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Remote Schooling During COVID-19 and Mental Soundness of Adolescents in Egypt

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The social isolation imposed by the pandemic of Coronavirus disease of 2019 (COVID-19) has a probable impact on the adolescents'mental milestones that are inextricably intertwined with socio-emotional experiences. The physical school attendance is not only for academic achievement but it offers a unique opportunity for an interactive peer relationship. Independency, resilience, self confidence, abstract thinking, problem solving are few examples of the countless moral gains of school attendance. This mental wellbeing is the first line of defense in stressful conditions against anxiety and depression. To disclose the imprint of school closure as a stressor exposing adolescents to anxiety and depression. Materials and methods: One hundred twenty six adolescents were enrolled in our study. Two validated Egyptian inventories were used to screen for anxiety and depression. Sixty three candidates (group1) were assessed before school closure in comparison to another sixty three of their matched peers (group2) after school closure. The scores of the physical, emotional, physiological and social aspects of anxiety were significantly different between the two groups with P-values of 0.021, 0.007, 0.031 and 0.007 respectively. In the assessment of depression, two items (self esteem and concentration ability) were mostly affected after school closure with highly significant P values of 0.015 and 0.016 respectively. Several risk factors influence the mental health of adolescents among which the school closure is an important one.

Keywords: Anxiety; COVID-19; Depression; Remote; Schooling.

In 12th January 2020, the WHO announced that a new Corona virus resulted in respiratory disease in Wuhan, China. The Egyptian ministry of health documented the first case in 14th February 2020. In March 11th 2020, the WHO tagged the Covid-19 as a worldwide pandemic. In 14th March 2020 Egypt took some precautionary measures, on top of which was the closure of schools and universities.

The world has been facing a global public health crisis owing to the COVID-19 pandemic. This pandemic showed a significant socio-economic, political and psycho-social impact [1]. Several disease control measures have been implemented by governments as social distancing, school closures and home quarantine[2].

Wide-ranging and long lasting psychological impacts of these measurements have been reported including post-traumatic stress symptoms, confusion, and anger[3]. For children and adolescents, school closures resulted in increased social distancing and loneliness which is a painful experience owing to the discrepancy between real and desired social contact. They suffered a physical

isolation from their peers, teachers, extended families, and community networks. A well-established link between loneliness and mental health including stress, anxiety, and behavioral disorders has been reported[2, 4, 5].

Actually, COVID-19 pandemic is directly linked to student's anxiety as they worry about health consequences, family finances, and education besides social isolation. More than 7 in 10 children and young people linked the pandemic with their stress, worry, and anxiety[6]. Educators, school social workers, and counselors are the main source of emotional support for adolescents who firstly observe any warning signs of mental health problem or any unsafe situation. However, educators' support and intervention have been limited during school closings[7]. Indeed, connectedness of adolescent to school was significantly associated with positive consequences including decreased risk of depressive and anxiety disorders[8].

Moreover, adolescence during physical isolation may favorite psychoactive substance and other reinforcing behaviors as gambling, video gaming or using social media to reduce stress and to alleviate mood. These addictive behaviors may decrease engagement in usual social and daily living activities that may turn into habits difficult to break[9].

This has led school systems around the world to rapidly attempt remote learning. However, students had to struggle with technology access, shifts in routine and social isolation. It is also unclear how prepared students are to respond to this challenge[6, 10].

We realized that a nonchalance of the scholastic role is critical as it negatively influences the acquisition of life skills and empowerment. Therefore, our study focused on the manifestations of anxiety and depression among Egyptian adolescents before and after school closure. The study was carried out to disclose the imprint of school closure and remote learning as a stressor exposing adolescents to anxiety and depression.

MATERIALS AND METHODS

Ethical approval: The protocol of the study was approved by the "Ethical Committee" of the NRC. Written informed consent was signed by the legal guardian of each child before participation in the study. The ethical approval number is 19224.

One hundred twenty six adolescents were enrolled in our observational case control study. Personal data, social level, physical activity and anthropometry were evaluated for each participant. Two validated Egyptian inventories were used to screen for anxiety and depression. Sixty three candidates (controls group1) were assessed before school closure in comparison to another sixty three of their matched peers (cases group2) after school closure.

Adolescents in group 1 were recruited through school visits of preparatory and secondary classes in schools of Giza governorate, after obtaining necessary approval from school district and from the Central Agency for public mobilization and statistics. Dates of school visits were: 3/3/2020, 5/3/2020, 9/3/2020 and 10/3/2020

On the other hand, those in group 2 were enrolled through appointments within the period from 23\9\2020 to 10\6\2021 in the clinics of the Medical Research Centre of Excellence as the schools were closed by then.

Inclusion criteria; Egyptian adolescents (from 12-18 years) of both genders with no mental illness previously diagnosed

Exclusion criteria: age below 12 or above 18, any mental illness and those who refused to participate.

Anthropometric measurements were taken and plotted on WHO growth curves and AnthroCalc application served for data analysis[11].

Evaluation of social class was performed. Education and occupation indices of both parents were scored on a seven point scale (1 illiterate, 2 Primary, 4 Preparatory, 5 Secondary and 7 University) and (1 housewife or unskillful, 2 Industry, agriculture and general services, 4 skillful, 5 semiprofessional and 7 professional). Then both parental scores were summated and classified into Low < 8, Middle 9-18 and High 19-28[12, 13].

The Inventory to Diagnose Depression (IDD) covers the full spectrum of depressive symptoms included in the Fourth Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). The inventory consists of 22 items. Each Item includes five sentences rated on an escalating scale of frequency and severity from 0 to 4. The

subject is asked to choose only one sentence from each item; the one which best describes his/her feelings in the preceding week. The number next to that sentence is to be encircled (zero, 1, 2, 3, or 4). The total score is calculated by adding the value of the number marked in each of the 22 items[14].

The inventory for anxiety was constructed from the Children's Manifest Anxiety Scale (CMAS)[15] and from personality scale of manifest anxiety[16]. The anxiety inventory evaluates five dimensions: physical, physiological, emotional, mental and social. Each of these dimensions includes 15 items. Thus a total of 75 items is obtained. The adolescent rates each item by always (scored 3), sometimes (scored 2) or rarely (scored1). The scale's total value is calculated by adding the scores given to each of the 75 items. An additional 15 items are included to assess and exclude lying children. The total score of the individual on the Lie Scale represents the extent of his truthfulness or falsehood, and the individual is excluded from the list of examinees if his estimation exceeds 15 degrees.

Both inventories of depression and anxiety were translated into Arabic and were statistically validated by assistant professor Magdi Mohamed Eldesouki in 2002 and 2015 respectively. The final form was accomplished after several reviews by specialists in mental health and professors in the Arabic language at Menoufia University.

Statistical Analysis: Quantitative data were statistically represented in terms minimum, maximum, mean, standard deviation (SD) and median. Comparison between groups was done using Independent samples T-Test for comparing two parametric groups, and using Mann-Whitney Test for comparing two nonparametric groups. Qualitative data were statistically represented in terms number and percent. Comparison between groups was done using Crosstab Chi-Square Test. A probability value (p value) less than or equal to (0.05) was considered significant. All statistical analysis was performed using statistical software SPSS (Statistical Package for Social Science) statistical program version (22.0). Graphs were done using SPSS statistical program version (22.0) and Microsoft Excel program version 2016.

RESULTS

Our study involved two groups: Group1 "pre" and group2 "post" school closure. The children in both groups were matching as regards age and anthropometry with insignificant P-values except for the waist/hip ratio with significantly higher values (P0.044) in group2, as shown in table 1.

Male and female sex was equally presented in both groups (P=0.278). High social level was predominant among group 1 while middle social level was more prevalent in group 2 with a percentage of 61.3% and 50.8% respectively (P=0.001). Adequacy of physical activity was judged in both groups according to adherence to WHO recommendations[17]. A significantly higher number of twelve adolescents were following

Table 1. Comparison between Pre- and Post-school closure groups as regards age range and anthropometric measurements

	Groups	N	Min.	Max.	Mean ± S.D.	P value
Age in years	Pre	63	12.00	17.00	14.94 ± 1.29	0.251
	Post	63	12.00	18.00	14.65 ± 1.48	
Weight - Percentile	Pre	63	0.40	99.90	65.03 ± 33.66	0.144
	Post	63	0.40	99.90	54.03 ± 36.12	
Height - Percentile	Pre	63	0.70	99.50	40.40 ± 28.24	0.442
	Post	63	0.20	99.90	37.69 ± 31.02	
BMI - Percentile	Pre	63	0.20	99.90	71.50 ± 31.29	0.215
	Post	63	0.20	99.90	62.18 ± 36.24	
Waist/Height	Pre	63	0.36	0.68	0.48 ± 0.07	0.666
	Post	63	0.35	0.87	0.48 ± 0.10	
Waist/HIP	Pre	63	0.63	1.78	0.80 ± 0.15	0.044
	Post	63	0.70	1.00	0.81 ± 0.07	

WHO recommendations before school closure compared to only three after school closure (P=0.013) as illustrated in table 2

The self administered anxiety inventory revealed a significant discrepency between both groups concerning the rating by (always 3, sometimes 2 and rarely 1) for statements in the emotional, physical, physiological and social aspects of anxiety. The social aspect statement was (I feel that others do not accept me), three statements in Emotional aspect (Annoyed by loud noises, I don't feel good, I get upset easily when I have a difficult problem), two statements about the physical aspect (I suffer from indigestion a lot, I feel numbness in different parts of the body) and in the Physiological aspect one statement (I feel like my hands tremble when I'm exposed to embarrassing situations) with P-values of 0.007, 0.007, 0.043, 0.031, 0.021, 0.048 and 0.046 respectively as shown in table 3.

The score of the social dimension of anxiety was higher before school closure as demonstrated in table 4 with a significant P value of 0.05.

In the inventory of depression, a significant discrepancy was found between both groups as

Table 2. Gender distribution, social class and physical activity among both groups

Parameters		Group		Chi-Square	P value
		Pre (n (%))	Post (n (%))		
Gender	Male	23 (36.50%)	29 (46.00%)	1.179	0.278
	Female	40 (63.50%)	34 (54.00%)		
Social Class	Low	1 (1.60%)	14 (22.20%)	20.751	0.001
	Middle	23 (37.10%)	32 (50.80%)		
	High	38 (61.30%)	17 (27.00%)		
WHO Recommendations	Followed	12 (19.00%)	3 (4.80%)	6.130	0.013
	Not followed	51 (81.00%)	60 (95.20%)		

Table 3. Comparison between both groups as regards the ratings of anxiety

Aspects of anxiety	Statement	Rating	Groups		Chi-Square	P value
			Pre(N - %)	Post(N - %)		
Three emotional	Annoyed by loud noises	1	34.80%	14 22.20%	10.02	0.007
		2	31 49.20%	19 30.20%		
		3	29 46.00%	30 47.60%		
	I don't feel good	1	16 25.40%	21 33.30%	6.29	0.043
		2	35 55.60%	39 61.90%		
		3	12 19.00%	34.80%		
	I get upset easily when	1	23 36.50%	10 15.90%	6.94	0.031
	I have a difficult problem	2	25 39.70%	33 52.40%		
		3	15 23.80%	20 31.70%		
Two physical	I suffer from	1	47 74.60%	32 50.80%	7.71	0.021
	indigestion a lot	2	12 19.00%	22 34.90%		
		3	46.30%	9 14.30%		
	I feel numbness in	1	21 33.30%	19 30.20%	6.06	0.048
	different parts of	2	31 49.20%	41 65.10%		
	the body	3	11 17.50%	34.80%		
physiological	I feel like my hands	1	29 46.00%	42 66.70%	6.15	0.046
	tremble when I'm exposed	2	17 27.00%	13 20.60%		
	to embarrassing situations	3	17 27.00%	8 12.70%		
social	I feel that others	1	14 22.20%	31 49.20%	10.05	0.007
	do not accept me	2	34 54.00%	23 36.50%		
		3	15 23.80%	9 14.30%		

regards the scores given to three statements as shown in table (5). The statements evaluate the interest in sex, the self esteem and the ability to concentrate with P values of 0.046, 0.015 and 0.016 respectively. The total scores to the inventory of depression were equivalent in both groups as noted in table 6.

DISCUSSION

Different distribution of the manifestations of anxiety was observed between both groups. Three negative manifestations of anxiety were more frequently rated after school closure. One emotional and two physical were detected. The

Table 4. Comparison between the total scores of each of the five dimensions of anxiety in both groups

Parameters	Groups	N	Min.	Max.	Mean ± S.D.	Percent change	P value
Physic total	Pre	63	15	36	23.21 ± 5.28	100.00	0.230
	Post	63	16	33	24.30 ± 4.89	104.72	
Physiol total	Pre	63	15	41	26.46 ± 5.66	100.00	0.281
	Post	63	15	37	25.43 ± 5.00	96.10	
Emo total	Pre	63	16	45	30.76 ± 6.36	100.00	0.626
	Post	63	20	45	30.25 ± 5.26	98.35	
Mental total	Pre	63	15	41	29.35 ± 6.07	100.00	0.388
	Post	63	15	45	28.41 ± 6.06	96.81	
Social total	Pre	63	15	43	28.06 ± 6.54	100.00	0.050*
	Post	63	15	44	25.86 ± 6.18	92.14	
Anx total	Pre	63	80	200	137.84 ± 26.14	100.00	0.411
	Post	63	87	202	134.25 ± 22.54	97.40	

Table 5. The scores of depression in group1 compared to group2

Score and statement	Type		Chi-Square	P value
	Pre(n (%)	Post(n (%)		
Interest in Sex				
Zero My interest in sex has not changed recently	38 60.30%	51 81.00%	9.692	0.046
1 My interest in sex has become slightly less than usual	57.90%	69.50%		
2 My interest in sex has become noticeably low	23.20%	11.60%		
3 My interest in sex is now too little	34.80%	11.60%		
4 I've lost all interest in sex	15 23.80%	46.30%		
Self esteem				
Zero I don't feel like I have a tendency to fail	26 41.30%	26 41.30%	12.332	0.015
1 My self esteem is sometimes low	14 22.20%	24 38.10%		
2 I feel inferior to others	16 25.40%	46.30%		
3 I feel a tendency to fail	57.90%	34.80%		
4 I feel like a worthless person	23.20%	69.50%		
Concentration				
Zero As always, I can focus on anything	19 30.20%	32 50.80%	12.140	0.016
1 My ability to focus is a little less than usual	35 55.60%	19 30.20%		
2 My level of attention is not as good as usual although I find it difficult to gather my thoughts but it does not cause me any problems	8 12.70%	69.50%		
3 My ability to read or engage in conversation is not as good as usual	11.60%	46.30%		
4 I can't read, watch TV, or engage in conversation without finding it difficult	00.00%	23.20%		

Table 6. Comparison between the two groups as regards the total score of depression

Parameters	Groups	N	Min.	Max.	Mean ± S.D.	Percent change	P value
Total score	Pre	63	0	63	22.59 ± 12.09	100.00	0.442
	Post	63	2	60	20.94 ± 11.95	92.69	

emotion of getting easily upset was described "rare" by more than one third (36.5%) of adolescents in group 1 while only by (15.9%) in group2 (P value 0.031). The percent of those who "always" suffered of indigestion was (6.3%) in group1 but more than the double of this percent in group2 (14.3%) (P value 0.021). Less than the half (49%) and more than the half (65%) in group1 and group2 respectively, "sometimes" complained of numbness (P value 0.048). This goes in agreement with the study done in the United Kingdom by McElroy et al, who detected a rise in anxiety in relation to the lockdown[18].

On the other hand, four manifestations of anxiety were commoner before school closure. They encompassed two emotional, one social and one physiological aspect. The emotion of getting annoyed by loud noise was scored "rare" by 4.8% of children in group1 as opposed to 22.2% in group2 (P value 0.007) .The emotion of not feeling good was "always" experienced by 19% of adolescents before school closure in contrast to 4.8 % after school closure (P value 0.043). The social feeling of rejection by others was "sometimes" experienced by 54% before school closure but was "rarely" felt by 49.2% after school closure (P value 0.007). The physiological aspect of hand tremors when embarrassed was "always" present in 27% before versus 12.7% after closing schools (p value 0.046).

A possible explanation for the attenuation of some anxiety's aspects post school closure is that a quality family support is able to alleviate the harm of home isolation. Same argument was mentioned by Wang et al who deduced that the bonding and the mutual "parents-child" relationship can protect against the repercussions of being prevented from going to school[19]. Also, Tang et al noticed some gains from home isolation resulting from stronger relations with parents[20].

The total score for social aspect of anxiety was higher in group1 with a significant P-value of 0.05 between both groups. This may be due to the prevalence of bullying among teenagers and limited acceptance of others. This can render the school environment a stressful one for some adolescents.

The holistic anxiety score was similar in both groups with an insignicant (P-value of 0.411). This matches with Chen et al in their analogous study in China on adolescents[21].

Concerning the depression inventory, there were highly significant differences in the scores of three components.

The interest in sex was lost in 23.8% of group1 but only in 6.3% of group2 (P value 0.046).

While more children (9.5%) felt worthless after school closure than their peers (3.2%) who attended schools. None from group1 found difficulty in reading, watching TV, or engaging in conversation, on the contrary 3.2% of adolescents in group2 found it difficult. Comparably, a negative effect of COVID-19 on mental health was stated by Oosterhoff et al, in their study in the United States and by Zhang et al in China[22, 23].

The total scores of depression were equivalent in both groups (P 0.442). Similarly, in Japan Isumi et al found no significant drawback of COVID-19 on adolescents' mental health[24].

The highly significant disparity in the social level (P value 0.001) between the two groups may be one of the main influencers on the impact of school closure on children. More than half the candidates in group1 were from the high class (61.3%), while more than half of the candidates in group2 were from the middle class (50.8%). This goes with the conclusion of Gesturd et al in their comparable study on adolescents in Norway. They attributed a great imprint to the social level as an exposure risk for anxiety and depression[25].

Unfortunately physical activity is neglected in our country although it is of utmost importance in adolescence. The community's investment in ensuring the physical health of adolescents is a very rewarding investment. It is a safety valve in the event of exposure to various life stresses. The majority of the participants

in both groups were not following the WHO recommendations for physical activity with exaggerated increment after school closure (81% of group1 and 95.2% of group 2 P-value 0.013). This view is supported by the research carried out by Abd El-Shaheed et al, on physical activity in Egyptian adolescents[17].

Finally, multiple risks and precipitating factors predispose adolescents to anxiety and depression. No single cause effect can be defined. This goes in harmony with the conclusion done by Jones et al. They conducted a large systemic review and deduced that a plenty of risks mitigate the role of school closure as a sole influencer on mental soundness[26].

CONCLUSIONS

Attending school is not only about efficient academic achievement but mental wellbeing too. Many lines of defense should integrate to compensate for remote schooling. A quality family support and adherence to physical activity are the main outlets for adolescents when banned from going to school.

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Conflict of interests

The authors declare having no conflict of interest.

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Limitations

The dates of the four school visits were all in the first 10 days of March 2020 which was very close in timing to the governmental decision of schools' closure mid March 2020. The children were already under stress by the disturbing worldwide news about the novel COVID-19. This was the reason why the scores of both groups were very close as for anxiety as for depression.

Recommendations

Further studies are needed in the field of adolescents' mental well being and special emphasis on their "right" of having alternatives other than going to school for creativity and physical activity.

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