. Alyahri A, Goodman R. Validation of the Arabic Strengths and Difficulties Questionnaire and the Development and Well-Being Assessment. *Eastern Mediterranean Health Journal*. 2006;12 Suppl 2:S138-46. doi:12_S2/12_S2_2006_138_146.pdf.
15. Ravens-Sieberer U, Wille N, Erhart M, Bettge S, Wittchen HU, Rothenberger A, et al. Prevalence of mental health problems among children and adolescents in Germany: results of the BELLA study within the National Health Interview and Examination Survey. *Eur Child Adolesc Psychiatry*. 2008;17 Suppl 1(1):22-33. doi:10.1007/s00787-008-1003-2.
16. Costello EJ, Egger H, Angold A. 10-year research update review: the epidemiology of child and adolescent psychiatric disorders: I. Methods and public health burden. *J Am Acad Child Adolesc Psychiatry*. 2005;44(10):972-86. doi:10.1097/01.chi.0000172552.41596.6f.
17. Malik TA, Siddiqui S, Mahmood A. Behavioural and emotional problems among school children in Pakistan: A telephonic survey for prevalence and risk factors. *J Paediatr Child Health*. 2019;55(12):1414-23. doi:10.1111/jpc.14429.
18. Minatoya M, Itoh S, Araki A, Tamura N, Yamazaki K, Nishihara S, et al. Associated factors of behavioural problems in children at preschool age: the Hokkaido study on environment and children's health. *Child Care Health Dev*. 2017;43(3):385-92. doi:10.1111/cch.12424.
19. Santos LM, Queiros FC, Barreto ML, Santos DN. Prevalence of behavior problems and associated factors in preschool children from the city of Salvador, state of Bahia, Brazil. *Brazilian Journal of Psychiatry*. 2016;38(1):46-52. doi:10.1590/151644462014-1596.
20. Abd Elhamid A, Howe A, Reading R. Prevalence of emotional and behavioural problems among 6–12 year old children in Egypt. *Soc Psychiatry Psychiatr Epidemiol*. 2009;44(1):8-14. doi:10.1007/s00127-008-0394-1.
21. Mowafy M, Ahmed D, Halawa E, Emad El Din M. Prevalence and predictors of emotional and behavioral problems among rural school Egyptian adolescents. *The Egyptian Journal of Community Medicine*. 2015;33(1):79-92. doi:10.21608/ejcm.2015.717.
22. Osman SR, Khalaf SA, Omar MS, Ismail TA. Behavioral and Emotional Problems among Adolescent Students. *Journal of High Institute of Public Health*. 2019;49(2):82-9. doi:10.21608/jhiph.2019.49259.
23. Pearcey S, Shum A, Waite P, Patalay P, Creswell C. Covid-19: Supporting Parents, Adolescents and Children during Epidemics

- (Co-Space) study. Report 04: Changes in children and young people's emotional and behavioural difficulties through lockdown [internet]. Available from: <https://www.psy.ox.ac.uk/research/topic-research-group/supporting-parents-adolescents-and-children-during-epidemics>.
24. Aldam SFS, Keliat BA, Wardani IY, Sulistiowati NMD, Florensa MVA. Risk Factors of Mental Health in Adolescents: Emotional, Behavioral, Family, and Peer Relationship Problems. *Comprehensive Child and Adolescent Nursing*. 2019;42(sup1):284-90. doi:10.1080/24694193.2019.1594461.
25. El Keshky M, Alahmadi NA. An analysis of prevalence rates of Saudi's students with emotional and behavior problems and its effects of gender and age. *International Journal of Applied Psychology*. 2017;7(5):101-9. doi:10.5923/j.ijap.20170705.01.
26. Faridh R. Hubungan antara regulasi emosi dengan kecenderungan kenakalan remaja. Naskah publikasi. 2008.
27. Davis E, Sawyer MG, Lo SK, Priest N, Wake M. Socioeconomic risk factors for mental health problems in 4-5-year-old children: Australian population study. *Acad Pediatr*. 2010;10(1):41-7. doi:10.1016/j.acap.2009.08.007.
28. Kovess-Masfety V, Husky MM, Keyes K, Hamilton A, Pez O, Bitfoi A, et al. Comparing the prevalence of mental health problems in children 6–11 across Europe. *Soc Psychiatry Psychiatr Epidemiol*. 2016;51(8):1093-103. doi:10.1007/s00127-016-1253-0.
29. Fegert JM, Vitiello B, Plener PL, Clemens V. Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. *Child and Adolescent Psychiatry and Mental Health*. 2020;14:20. doi:10.1186/s13034-020-00329-3.
30. Jiao WY, Wang LN, Liu J, Fang SF, Jiao FY, Pettoello-Mantovani M, et al. Behavioral and emotional disorders in children during the COVID-19 epidemic. *J Pediatr*. 2020;221:264. doi:10.1016/j.jpeds.2020.03.013.
31. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*. 2020;395(10227):912-20. doi:10.1016/S0140-6736(20)30460-8.
32. Reiss F, Meyrose AK, Otto C, Lampert T, Klasen F, Ravens-Sieberer U. Socioeconomic status, stressful life situations and mental health problems in children and adolescents: Results of the German BELLA cohort-study. *PLoS One*. 2019;14(3):e0213700. doi:10.1371/journal.pone.0213700.
33. Bøe T, Serlachius AS, Sivertsen B, Petrie KJ, Hysing M. Cumulative effects of negative life events and family stress on children's mental health: the Bergen Child Study. *Soc Psychiatry Psychiatr Epidemiol*. 2018;53(1):1-9. doi:10.1007/s00127-017-1451-4.
34. Marsh R, Salika T, Crozier S, Robinson S, Cooper C, Godfrey K, et al. The association between crowding within households and behavioural problems in children: Longitudinal data from the Southampton Women's Survey. *Paediatr Perinat Epidemiol*. 2019;33(3):195-203. doi:10.1111/ppe.12550.
35. Carneiro P, Meghir C, Parey M. Maternal Education, Home Environments, and the Development of Children and Adolescents. *Journal of the European Economic Association*. 2013;11(suppl_1):123-60. doi:10.1111/j.1542-4774.2012.01096.x.
36. McPherson KE, Kerr S, McGee E, Morgan A, Cheater FM, McLean J, et al. The association between social capital and mental health and behavioural problems in children and adolescents: an integrative systematic review. *BMC psychology*. 2014;2(1):7. doi:10.1186/2050-7283-2-7.
37. Miranda DMD, Athanasio BdS, Oliveira ACS, Simes-e-Silva AC. How is COVID-19 pandemic impacting mental health of children and adolescents? *International Journal of Disaster Risk Reduction*. 2020;51:101845. doi:10.1016/j.ijdrr.2020.101845.
38. Bjornsdotter A, Enebrink P, Ghaderi A. Psychometric properties of online administered parental strengths and difficulties questionnaire (SDQ), and normative data based on combined online and paper-and-

pencil administration. Child and Adolescent
Psychiatry and Mental Health. 2013;7(1):40.

doi:10.1186/1753-2000-7-40.