



## **Factors Associated with Depressive Symptoms in Secondary School Students after the COVID-19 Pandemic in Lima, Peru 2023.**

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**Abstract**

*Introduction: The objective of the present study was to determine the factors associated with depressive symptoms in 4th and 5th-grade secondary school students from a public school in Lima, Peru after the COVID-19 pandemic.*

*Methods: Analytical cross-sectional study with a population of 127 students, considered through a census. Results: 51.61% of students presented depressive symptoms. Of the total participants, 58.06% were women, while 41.94% were men; 87.90% had a bad relationship with their classmates; 21.77% had family dysfunction; 54.84% of the students did not live with both parents; 45.16% had a family member die from COVID-19 during the pandemic. In the bivariate analysis (Chi 2), female sex ( $p < 0.001$ ) and family dysfunction ( $p = 0.002$ ) were the two factors associated with depressive symptoms in this study. In the multivariate analysis, these associations were confirmed.*

*Conclusion: Being female and having family dysfunction are factors associated with depressive symptoms in 4th and 5th-grade secondary school students from a public school in Lima (Peru) post-pandemic in 2023.*

**I. INTRODUCTION**

In recent years there has been a large increase in cases of mood disorders, including anxiety and depression, which have been influenced by social isolation (1). These problems have always been present in the population, but in many cases, they are not given the corresponding importance and in other cases, they are not diagnosed promptly. According to the Journal of the Faculty of Medicine of the National Autonomous University of Mexico (UNAM), depression rates in adolescents increase between 13 and 18 years of age (2). However, despite having an early presentation of symptoms, few receive early care (2).

According to the World Health Organization (WHO) in 2021, one in seven young people aged 10 to 19 suffered from a mental disorder, with depression, anxiety, and behavioral disorders being the main causes of illness and disability in this age group (3). In addition, it was also reported that 2.8% of adolescents between 15 and 19 years old suffered from depression (3). This situation may be influenced by the COVID-19 pandemic. On March 11, 2020, the WHO declared the start of the COVID-19 pandemic. More than 3 years

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later, on May 5, 2023, the WHO declared the end of COVID-19 as an international health emergency. In 2020, a study was published that analyzed depression and anxiety in 1,036 adolescents during the COVID-19 pandemic in China. In this study, the result was that 11.78% suffered from depression (4). Added to the emotional burden that social isolation represented, having had family members sick with COVID-19 also caused adverse effects on mental health. According to a study conducted in 2020 in Wuhan, adolescents who had sick parents during the pandemic were at greater risk of presenting depressive symptoms (5). Likewise, adolescents who lost a family member to COVID-19 are more likely to suffer from depressive disorders. In a study conducted in 2022, it was reported that the death of a parent or caregiver represents an elevated risk of suffering from psychiatric disorders, particularly major depressive disorder. The closer the bond between the adolescent and the deceased relative, the greater the risk of depression. Grief represents an academic and social challenge for them since they suffer from attention difficulties in the classroom, less interest in relationships with classmates, and fewer future aspirations (6). Likewise, in 2021 Mariah Hawes published an article in which the increase in depressive and anxious symptoms during the pandemic in adolescents and young adults was analyzed (7). The result was that women tend to be the most affected, mostly presenting depression and somatic symptoms (7). This finding may be due to the fact that during the pandemic they were more exposed to stressors, and as a result, they internalized the symptoms (7). Next, Chengqi Cao and Li Wang in 2022 published a study that investigated the prevalence and associated risk factors of anxiety, depression, and post-traumatic stress symptoms in adolescents in China after the pandemic and confinement. In this, a prevalence of 16.9% of post-traumatic stress, 12.8% of depression, and 7.1% of anxious symptoms was found. Furthermore, it states that the predictors most associated with these disorders were family relationships ( $p < 0.01$ ) and social support ( $p < 0.01$ ) (8). A study conducted in Malaysia in 2022 reported that adolescents who are bullied at school and are not under parental supervision are more likely to suffer from depressive symptoms. Bullying is considered an unfavorable event in the life of adolescents because it causes a decrease in self-esteem and the desire to establish social relationships. Likewise, the lack of parental supervision causes adolescents to feel alone without someone to turn to when they have a problem, which in turn means a delay in seeking help (9).

In the national context, according to the National Institute of Mental Health “Honorio Delgado – Hideyo Noguchi”, in 2011, 8.6% of adolescents in Lima have had a depressive episode at some point in their lives, so it can be seen that this problem is not current, but has been present for more than a decade (10). This may be because the family environment plays an important role in the development of these problems, with

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the most frequent associated factors being marital conflicts or emotional difficulties between one of the parents and the minor, and abuse, whether emotional, physical, or sexual (10). In the same way, in 2021 a study was carried out in which 560 adolescents from South Lima between 12 and 21 years old were analyzed, 60% of them experienced sadness, 53.1% excessive worry, 51.3% difficulty being calm, and 43.2 % of vacuum sensation. Thus, the pandemic could predispose the presence of these symptoms, affecting the mental health of adolescents (11).

In the current study, the associated factors with depressive symptoms in 4th and 5th grade secondary school students from a school in Lima after the COVID-19 pandemic were determined.

### **1.1 Justification**

The present research work addressed a topic that, despite being relevant today, is still not fully diagnosed in time, leading to potentially serious consequences for a vulnerable population such as adolescents, because it is a stage in which they are exposed to various changes, both biological and behavioral and social. This group is subjected to greater social pressures, they begin to make decisions on their own and create their identity (12). It is highlighted that one of the most worrying consequences of this condition is suicide. According to a study in Ecuador, in 2020 there were 97 suicides among adolescents between 10 and 19 years old, the majority being men. It is mentioned that psychological diseases such as depression have been exacerbated by the pandemic (13). Furthermore, Nuey Montero (2021) pointed out that there is a relationship between the experiences lived during the COVID-19 pandemic and suicide, and that one of the main causes of suicide may be the loss of a beloved family member and bullying (11). She also mentions that in Spain, suicide is the main cause of death in young people between 15 and 29 years old, mainly in men (14).

Furthermore, in 2021 the "Centers for Disease Control and Prevention" of the United States reported that according to the first national survey carried out on 7,705 students from ninth to twelfth grade, it was found that 44% presented feelings of sadness or hopelessness almost every day for two weeks and that more than half of respondents said they experienced emotional abuse from their parents or guardian, and that 11% reported physical abuse (15). We consider that it is feasible to carry out this research due to the accessibility we have to this population and the tool we will use will be easy and quick to apply. Likewise, the financial expense will be minimal, since our data collection tool will be applied in person. Next, we consider that this work is interesting and relevant because it will allow us to understand the disease, allowing early detection of pathologies to avoid unfavorable situations. Finally, our work is ethical because the desire of each

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adolescent and her parents to participate will be respected, through the application of consent and informed assent provided before taking the questionnaire and guaranteeing the confidentiality of the information. Additionally, the results of this research will be reported to the director of the participating educational institution so that cases of family dysfunction and depressive symptoms are addressed by the corresponding authorities

## 1.2. Objectives

### General objective:

To determine the frequency and associated factors with the presence of depressive symptoms in 4th and 5th-grade secondary school students from a public school in Lima, post-COVID-19 pandemic.

### Specific objectives:

- To determine the frequency of depressive symptoms in 4th and 5th grade secondary school students from a public school in Lima post-COVID-19 pandemic.
- To determine if sex is associated with depressive symptoms in 4th and 5th grade secondary school students from a school in Lima post-COVID-19 pandemic.
- To determine if a dysfunctional home is associated with depressive symptoms in 4th and 5th grade secondary school students from a school in Lima post-COVID-19 pandemic.
- To determine if poor relationships with classmates are associated with depressive symptoms in 4th and 5th grade secondary school students from a school in Lima post-COVID-19 pandemic.
- To determine whether not living with both parents is associated with depressive symptoms in 4th and 5th-grade secondary school students from a school in Lima post-COVID-19 pandemic.
- To determine if the death of a family member due to COVID-19 is associated with depressive symptoms in 4th and 5th grade secondary school students from a school in Lima post-COVID-19 pandemic.

## II. METHODS

### 2.1 Design

A cross-sectional-analytical study was carried out.

### 2.2 Population

The study population of the public school was 128 students in the 4th and 5th years of secondary school in Lima.

Inclusion criteria:

- School students in the 4th and 5th year of secondary school at Simón Bolívar School in Lima.
- Acceptance of parents and students to participate in the study.

Exclusion criteria:

- Incomplete questionnaires.

### 2.3 Sample

The study population was 127 students because one student did not accept to participate.

### 2.4 Variables

*Table 1: Sociodemographic characteristics*

Sociodemographic characteristics		
	Definition	Operationalization
Age	Number of years from the birth of the respondent to the present	Older and equal to 16 years Under 16 years old
Level of instruction	Highest level of education that has been completed or is in progress.	4th-grade 5th-grade

*Table 2: Independent variables*

Independent variables					
	Definition	Instrument	Variable type	Measuring scale	Operationalization
Sex	Biological and physiological characteristics of the person		Dichotomous	Nominal	Feminine Masculine
Relationship with their classmates	Quality of the relationship with their classmates.	Aggression and victimization scale	Dichotomous	Nominal	Bad relationship Yes No
Family relationship	Family usually with conflicts and abuse.	APGAR familiar	Dichotomous	Nominal	Dysfunctional home Yes No
Lives with both parents	The adolescent lives with both parents		Dichotomous	Nominal	Lives with both parents No Yes
Relatives who died from COVID-19	Presence of a family member who has died from COVID-19 during the last 2 years		Dichotomous	Nominal	Deceased relative Yes No

*Table 3: Dependent variable*

Dependent variable					
	Definition	Instrument	Variable type	Measuring scale	Operationalization
Depressive symptoms	Group of conditions associated with changes in a person's mood.	Beck Depression Inventory	Dichotomous	Nominal	Yes No

## 2.5. Data collection and instrument

The parents agreed to participate in this study, then signed the informed consent, and the student signed informed assent. Data collection was carried out through a written questionnaire applied after the WHO announced the end of the COVID-19 pandemic.

The questionnaire registered the sociodemographic variables: a) age, b) level of instruction.

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Independent Variables: Sex, Relationship with their classmates, Family relationship, Lives with both parents and Relatives who died from COVID-19.

**Sex** was considered male and female.

**Relationship with their classmates:**

To measure the relationship with their classmates, the "**School Violence Scale**" was used which was created by Emler and Reicher in 1995 but adapted to Spanish by Estévez, Musitu, and Herrero in 2005. This tool consists of 19 questions that evaluate whether the person has presented referred behavior in the last 12 months. It also consists of 2 subscales to evaluate violent behavior and victimization (16). These scales can be applied to school adolescents from 11 to 20 years old and the approximate duration is 10 minutes (17). In 2016, Mafalda Ortiz and José Livia conducted a study to determine the validity and reliability of the school violence scale in public school students in Lima (17). According to Ortiz and Livia, the reliability of the instrument was analyzed with the internal consistency method, the Cronbach's alpha coefficient presented a value of 0.895, therefore, there is good internal consistency (17). Likewise, the violent behavior subscale had a Cronbach's alpha of 0.88 and the victimization subscale of 0.80 (17).

**Family Relationship**

To evaluate the family relationship variable, the family APGAR was used, which was developed in 1978 by Dr. Gabriel Smilkstein, who is a family doctor and has been adapted in several countries, including Peru (18). This tool consists of 9 questions, which seek to demonstrate the functional status of the family. For each question there are 5 possible answers, 0 represents "never", 1 "almost never", 2 "sometimes", 3 "almost always" and 4 "always". Then, the score interpretation is between 17 and 20 which means that it is normal, if it goes from 13 to 16 it represents that there is a mild dysfunction, if it is from 10 to 12 there is moderate dysfunction, and if it is less than 10 there is severe dysfunction (18). In 2014, Humberto Castilla published a study in which he applied the family APGAR to 256 students aged 11 to 18 in a school in Lima, Peru, concluding that this tool has acceptable factorial validity (19).

**Lives with both parents** was evaluated using a direct question, Do you currently live with both parents? with a yes or no response, as appropriate.

**Relatives who died from COVID-19** were also measured through a direct question, have you had a family member die from COVID-19 during the pandemic? with a yes or no answer.



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## **The Dependent Variable:**

### **Depressive Symptoms**

Beck Depression Inventory was used. The BDI stands out and is useful to detect the presence of depressive symptoms in adolescents and the adult population. This was created in 1996 by Aaron T. Beck to identify the presence of depressive symptoms in the population and has been adapted and validated in several countries (20). The Beck Depression Inventory is a self-administered questionnaire consisting of 21 questions. This tool allows us to evaluate certain characteristics that may indicate whether an individual presents depressive symptoms, for example, judgments of insufficiency, ugliness, sadness, evilness, and worry, among others. The duration is 5 to 10 minutes, although some people may take longer to complete it (21). Each BDI question has 4 alternatives, of which the participant must mark the one that they consider applicable to their case. The alternatives have a score from 0 to 3, according to the order in which they appear (21). The results are classified into 6 categories; If the score is less than or equal to 10 it means that there is no presence of depressive symptoms, if it is between 11 and 16 there is mild depression, 17 to 20 indicates intermittent states of depression, 21 to 30 means moderate depression, 31 to 40 is severe depression, and greater than 40 indicates extreme depression. The BDI has been validated in Peru, the first was carried out by Raffo in 1994 (21), however, in the same year Reátegui published research that is considered the largest study carried out in the country to validate this tool, reaching to the conclusion that it is a very useful and reliable tool to determine if a child or adolescent presents depressive symptoms (22).

Reategui found a relationship between depressive symptoms and self-perception, which was measured with the Daniels-Piers Self-Concept Scale for children, with which he obtained a highly significant inverse relationship of -0.80 in women, -0.64 in men and -0.70 in both, demonstrating that it exists between high scores of depressive symptomatology and low self-concept. The next criterion that he evaluated was emotional instability, using the Eysenk Personality Inventory for Children (IPE-N), obtaining a correlation of -0.33. He then measured introversion with the IPE-N and obtained a considerable positive correlation of 0.77. He finally evaluated poor school performance, finding a certain relationship with low school grades of -0.22 ( $p < 0.01$ ) (23).

### **2.6 Statistic analysis**

At the end of data collection, the selection, interpretation, and analysis of the data was carried out. Regarding the univariate analysis, categorical variables were expressed as percentages and frequencies, while numerical variables were expressed as mean, median, or standard deviation, as appropriate.

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The bivariate analysis allowed us to know if there is an association between the independent and dependent variables.

The chi-square test was applied because the independent variables and the dependent variable were qualitative. A p-value < 0.05 was considered statistical significance. Finally, for the multivariate analysis, multiple logistic regression was applied. After this, an adjustment was made to evaluate the confounding variables and to know if the association was maintained.

## **2.7 Ethical aspects**

The questionnaire was only applied to those students who had the permission of their parents or guardians since the participants were minors. In turn, the students who agreed to participate in the study signed the informed consent. They were guaranteed the confidentiality of the information, in addition to the anonymity of the responses. Finally, the results of this research will be reported to the educational institution so that the institution develops a strategy for the benefit of its students.

## **III. RESULTS**

### **3.1 Univariate analysis**

From 128 students, one student did not agree to participate and 3 questionnaires were incomplete. At the end, we assessed 124 students.

**Table 4**

Variable	Frequency	Percentage
<b>Sociodemographic Characteristics</b>		
<b>Age</b>		
Under 16 years old	46	37.10%
Older or equal of 16 years old	78	62.90%
<b>Grade</b>		
5th-grade	65	52.42%
4th-grade	59	47.58%
<b>Independent variables</b>		
<b>Sex</b>		
Female	52	41.94%
Male	72	58.06%
<b>Relationship with classmates</b>		
Bad	109	87.90%
Good	15	12.10%
<b>Family dysfunction</b>		
Yes	27	21.77%
No	97	78.23%
<b>Lives with both parents</b>		
No	68	54.84%
Yes	56	45.16%
<b>Relatives who died from COVID-19</b>		
Yes	56	45.16%
No	68	54.84%
<b>Dependent variable</b>		
<b>Depressive symptoms</b>		
Yes	64	51.61%
No	60	48.39%

In relation to the univariate analysis, this can be seen in table No. 4 in which it is seen that there were a total of 52 (41.94%) women and 72 (58.06%) men. The predominant age among the participants was greater than and equal to 16 years (62.90%), while the minority reported being younger than 16 years (37.10%). The majority of students are in the 5th year of secondary school, 52.42% of them, while 44.94% belong to the 4th year of secondary school. Those students who indicated having a bad relationship with their classmates represent 87.90% of the total participants, while only 12.10% indicated having a good relationship with their

classmates. On the contrary, with respect to the relationship with family members, the majority (78.23%) have a good relationship, while those who had a bad relationship correspond to only 21.77%. Likewise, the majority reported not living with both parents, corresponding to 54.84%. 45.16% of the students responded that they had at least one family member die from COVID-19. Finally, regarding the presence of depressive symptoms, just over half (51.61%) turned out to present these symptoms.

### 3.2 Bivariate analysis

**Table 5**

Variable	Presence of depressive symptoms	No presence of depressive symptoms	P-value
<b>Sex</b>			
Female	38 (30.64%)	14 (11.29%)	< 0.001
Male	26 (20.97%)	46 (37.09%)	
<b>Relationship with classmates</b>			
Bad	57 (45.97%)	52 (41.94%)	0.683
Good	7 (5.65%)	8 (6.45%)	
<b>Family dysfunction</b>			
Yes	21 (16.94%)	6 (4.84%)	0.002
No	43 (34.68%)	54 (43.55%)	
<b>Lives with both parents</b>			
No	37 (29.84%)	31 (25%)	0.492
Yes	27 (21.77%)	29 (23.39%)	
<b>Relatives who died from COVID-19</b>			
Yes	32 (25.81%)	24 (19.35%)	0.263
No	32 (25.81%)	36 (29.03%)	

In table N°5 you can see the bivariate analysis. To do this we use the chi-square, since all the variables, both independent and dependent, are qualitative. To know if there is an association, a p-value < 0.05 was used. In this, it can be seen that the presence of an association between depressive symptoms and female sex, with a  $p < 0.001$ . Likewise, an association was found between family dysfunction and depressive symptoms, with a  $p = 0.002$ . On the other hand, poor relationships with peers, not living with both parents and having a family member die from COVID-19 were not shown to be associated with the presence of depressive symptoms.

### 3.3 Multivariate analysis: Logistic Regression

**Table 6**

Variables	OR	95% IC	P
Female	5.06	2.15 – 11.91	< 0.001
Bad family composition	0.97	0.43 – 2.21	0.946
Relatives who died from COVID-19	1.76	0.77 – 4.01	0.177
Bad relationships with classmates	1.21	0.34 – 4.33	0.768
Family dysfunction	3.77	1.29 – 10.99	0.002

*OR: Odds Ratio. IC: 95% of confidence interval*

Table No. 6 shows the logistic regression analysis, which confirms that there is an association and its magnitude. The association between the variable female sex and depressive symptoms has an OR of 5.06 (OR >1), indicating that women are 5.06 more likely to develop depressive symptoms compared to men.

Regarding the association between family dysfunction and depressive symptoms, it presents an OR of 3.77 (OR >1), indicating that those students with family dysfunction are 3.77 times more likely to develop depressive symptoms than those who do not have family dysfunction.

## IV. DISCUSSION

This study was carried out to find the associated factors with depressive symptoms in Peruvian school students after the COVID-19 pandemic. The factors taken into account were sex, relationship with classmates, family relationship, living with both parents or neither, and having had a family member die from COVID-19 during the pandemic.

On the one hand, the results showed that there was an association between female sex and depressive symptoms in schoolchildren after the COVID-19 pandemic. Previous studies determined the female sex as a

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risk factor for depression and other disorders such as anxiety. A study conducted during the pandemic on Korean schoolchildren found that adolescent girls are more susceptible to psychological distress compared to their male peers (24). Other studies reported that during outbreaks of infectious diseases, such as COVID-19, women had higher rates of depression than men (25). This may be due to different parenting patterns between boys and girls (26). School authorities can take preventive measures by knowing this population is at risk for depression.

On the other hand, the results also showed an association between family dysfunction and depressive symptoms in schoolchildren after the COVID-19 pandemic. In studies carried out in an Asian population, it was shown that a good family relationship was a protective factor against depression, while a poor family relationship behaved as a risk factor (27). It has been reported that the family accompanies adolescents during this conflictive stage, teaching them to handle the challenges and problems that may arise. There are even psychological theories that explain that the quality of attachment and family cohesion serves as a basis for the adolescent to explore their stage of development in a better way (28). Family members can be very helpful in the prevention stage, but they are also helpful during psychotherapy after the diagnosis of depression. Family support is one of the pillars for any adolescent when overcoming emotional disorders (29).

The period of adolescence brings with it various changes, which, added to depression, can be terrible for the adolescent. Therefore, it is important to know those factors that are mostly associated with depressive symptoms, to know where to start taking action, to whom to pay more attention, and thus be able to avoid the increase in the numbers of adolescents with depression or who suffer its consequences.

### **The implication of the results**

The results will be presented to the educational institution to publicize the depressive symptoms of its students, in a general way since the questionnaires were anonymous. The intention of reporting the results was so that the corresponding professionals of the institution could take corrective and supportive measures for their students.

### **Limitations and strengths**

It is important to know the mental health of adolescents.

The present study helped to understand the factors associated with depressive symptoms in students from a school in Lima, so the limitation is that the results cannot be extrapolated to other educational institutions in Lima.

## V. CONCLUSION

Being female and having family dysfunction are factors associated with depressive symptoms in 4th and 5th-grade secondary school students from a public school in Lima post-COVID-19 pandemic in 2023.

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