



Article

# Depressive Symptoms and Their Associated Factors in Vocational–Technical School Students during the COVID-19 Pandemic

Michele da Silva Valadão Fernandes <sup>1,\*</sup>, Thays Martins Vital da Silva <sup>1,2</sup>, Priscilla Rayanne e Silva Noll <sup>1,3</sup>, Alexandre Aparecido de Almeida <sup>4</sup> and Matias Noll <sup>1,5,6,\*</sup>

- <sup>1</sup> Federal Institute of Education, Science and Technology of Goiano, Goiás 76300-000, Brazil; thaysvital@iftm.edu.br (T.M.V.d.S.); priscilla.noll@usp.br (P.R.e.S.N.)  
<sup>2</sup> Federal Institute of Education, Science and Technology of Triângulo Mineiro, Minas Gerais 38706-328, Brazil  
<sup>3</sup> University of São Paulo (Universidade de São Paulo—USP), São Paulo 01246-903, Brazil  
<sup>4</sup> Federal Institute of Education, Science and Technology of Tocantins, Tocantins 77950-000, Brazil; alexandre.almeida@ifto.edu.br  
<sup>5</sup> Federal University of Goiás, Goiás 74001-970, Brazil  
<sup>6</sup> Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, 5230 Odense, Denmark  
\* Correspondence: michelevaladao2021@gmail.com (M.d.S.V.F.); matiasnoll@yahoo.com.br (M.N.)

**Abstract:** The objectives of this study were to compare the prevalence of depressive symptoms, behavioral habits, and QoL in students from two vocational–technical schools, and to determine the association of depressive symptoms with behavioral habits and quality of life (QoL) in these students during the COVID-19 pandemic. A cross-sectional survey was conducted with students attending the institution of the Brazilian Federal Network of Professional, Scientific and Technological Education. The students answered a questionnaire on sociodemographic variables, situations related to the COVID-19 pandemic, behavioral habits, QoL, and depressive symptoms. The outcome variable was the presence of depressive symptoms, assessed using the Children’s Depression Inventory (CDI). Poisson regression analysis with robust variance was performed. A total of 343 students participated in this study (women, 55.7%; mean age of 16.1 ± 0.93 years). The prevalence of depressive symptoms among students was 43.4% (95% confidence interval [CI]: 38.0–49.0), and these symptoms were significantly associated with being female (prevalence ratio [PR] 1.72; 95% CI: 1.31–2.27); being in the 10th grade (PR: 1.80; 95% CI: 1.18–2.76) and 9th grade (PR 2.08; 95% CI: 1.37–3.18); social isolation (PR: 2.04; 95% CI: 1.00–4.14); hunger due to a lack of food at home (PR: 1.78; 95% CI: 1.33–2.39); low physical activity levels (PR: 1.68; 95% CI: 1.09–2.59); and moderate (PR: 2.87, 95% CI: 1.68–4.89) and low QoL (PR: 5.66; 95% CI: 3.48–9.19). The results emphasize the importance of interventions aimed mainly at female students and those in the initial years of high school, in addition to the importance of physical activity, food safety, and QoL to improve the mental health of students.

**Keywords:** COVID-19; adolescents; depression; quality of life; mental health



**Citation:** Fernandes, M.d.S.V.; Silva, T.M.V.d.; Noll, P.R.e.S.; Almeida, A.A.d.; Noll, M. Depressive Symptoms and Their Associated Factors in Vocational–Technical School Students during the COVID-19 Pandemic. *Int. J. Environ. Res. Public Health* **2022**, *19*, 3735. <https://doi.org/10.3390/ijerph19063735>

Academic Editor: Paul B. Tchounwou

Received: 28 January 2022

Accepted: 15 March 2022

Published: 21 March 2022

**Publisher’s Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Mental-health-related problems have increased significantly in the last two years. Since social distancing/isolation measures were introduced due to the coronavirus disease (COVID-19) pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), studies have shown considerable increases in negative symptoms such as depression, anxiety, and stress in people of different ages [1,2]. Adolescents, who are at high risk for mental health problems, began to experience stress, emotional conflicts, fear, and a sudden change in routine more intensely than people in other age groups [3,4]. Among mental health problems, depression was already the most common mental disorder in adolescents, even before the global health crisis [5]. As if the age of vulnerability that

is adolescence was not enough by itself, with the pandemic, many of these young people began to experience an increase in anxiety and depressive symptoms, associated with overlapping risk factors [3,4].

Depression is characterized by physical, cognitive, and somatic symptoms, such as a sad or irritable mood, a loss of interest and pleasure, changes in weight and sleep patterns, agitation or motor retardation, fatigue, difficulty concentrating, feelings of worthlessness or guilt, frustration, and suicidal ideation [6,7]. During adolescence, the developmental changes experienced by an individual are marked by emotional instability, which can interfere with positive decision-making [8]. Thus, adolescence is a period of vulnerability for the development of risky mental health behaviors [9,10].

Evidence suggests that depression in adolescents may be associated with risky behaviors such as insufficient levels of physical activity [11–14], psychoactive substance use [15], unhealthy eating habits [16–18], and risky sexual behavior [19,20]. Experts argue that there may be a positive relationship between physical activity and brain health in adolescents, which involves both cognitive function and mental health [14]. Additionally, the use of licit or illicit psychoactive substances is associated with depression in adolescents [9,15]. In adolescence, episodes of rebellion and dangerous habits such as alcohol drinking and drug use may start to develop, especially among adolescents who lack the support of family and friends [9,21]. A lower depressive symptomatology was also found among adolescents who had a good-quality diet, based on the regular consumption of fruits and vegetables, for example [22]. Hence, exploring the associations between depressive symptoms and behavioral habits during the pandemic is important for reducing the high burden related to the increase in mental illness in adolescents.

During the COVID-19 pandemic, prolonged social isolation, grief, domestic violence, and excessive Internet and social media use have contributed to the increase in depressive symptoms [1,23–25]. Social isolation and prolonged school closures led to reduced levels of physical activity and increased sedentary habits [26]. Consequently, the COVID-19 pandemic considerably changed the lives of adolescents, increasing the risk of mental illness [27]. In addition, adolescents with more severe depressive symptoms began to experience losses in different dimensions of quality of life (QoL) [2–4,28]. Recent studies have already shown that the pandemic has negatively impacted the QoL of adolescents [28]. The psychosocial dimensions of adolescents' QoL, such as mood, self-esteem, and social relationships, have been affected, evidencing the relevance of the school environment for the promotion of mental health among students [29].

Challenges arising from remote learning during the pandemic affected the teaching–learning process in adolescents [30]. The requirement for mastering new skills by the students, such as proficiency in digital technologies and the ability for autonomous learning, may have increased stress and negatively affected their moods [30,31]. In addition, adolescents, especially vocational–technical school students, are commonly subjected to a heavy study load, academic stress, and excessive activities and school subjects [32,33].

In Brazil, for example, full-time vocational–technical school programs are offered by the Brazilian Federal Network of Professional, Scientific and Technological Education) [34,35]. In the Brazilian educational system, 8.1 million students are enrolled in secondary education, 23.5% of whom are in vocational education; among these, around 500,000 students attend vocational–technical schools [34,35]. Students from vocational–technical schools are subjected to an overload of lessons (around 36–40 h per week), which is much higher than the time that high school students spend studying [36]. However, the available literature on these and other mental health risk factors in vocational–technical school students, especially during the COVID-19 pandemic, remains scarce, thereby limiting our ability to understand and address these problems.

In addition to monitoring depressive symptoms among vocational–technical school students, early diagnosis is crucial for effectively planning public policies that focus on the prevention and treatment of depression in this population [37]. Therefore, it is important to clarify the factors associated with depressive symptoms and to understand the repercus-

sions of the COVID-19 pandemic on the mental health and QoL of these students. Thus, regional differences should be considered as a function of the local culture, study hours, and school environment of the students [38–41]. Based on the above, the main aim of this study was to compare the prevalence of depressive symptoms, behavioral habits, and QoL in students from two campuses with different socioeconomic and cultural characteristics (urban and rural). Secondly, our study intended to determine the association between depressive symptoms with behavioral habits (eating habits, psychoactive substance use, risky sexual behavior and physical activity level) and QoL in these students during the COVID-19 pandemic.

## 2. Materials and Methods

### 2.1. Study Type

This study is part of a larger research project, titled “Depressive Symptoms and Quality of Life among Vocational–Technical School Students (SDQV-EMI).” This cross-sectional study was conducted with students of the Brazilian Federal Network of Professional, Scientific and Technological Education from April to July 2021.

### 2.2. Context

Vocational–technical school students from two campuses at an institution of the RFEPCT—IF-Goiano were invited to participate in the study. One of the campuses is located in an urban city (metropolitan area) and the other in a rural city (rural area), in the interior of the state of Goiás [42]. IF Goiano is a multi-campus, multi-curricular, professional, basic, secondary- and higher-education institution, specializing in Vocational Education [43]. The institution offers vocational–technical programs in secondary education in different areas of training, which are structured based on the concept of an integrated curriculum and a comprehensive human training [44].

The vocational–technical school of the Federal Institutes offers full-time programs. However, the workload among the programs may vary with the political pedagogical projects on each campus [45]. Although IF students tend to have a lower average socioeconomic index and greater ethnic–racial diversity, their academic performance is highly similar to that of students from private schools [44]. Their good academic results stem mainly from their general average grades in the National Secondary Education Examination the high-quality training of their teachers, and the good teaching facilities and conditions [44].

The urban city had an estimated population of 22,000 inhabitants, a high Human Development Index (HDI = 0.706), and a per capita Gross Domestic Product (GDP) of approximately BRL 53,000.00 in 2018 [42]. The rural city is located approximately 180 km from the capital Goiânia, has approximately 22,000 inhabitants, and has a high HDI (0.775) [42]. The per capita GDP of the city was BRL 24,893.60 in 2018 [42].

### 2.3. Participants

The sample size was calculated to assess population parameters in the vocational–technical school adolescents from both campuses. Based on the estimated population, the recommended sample size was 257 participants (5% maximum error and 95% confidence level) [46]. The final sample included 343 adolescent students who were 9th, 10th, and 11th graders, that is, who attended the first, second, and third years of the vocational–technical school.

Three hundred and forty-three teenagers aged between 14 and 18 years (55.7% women, with a mean age of  $16.1 \pm 0.9$  years) participated in the study. Of the total sample, 110 participants (73.6% women,  $16.1 \pm 0.9$  years) studied on the campus in the metropolitan area and 233 (47.2% women,  $16.0 \pm 0.9$  years) studied on the campus in the rural area.

#### 2.4. Data Collection Procedure

Data were collected using an online questionnaire. The Informed Consent Form (ICF), the Informed Assent Form (IAF), and the research questionnaire were structured and shared via a digital platform. Students who agreed to participate in this study, with the consent of their legal guardians, received the link to the research questionnaire and the digital application via email, as well as their copies of the ICF (guardian) and IAF (minor). The study was approved by the Research Ethics Committee of the Federal Institute of Education, Science and Technology of Goiano (n° 28837120.0.0000.00.36).

#### 2.5. Instruments

##### 2.5.1. Sociodemographic- and COVID-19-Pandemic-Related Variables

Sociodemographic (sex, age, color/ethnicity, vocational–technical secondary program, grade, region, access to cell phone/computer, employment status, and household) and COVID-19-pandemic-related (prior diagnosis of COVID-19, social isolation, attitude towards social distancing measures, social distancing measures adopted, and concern with family health and finances and learning during remote classes) data were collected [47].

##### 2.5.2. Behavioral Habits

Behavioral habits encompass issues related to eating habits, psychoactive substance use, risky sexual behavior [21,47,48], and physical activity level. These variables are described below:

- (A). Eating habits: Feeling hungry due to lack of food in the last seven days; consumption of fruits, vegetables and soda in the last seven days.
- (B). Psychoactive substance use: Tobacco smoking (smoked at least once; frequency of smoking in the last 30 days); alcohol drinking (drank at least once; frequency of drinking in the last 30 days, experienced getting drunk at least once); illicit drug use, including marijuana, cocaine, and crack (used at least once; frequency of use in the last 30 days).
- (C). Risky sexual behavior: Prior sexual intercourse; age at first instance of sexual intercourse; number of sexual partners in lifetime.
- (D). Physical activity level: Self-reported physical activity was assessed using the short version of the International Physical Activity Questionnaire (IPAQ—short version), validated for Brazilian adolescents [48]. The IPAQ—short version assesses the frequency (days/week) and duration (minutes/day) of walking, and moderately and vigorously exercising, in the last seven days. The physical activity level in the participants was classified as “low” (not meeting the criteria for the “moderate” or “high” categories); “moderate” (at least 20 min of vigorous physical activity three or more days/week; at least 30 min of moderate physical activity or walking five or more days/week; any combination of walking, moderate, or vigorous physical activity reaching at least 600 metabolic equivalent of task (MET) minutes/week at least five days/week); and “high” (vigorous physical activity reaching at least 1500 MET minutes/week at least three days/week; any combination of walking, moderate, or vigorous physical activity reaching at least 3000 MET minutes/week at least seven days/week) [49].

##### 2.5.3. Quality of Life

QoL was assessed using the abbreviated version of the World Health Organization Quality of Life Assessment Instrument (WHOQOL-bref), translated and validated into Portuguese [50]. The WHOQOL-bref contains 26 questions scored based on a five-point, Likert-type scale as follows: 1 = “very poor”; 2 = “poor”; 3 = “neither poor nor good”; 4 = “good”; 5 = “very good”. The first two questions refer to self-perception of QoL (WHOQOL-1) and to satisfaction with health (WHOQOL-2). The other 24 items are divided into the following four domains: physical health (7 items), psychological (6 items), social relationships (3 items), and environment (8 items). The four domains of the WHOQOL-bref

are converted into a scale ranging from 0–100 points (WHOQOL, 1998). The closer to 100 the total score, the better the QoL. The instrument showed validity, satisfactory internal consistency (Cronbach's alpha = 0.91), and test–retest reliability [50,51]. For data analysis, QoL indices were categorized into tertiles and classified as “low QoL” (tertile 1—0 to 49.47 points), “moderate QoL” (tertile 2—49.48 to 58.68 points), and “high QoL” (tertile 3—58.69 to 100 points).

#### 2.5.4. Depressive Symptoms

Depressive symptoms were assessed using the version of the Children's Depression Inventory (CDI) validated for the Brazilian population [52]. The CDI consists of 27 items referring to affective, cognitive, somatic, and behavioral symptoms. Each CDI item consists of three statements scored 0, 1, or 2, and the sum total indicates the final score. The participants had to check the options that best described their situation in the last two weeks. The cut-off score adopted was 17 points [53]. Thus, a score of 17 or higher indicated the presence of depressive symptoms. The version that was validated and standardized by Gouveia et al. [52] had an internal consistency index (Cronbach's alpha) of 0.81. Other studies conducted with Brazilian adolescents demonstrated good internal consistency, with Cronbach's alpha ranging from 0.85–0.91 [53,54].

#### 2.6. Data Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 25.0, using descriptive statistics and the Chi-squared test (bivariate analysis) to compare the prevalence of depressive symptoms, QoL, and behavioral habits between campuses. The data were tested for normality using the Kolmogorov–Smirnov test. Considering the non-normal distribution of the data, non-parametric tests (Mann–Whitney U Test) were used to compare the median CDI and WHOQOL-bref scores between participants on the two campuses.

Due to the absence of significant differences in the presence of depressive symptoms between the samples from the two campuses, an analysis based on the Poisson regression model with robust variance was performed on the entire sample [55,56]. In this analysis, depressive symptoms were considered outcome variables, while sociodemographic variables, QoL, and behavioral habits were considered independent variables. Poisson regression was adjusted for the following variables, selected according to the literature: sex, age, region, and prior diagnosis of COVID-19 [21,57–60]. The effect was measured using the prevalence ratio (PR) and corresponding 95% confidence intervals (95% CI) ( $p < 0.05$ ). This method of analysis was chosen because, when the outcome variable has a high frequency, the odds ratio (OR) may overestimate the measure of association [56]. Furthermore, interpreting the OR as risk in cross-sectional studies can be misleading because the prevalence of the study variables is measured, not the incidence [56].

### 3. Results

#### 3.1. Sample Description

Table 1 presents the sociodemographic characteristics and COVID-19-pandemic-related situations of the included participants from the two campuses. The populations of students from the urban and rural campuses differed significantly in sex; the urban campus had a greater representation of women, whereas the rural campus was more represented by men ( $p < 0.001$ ).

**Table 1.** Sociodemographic characteristics and COVID-19-pandemic-related situations in the sample, stratified by campus.

Variables <sup>a</sup>		Urban Campus (N = 110)	Rural Campus (N = 233)	
Sociodemographic Characteristics	N (%)	N (%)	N (%)	
Sex				
Male	152 (44.3)	29 (26.4)	123 (52.8)	<0.001
Female	191 (55.7)	81 (73.6)	110 (47.2)	
Age (years)				
14	10 (2.9)	5 (4.5)	5 (2.1)	
15	89 (25.9)	21 (19.1)	68 (29.2)	0.166
16	133 (38.8)	45 (40.9)	88 (37.8)	
17–18	111 (32.4)	39 (35.5)	72 (30.9)	
Color/ethnicity				
White	133 (38.8)	38 (34.5)	95 (40.8)	0.072
Brown	165 (48.1)	51 (46.4)	114 (48.9)	
Other	45 (13.1)	21 (19.1%)	24 (10.3)	
Grade/Year				
9th grade/1st year	150 (43.7)	47 (42.7)	103 (44.2)	
10th grade/2nd year	114 (33.2)	30 (27.3)	84 (36.1)	0.075
11th grade/3rd year	79 (23.0)	33 (30.0)	46 (19.7)	
Computer				
Yes	266 (77.6)	82 (74.5)	184 (79.0)	0.359
No	77 (22.4)	28 (25.5)	49 (21.0)	
Employment				
Yes	83 (24.2)	29 (26.4)	54 (23.2)	0.520
No	260 (75.8)	81 (73.6)	179 (76.8)	
Household				
Lives with the parents	189 (55.1)	57 (51.8)	132 (56.7)	
Lives only with the mother	111 (32.4)	33 (30.0)	78 (33.5)	0.121
Lives only with the father	16 (4.7)	9 (8.2)	7 (3.0)	
Does not live with the parents	27 (7.9)	11 (10.0)	16 (6.9)	
Pandemic-related situations				
COVID-19 diagnosis				
Yes	43 (12.5)	11 (10.0)	32 (13.7)	0.330
No	300 (87.5)	99 (90.0)	201 (86.3)	
Social isolation				
Extremely isolated	29 (8.5)	9 (8.2)	20 (8.6)	
Very isolated	69 (20.1)	23 (20.9)	46 (19.7)	0.881
Moderately isolated	142 (41.4)	49 (44.5)	93 (39.9)	
Slightly isolated	68 (19.8)	19 (17.3)	49 (21.0)	
Not at all isolated	35 (10.2)	10 (9.1)	25 (10.7)	
Concern with the health of family/friends				
Extremely concerned	79 (23.0)	32 (29.1)	47 (20.2)	
Very concerned	141 (41.1)	39 (35.5)	102 (43.8)	0.269
Moderately concerned	71 (20.7)	22 (20.0)	49 (21.0)	
Slightly concerned	36 (10.5)	10 (9.1)	26 (11.2)	
Not at all concerned	16 (4.7)	7 (6.4)	9 (3.9)	
Concern with remote learning				
Extremely concerned	165 (48.1)	52 (47.3)	113 (48.5)	
Very concerned	106 (30.9)	29 (26.4)	77 (33.0)	0.275
Moderately concerned	48 (14.0)	17 (15.5)	31 (13.3)	
Slightly concerned	17 (5.0)	9 (8.2)	8 (3.4)	
Not at all concerned	7 (2.0)	3 (2.7)	4 (1.7)	

Table 1. Cont.

Variables <sup>a</sup>		Urban Campus (N = 110)	Rural Campus (N = 233)	
Concern with the impact of COVID-19 on finances				
Extremely concerned	80 (23.3)	30 (27.3)	50 (21.5)	0.137
Very concerned	86 (25.1)	26 (23.6)	60 (25.8)	
Moderately concerned	91 (26.5)	35 (31.8)	56 (24.0)	
Slightly concerned	51 (14.9)	12 (10.0)	39 (16.7)	
Not at all concerned	35 (10.2)	7 (6.4)	28 (12.0)	
Social distancing measures				
I followed all social distancing measures, and I did not leave home to perform any activity	62 (18.1)	20 (18.2)	42 (18.0)	0.037
I only left home to perform essential activities, unrelated to work	157 (45.8)	39 (35.5)	118 (50.6)	
I left home to perform essential activities, including work	106 (30.9)	44 (40.0)	62 (26.6)	
I did not follow any social distancing measure	18 (5.2)	7 (6.4)	11 (4.7)	
Social distancing period				
Fewer than 30 days	59 (17.2)	19 (17.3)	40 (17.2)	0.538
From 30 to 60 days	94 (27.4)	26 (23.6)	68 (29.2)	
More than 60 days	190 (55.4)	65 (65)	125 (53.6)	

<sup>a</sup>—For some variables, the total scores reflect missing data; *p*—*p* value of the Chi-square/Fisher's exact test.

Among the COVID-19-pandemic-related variables, 30% of all students felt “extremely/very isolated”, 64.1% were “extremely/very concerned” with the health of family/friends, 79% were “extremely/very concerned with their own remote learning”, and 48.4% were “extremely/very concerned with finances”. The measures of social distancing adopted during the pandemic revealed different behaviors between students from the two campuses, with 6.4% of students in the urban city region reporting that they did not follow any social distancing measures, and 40.0% leaving home to perform essential activities, including work. On the rural campus, a higher percentage (50.6%) of students left home to perform essential activities unrelated to work, with 4.7% of students not following any social distancing measures (*p* = 0.037) (Table 1).

### 3.2. Depressive Symptoms, Behavioral Habits and QoL in Students

CDI results indicate a prevalence of 43.4% (95% CI: 38.0–49.0) of depressive symptoms among students. In the sample of the urban campus, the prevalence of depressive symptoms was 43.6% (95% CI: 37.1–49.8). In the rural campus, the prevalence of depressive symptoms was 43.3% (95% CI: 34.6 to 53.0) (Table 2). No differences in eating habits, substance use, or physical activity level were found between campuses. The campuses only differed in prior sexual intercourse and in WHOQOL-bref. Of the students on the urban campus, 32.1% had previous sexual intercourse, whereas on the rural campus, this percentage was 22.7%. A higher percentage of students with high QoL was observed on the rural campus compared with the urban campus (34.3% versus 30.9%, *p* < 0.001).

**Table 2.** Depressive symptoms, behavioral habits, and QoL in the sample, stratified by campus.

Variables <sup>a</sup>	TOTAL (N = 343) N (%)	Campuses N (%)		p
		Urban Campus (N = 110)	Rural Campus (N = 233)	
Eating habits *				
Feeling hungry **				
Never	285 (83.1)	90 (81.8)	195 (83.7)	0.696
Rarely	40 (11.7)	15 (13.6)	25 (10.7)	
Sometimes/often/always	18 (5.3)	5 (4.5)	13 (5.6)	
Eating fruits **				
Regular consumption <sup>b</sup>	151 (44.0)	50 (45.5)	101 (43.3)	0.714
Irregular consumption	192 (56.0)	60 (54.5)	132 (56.7)	
Eating legumes/vegetables **				
Regular consumption <sup>b</sup>	212 (61.8)	72 (65.5)	140 (60.1)	0.339
Irregular consumption	131 (38.2)	38 (34.5)	93 (39.9)	
Drinking soda **				
Regular consumption <sup>b</sup>	100 (29.2)	39 (35.5)	61 (26.2)	0.078
Irregular consumption	243 (70.8)	71 (64.5)	172 (73.8)	
Substance use *				
Tobacco smoking				
Yes	41 (12.0)	12 (10.9)	29 (12.4)	0.682
No	302 (88.0)	98 (89.1)	204 (87.6)	
Smoked ***				
Never	334 (97.4)	106 (96.4)	228 (97.9)	0.617
1–2 days	4 (1.2)	2 (1.8)	2 (0.9)	
3–9 days	1 (0.3)	0 (0.0)	1 (0.4)	
10 or more days	4 (1.2)	2 (1.8)	2 (0.9)	
Alcohol drinking				
Yes	150 (43.7)	51 (46.4)	99 (42.5)	0.500
No	193 (56.3)	59 (53.6)	134 (57.5)	
Drank *** <sup>c</sup>				
Never	275 (80.2)	85 (77.3)	190 (81.5)	0.404
1–2 days	37 (10.8)	16 (14.5)	21 (9.1)	
3–9 days	23 (6.7)	6 (5.5)	17 (7.4)	
10 or more	8 (2.3)	3 (2.7)	5 (2.2)	
Being drunk *** <sup>c</sup>				
Never	278 (81.0)	84 (76.4)	194 (83.3)	0.617
1–2 days	37 (10.8)	16 (14.5)	21 (9.0)	
3–9 days	24 (7.0)	9 (8.2)	15 (6.4)	
10 or more days	4 (1.2)	1 (0.9)	3 (1.3)	
Prior drug use <sup>d</sup>				
Yes	12 (3.5)	4 (3.6)	8 (3.4)	0.924
No	331 (96.5)	106 (96.4)	225 (96.6)	
Drug use *** <sup>c</sup>				
Never	340 (99.1)	110 (100.0)	230 (98.7)	>0.005
1–2 days	0 (0.0)	0 (0.0)	0 (0.0)	
3–9 days	1 (0.3)	0 (0.0)	1 (0.4)	
10 or more	2 (0.6)	0 (0.0)	3 (0.9)	
Sexual behavior				
Prior sexual intercourse				
Yes	89 (25.9)	36 (32.1)	53 (22.7)	0.049
No	254 (74.1)	74 (67.3)	180 (77.3)	
Age of first sexual intercourse <sup>c</sup>				
≤12 years	7 (7.9)	3 (8.3)	4 (7.5)	0.549
13–14 years	25 (28.1)	8 (22.2)	17 (32.1)	

Table 2. Cont.

Variables <sup>a</sup>	TOTAL (N = 343) N (%)	Campuses N (%)		<i>p</i>
		Urban Campus (N = 110)	Rural Campus (N = 233)	
≥15 years	57 (64.0)	25 (69.4)	32 (60.4)	
Number of sexual partners in life <sup>c</sup>				
1	40 (44.9)	18 (50.0)	22 (41.5)	0.461
2 or 3	31 (34.8)	13 (36.1)	18 (34.0)	
4 or more	18 (20.2)	5 (13.9)	13 (24.5)	
Physical activity level				
Low	110 (32.1)	35 (31.8)	75 (32.2)	0.189
Moderate	173 (50.4)	50 (45.5)	123 (52.8)	
High	60 (17.5)	25 (22.7)	35 (15.0)	
WHOQOL-Bref				
High QoL	114 (33.2)	52 (47.3)	62 (26.6)	<0.001
Moderate QoL	115 (33.2)	24 (21.8)	91 (39.1)	
Low QoL	114 (33.5)	34 (30.9)	80 (34.3)	
Depressive symptoms (CDI)				
Yes (≥17)	149 (43.4)	48 (43.6)	101 (43.3)	0.960
No (<17)	194 (56.6)	62 (56.4)	132 (56.7)	

Acronyms: CDI—Children’s Depression Inventory; QoL—Quality of Life; WHOQOL-Bref—World Health Organization Quality of Life. \* Classification of eating habits based on indices proposed by the National Survey of School Health (PeNSE); \*\* Last seven days; \*\*\* Last 30 days. <sup>a</sup>—For some variables, the total scores reflect missing data; <sup>b</sup>—Regular consumption (at least on 5 of the 7 previous days); <sup>c</sup>—Only when applicable; <sup>d</sup>—marijuana, cocaine, crack; *p*—Chi-squared *p*-value/Fisher’s Exact Test.

The average CDI score among students was  $15.8 \pm 9.4$  (95% CI: 14.8–16.8). The analyses showed that female students ( $17.9$ ; 95% CI: 16.4–19.2) had higher CDI scores than male students ( $13.1 \pm 9.0$ ; 95% CI: 11.7–14.6,  $p < 0.001$ ). The mean CDI scores of the students from the urban ( $16.40 \pm 10.90$ ) and rural ( $15.47 \pm 8.70$ ) campuses did not differ significantly ( $p = 0.922$ ). Female students had higher mean CDI scores than male students, on both the urban ( $17.73 \pm 10.42$  versus  $12.69 \pm 11.57$ ,  $p = 0.009$ ) and rural ( $17.96 \pm 8.43$  versus  $13.24 \pm 8.27$ ,  $p < 0.001$ ) campuses, respectively. In addition, higher mean scores of overall QoL ( $p = 0.004$ ), social relationships ( $p < 0.001$ ), and environment ( $p < 0.001$ ) domains were observed in students from the urban campus (Table 3) than in those from the rural campus.

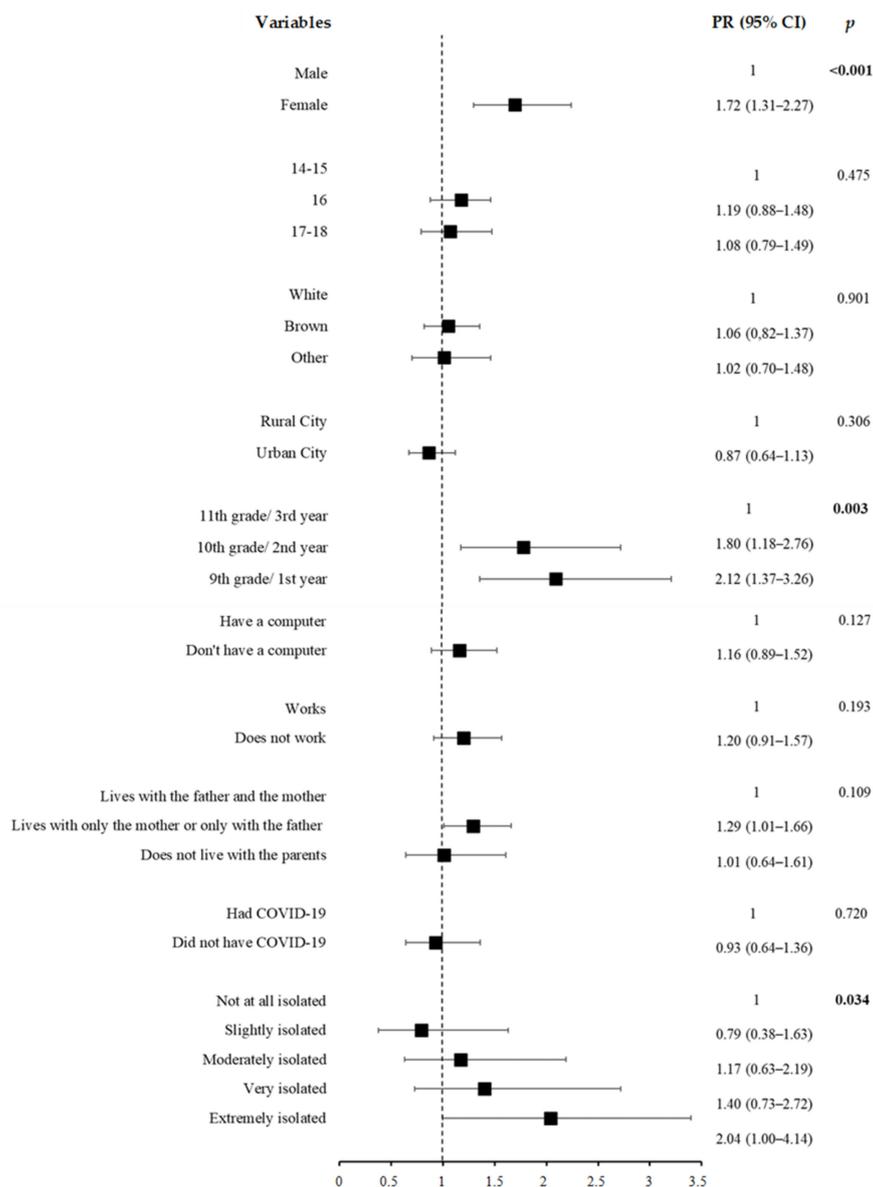
Table 3. Mean CDI and WHOQOL-bref scores, stratified by campus.

Variables	Total (n = 343)	Campus Urban (n = 110)	Campus Rural (n = 233)	<i>p</i> *
	Mean (SD), 95% CI	Mean (SD), 95% CI	Mean (SD), 95% CI	
CDI total score	15.8 (9.4), 14.8–16.8	16.4 (10.9), 14.3–18.4	15.5 (8.7), 14.4–16.6	0.922
Female	17.9 (9.3), 16.4–19.2	17.7 (10.4), 15.4–20.0	18.0 (8.4), 16.4–19.6	<0.001
Male	13.1 (9.0), 11.7–14.6	12.7 (11.6), 8.3–17.1	13.2 (8.3), 11.8–14.7	
<i>p</i> *	<0.001	0.009	<0.001	
WHOQOL-bref				
Physical health	52.6 (14.0), 51.1–54.1	52.8 (16.8), 49.6–55.9	52.5 (18.04), 50.9–54.2	0.913
Psychological	53.0 (19.7), 50.9–55.0	51.1 (22.8), 46.8–55.4	53.9 (18.24), 51.6–56.2	0.243
Social relationships	52.0 (19.5), 49.9–54.0	62.1 (18.2), 58.7–65.6	47.2 (11.8), 44.9–49.6	<0.001
Environment	57.5 (14.6), 56.0–59.1	62.4 (18.3), 58.9–65.8	55.2 (10.8), 53.7–56.8	<0.001
Overall QoL	53.8 (12.8), 52.4–55.1	57.1 (16.0), 54.1–60.1	52.2 (10.8), 50.8–53.6	0.004

Acronyms: CDI—Children Depression Inventory; SD—Standard deviation; CI—confidence interval; QoL—Quality of life; WHOQOL-Bref—World Health Organization Quality of Life. \* Mann–Whitney U Test indicating significant differences when  $p < 0.05$ .

### 3.3. Depressive Symptoms and Associated Factors during the COVID-19 Pandemic

The results from the Poisson regression analysis are outlined in Table S1. The results of the adjusted Poisson regression are shown in Figures 1–4. Figure 1 shows the adjusted PR results and indicates that the following variables were associated with the presence of depressive symptoms: being female (PR: 1.72; 95% CI: 1.31–2.27); being in the 10th grade/2nd year (PR: 1.80; 95% CI: 1.18–2.76); being in the 9th grade/1st year (PR: 2.08; 95% CI: 1.37–3.18); and experiencing extreme isolation during the pandemic (PR: 2.04; 95% CI: 1.00–4.14).

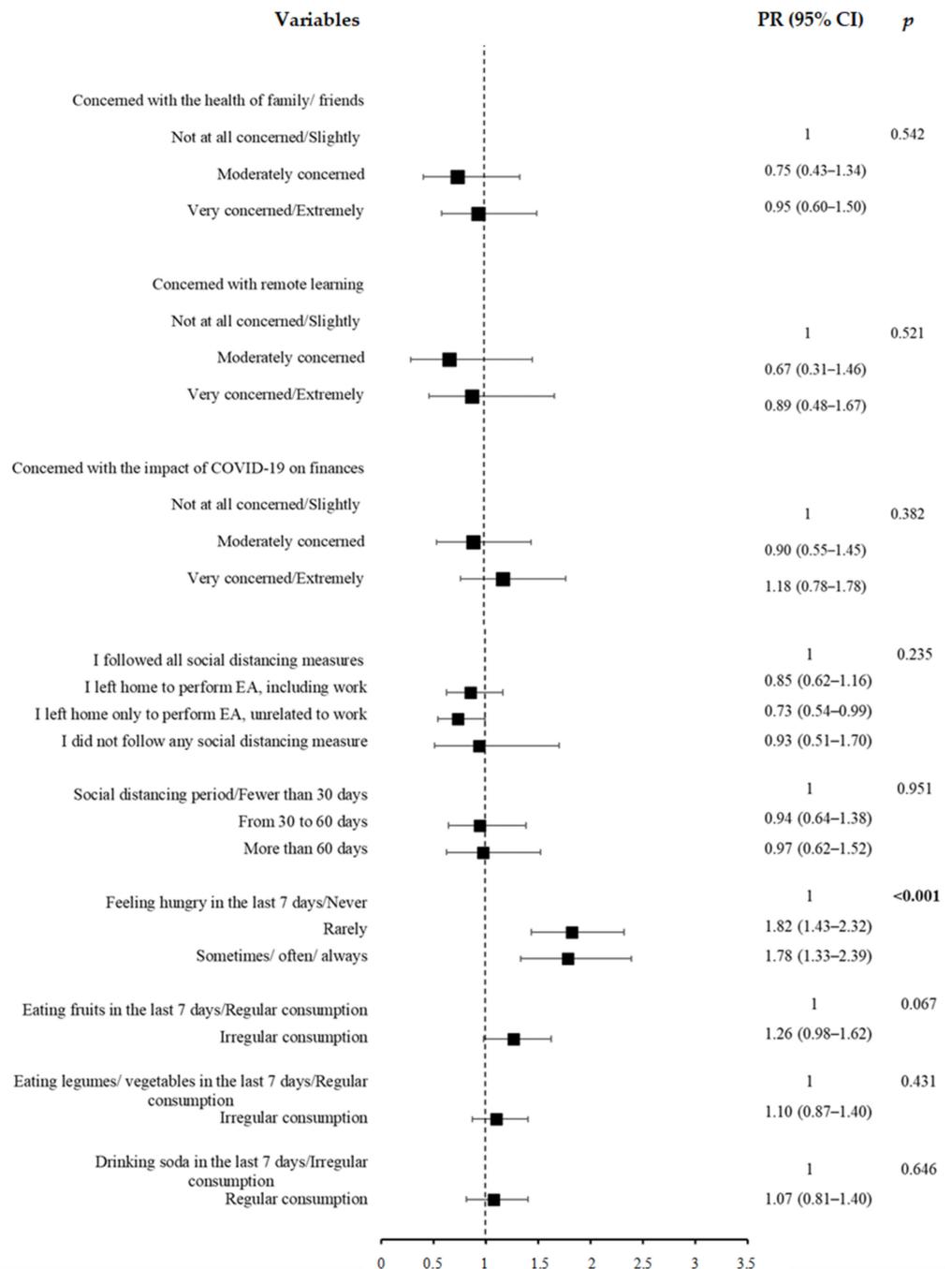


Abbreviations: CI, confidence interval; PR, prevalence ratio; p, p-value.

**Figure 1.** Poisson regression results for depressive symptoms and sociodemographic- and COVID-19-related variables ( $n = 343$ ).

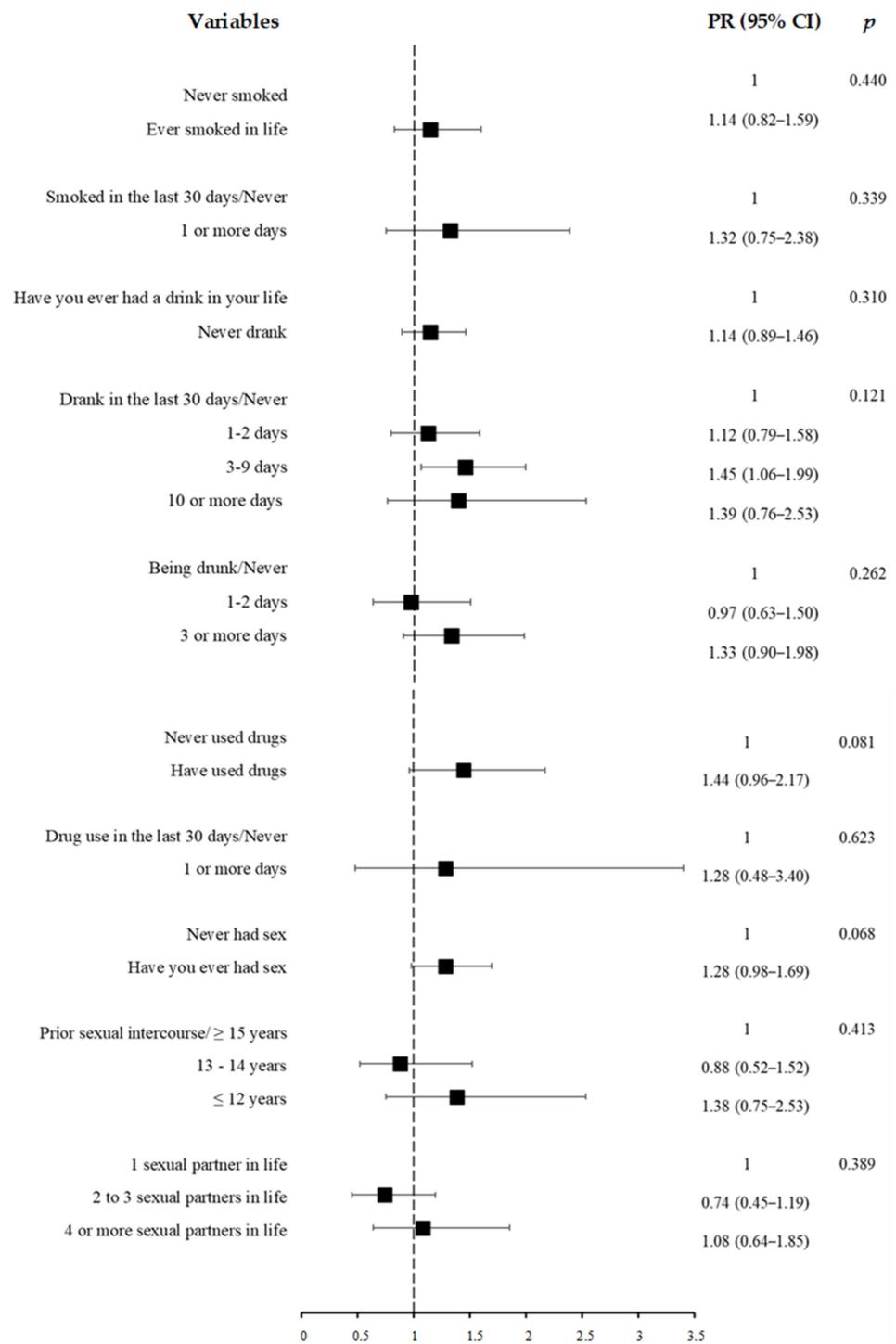
Of the variables related to behavioral habits, feeling hungry due to lack of food at home rarely (PR: 1.82, 95% CI: 1.43–2.32) and sometimes/often/always (PR: 1.78, 95% CI: 1.33–2.39) in the last seven days were associated with depressive symptoms (Figure 2). Figure 3 indicates that there was no significant association between depressive symptoms and variables related to the use of psychoactive substances and sexual behavior. The

prevalence of depressive symptoms was higher among students with low physical activity levels (PR: 1.68, 95% CI: 1.09–2.59) (Figure 4), moderate QoL (PR: 2.87, 95% CI: 1.68–4.89) and low QoL (PR: 5.66, 95% CI: 3.48–9.19) (Figure 4).



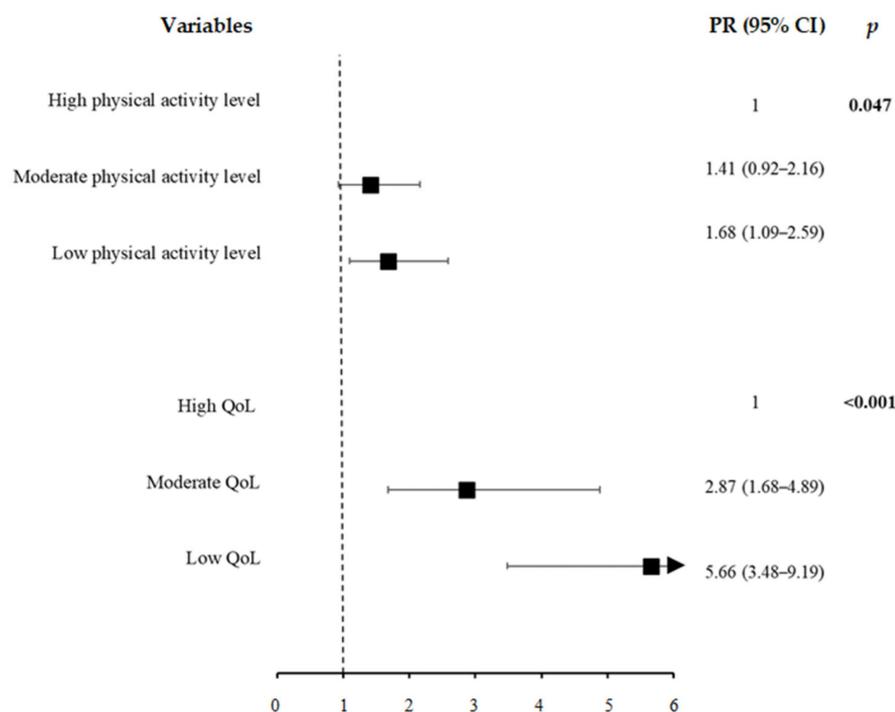
Abbreviations: CI, confidence interval; EA, essential activities; PR, prevalence ratio; p, p-value.

Figure 2. Poisson regression results for depressive symptoms and variables related to COVID-19 and eating habits (n = 343).



Abbreviations: CI, confidence interval; PR, prevalence ratio; p, p-value.

Figure 3. Poisson regression results for depressive symptoms and variables related to psychoactive substance use and sexual behavior (n = 343).



Abbreviations: CI, Confidence interval; PR, Prevalence ratio; p, p-value; QoL, Quality of life.

Figure 4. Poisson regression results for depressive symptoms and variables related to physical activity level and QoL (n = 343).

#### 4. Discussion

This study compared the prevalence of depressive symptoms, behavioral habits, and QoL in students from two campuses with different socioeconomic and cultural characteristics. Although the institutions were located in different geographic regions, no significant differences in the prevalence of depressive symptoms were found between the two groups of students. Except for sexual behavior, behavioral habits were similar between students on both campuses. Differences in sexual behavior between students, specifically regarding greater reports of sexual intercourse among urban campus students, may be related to aspects such as self-efficacy, religiosity, and family support, which are the variables associated with the onset of sexual life among adolescents [61,62]. Sexual initiation, which usually occurs during adolescence, can be an indicator of risk for sexual abuse, early pregnancy, and sexually transmitted diseases [62]. A study of adolescents reported that engaging in sexual activity increased the risk of depression, especially among girls [20]. In addition, other issues involving the number of sexual partners and condom use can directly affect psychological outcomes in adolescents and young adults [20,63,64]. Although our findings demonstrated that sexual behavior was not associated with depressive symptoms, future studies should further investigate risky sexual behaviors, especially condom use [20,63], and their impact on the mental health of vocational–technical school students.

Students from the metropolitan area scored higher in overall QoL and in the social relations and environment domains. This difference can be explained by the geographic region of the campus, which reflects the specificities of the local context where students live. Therefore, factors such as social support, interpersonal relationships, and access to recreation, leisure, health services, and transport can determine the self-perceived QoL of these adolescents [28,39]. Other conditions related to individual (gender, age, and grade) and social (interpersonal relationships, sleep habits, and family/school environment) aspects can also affect the level of QoL of students [65]. Social distancing measures were adopted with less caution by students in the metropolitan area; 6.4% of those students did not follow any social distancing measures, whereas 4.7% of students on the rural campus

did. This difference may be related to the higher scores in the social relationships and environment domains of students from the metropolitan area, because social isolation restricts activities such as contact with family and friends, opportunities for leisure, and a sense of freedom [23].

In addition, this study evaluated the prevalence of depressive symptoms and their association with behavioral habits and QOL in vocational–technical school students during the COVID-19 pandemic. The prevalence of depressive symptoms in students included in this study was similar to that found among adolescents in some countries in Asia, North America, and Europe, where estimates indicated a high rate of mental illness during the pandemic period [1,66,67]. There was also a significant association between social isolation and depressive symptoms among students. Social deprivation in adolescence may substantially harm emotional health, because adolescents experience a period of increasing need for interaction with peers [68]. Of the adverse conditions experienced by students during the pandemic, the feeling of loneliness has the greatest impact on mental health [31,69]. The feeling of loneliness is a construct strongly associated with depressive symptoms and the social distancing period [70], which may help to explain the higher prevalence of depressive symptoms among students who felt extremely isolated.

Female students had a 1.72 times higher prevalence of depressive symptoms than male students. In addition, women scored higher on the CDI than men on both campuses. This finding is in line with evidence that women suffer more from depression than men [71–73]. Several studies have attempted to explain the higher risk of depression among women based on a series of biological and social determinants [72,74]. Among those determinants, five stand out, namely hormonal changes [75], low physical activity levels [76,77], hormonal contraceptive use [78], playing multiple social roles [79,80], and the increased probability of suffering physical and/or sexual violence [81,82]. Therefore, developing preventive actions for the school environment requires a better understanding of these aspects and the development of actions and strategies to positively change the factors that can increase the probability of girls developing depressive symptoms.

The two-fold higher prevalence of depressive symptoms among first year students is a noteworthy finding. Depressive symptoms may decrease over the school years during high school [83] because first year students are adapting to the new educational institution and new interpersonal relationships, which exacerbates negative feelings such as insecurity, fear, anxiety, and stress [84]. Conversely, in the last years, students may be more adapted to the school routine and experience less academic pressure [83]. Other key aspects include profound biological, psychological, and social changes, which are more accentuated in the transition phase between childhood and adolescence [85,86]. These transformations can also considerably affect behavior and emotional control in early high school students [87].

Regarding eating habits, our study showed that students who felt hungry due to a lack of food at home had a higher prevalence of depressive symptoms. Limited or uncertain access to adequate food are conditions related to food insecurity, commonly found in low- and middle-income countries, which have experienced economic recession as a result of the COVID-19 pandemic [88,89]. Food insecurity directly affects the quality of diet and increases the risk of malnutrition and the consumption of unhealthy foods [90–92]. Food deprivation, restricted food choice, and anxiety about food supply may directly impair the psychological health of an individual [93]. Therefore, feelings of deprivation and food restriction were likely additional factors that negatively affected the students' moods during the social isolation period due to the COVID-19 pandemic.

Socioeconomic inequalities, culture, environmental aspects, and access to technologies are known to affect the levels of physical activity in adolescents [77]. In addition, good mental health in adolescents has been associated with high levels of physical activity [12,94,95]. This trend was confirmed in the present study, wherein low physical activity levels were associated with a higher prevalence of depressive symptoms. Mental health in adolescence is directly influenced by their level of physical activity through neurobiological, psychosocial, or behavioral mechanisms [96]. Studies suggest that regular physical activity can contribute

to changes in the structural and functional composition of the brain, the opportunity for social interaction, self-regulation, and coping skills among adolescents [97,98]. The regular practice of physical exercise can even increase the synthesis and release of neurotransmitters that improve mood and mental health [99]. Considering that more than half of Brazilian adolescents do not meet the daily recommendation of 60 min of moderate-to-vigorous physical activity, this behavior likely has short- and long-term damaging effects on the physical and psychological well-being of these young people [12,77,100]. Accordingly, effective approaches to combat this issue must target school-age audiences to promote increased physical activity levels and physical and psychological well-being.

Our findings showed that the prevalence of depressive symptoms was associated with moderate and low QoL. It is known that dissatisfaction with QoL is associated with a higher prevalence of symptoms of depression [101–103]. Adolescents' QoL comprises subjective dimensions (psychological, physical, and social functioning) and objective conditions (housing, employment, and educational facilities) [104,105]. However, it can be difficult to specify which aspects of QoL determine psychological health. This is because students' mental well-being can interact with parameters related to physical activity levels, for example, overweight and obesity [106]. In addition, vigorous physical activities have the potential to indirectly affect QoL by mitigating depressive symptoms [106]. Therefore, further studies are needed to clarify which dimensions of QoL interact with depressive symptoms among vocational–technical school students.

Some limitations may affect the interpretation and generalizability of our results. Because this was a cross-sectional study, we were unable to establish causal inferences. The convenience sample was concentrated in the Brazilian Midwest, precluding the generalization of the findings to the rest of Brazil. Another important limitation results from the online administration of self-reported questionnaires. Online data collection imposed by pandemic restrictions may have limited the sample of participants to those who had internet access. Lastly, we could not exclude residual bias caused by unmeasured variables such as income, anxiety and stress.

This study has several strengths. First, in addition to evaluating the prevalence of depressive symptoms, this study investigated their association with a broad set of indices of behavioral habits and with QoL; these are important variables for identifying students at a higher risk of depression, and have remained overlooked in research during the COVID-19 pandemic. Second, the study was based on a solid methodology using internationally validated instruments and statistical analyses, including the Poisson regression model. Poisson regression is regarded as a robust measure for estimating the prevalence of a given outcome, in terms of proportion [39]. Lastly, we evaluated vocational–technical school students of the Brazilian Federal Network of Professional, Scientific and Technological Education, a research area overlooked in scientific studies. Therefore, our findings help to guide public mental health policies in the context of vocational education, and to contribute to the literature in this field of research.

Based on our findings, future interventions should improve physical activity levels and the conditions of access to regular meals for students. Given the high vulnerability of women, specific approaches to promoting mental health among female students are also needed. Moreover, health and education policies must simultaneously focus on different mental health predictors, especially on increasing social support and providing opportunities for leisure, physical activity and sports to vocational–technical school students.

## 5. Conclusions

Students from both urban and rural campuses showed similar characteristics regarding the prevalence of depressive symptoms and behavioral habits, which differed only in relation to social distancing measures adopted during the COVID-19 pandemic, in sexual behavior, and in self-perception of QoL. This study demonstrated that the high prevalence of depressive symptoms among vocational–technical school students during the COVID-19 pandemic was associated with being female, being in the 10th and 9th grades, experiencing

social isolation, and having a moderate or low QoL. Regarding behavioral habits, the prevalence of depressive symptoms was associated with insufficient physical activity and irregular food consumption (feeling hungry) due to the lack of food at home. The results emphasize the importance of interventions aimed mainly at female students and those in the initial years of high school, in addition to the importance of physical activity, food safety, and QoL for the improvement of mental health in students.

**Supplementary Materials:** The following are available online at <https://www.mdpi.com/article/10.3390/ijerph19063735/s1>, Table S1. Poisson regression analysis of depressive symptoms and independent variables ( $n = 343$ ).

**Author Contributions:** Conceptualization, M.d.S.V.F. and M.N.; methodology, M.d.S.V.F. and M.N.; software, M.d.S.V.F. and M.N.; formal analysis, M.d.S.V.F. and M.N.; investigation, M.d.S.V.F., T.M.V.d.S. and M.N.; resources, M.d.S.V.F. and M.N.; writing—original draft preparation, M.d.S.V.F.; writing—review and editing, M.d.S.V.F., T.M.V.d.S., P.R.e.S.N., A.A.d.A. and M.N.; visualization, M.d.S.V.F. and M.N.; supervision, M.N.; project administration, M.N. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research did not receive external funding.

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of Federal Institute of Education, Science and Technology of Goiano (n° 28837120.0.0000.00.36, 6 April 2020).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** Due to sensitive data, the data can be accessed upon request to the authors.

**Acknowledgments:** The authors thank the Federal Institute of Education, Science and Technology of Goiano (IF Goiano) for funding this research, and the Child and Adolescent Health Research Group (GPSaCA).

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Wu, T.; Jia, X.; Shi, H.; Niu, J.; Yin, X.; Xie, J.; Wang, X. Prevalence of mental health problems during the COVID-19 pandemic: A systematic review and meta-analysis. *J. Affect. Disord.* **2021**, *281*, 91–98. [[CrossRef](#)] [[PubMed](#)]
2. Ravens-Sieberer, U.; Kaman, A.; Erhart, M.; Devine, J.; Schlack, R.; Otto, C. Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *Eur. Child Adolesc. Psychiatry* **2021**, *11*, 176–184. [[CrossRef](#)] [[PubMed](#)]
3. Hawes, M.T.; Szenczy, A.K.; Klein, D.N.; Hajcak, G.; Nelson, B.D. Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychol. Med.* **2021**, 1–9. [[CrossRef](#)] [[PubMed](#)]
4. Chen, X.; Qi, H.; Liu, R.; Feng, Y.; Li, W.; Xiang, M.; Cheung, T.; Jackson, T.; Wang, G.; Xiang, Y.T. Depression, anxiety and associated factors among Chinese adolescents during the COVID-19 outbreak: A comparison of two cross-sectional studies. *Transl. Psychiatry* **2021**, *11*, 148. [[CrossRef](#)] [[PubMed](#)]
5. Nagy-Pénzes, G.; Vincze, F.; Bíró, É. Contributing factors in adolescents' mental well-being—the role of socioeconomic status, social support, and health behavior. *Sustainability* **2020**, *12*, 9597. [[CrossRef](#)]
6. Rice, F.; Riglin, L.; Lomax, T.; Souter, E.; Potter, R.; Smith, D.J.; Thapar, A.K.; Thapar, A. Adolescent and adult differences in major depression symptom profiles. *J. Affect. Disord.* **2019**, *243*, 175–181. [[CrossRef](#)]
7. Mojtabai, R.; Olfson, M.; Han, B. National trends in the prevalence and treatment of depression in adolescents and young adults. *Pediatrics* **2016**, *138*, e20161878. [[CrossRef](#)]
8. Ferreira, V.R.; Jardim, T.V.; Sousa, A.L.L.; Rosa, B.M.C.; Jardim, P.C.V. Smoking, alcohol consumption and mental health: Data from the Brazilian study of Cardiovascular Risks in Adolescents (ERICA). *Addict. Behav. Rep.* **2019**, *9*, 100147. [[CrossRef](#)]
9. Rodzlan Hasani, W.S.; Saminathan, T.A.; Ab Majid, N.L.; Miaow Yn, J.L.; Mat Rifin, H.; Abd Hamid, H.A.; Robert Lourdes, T.G.; Ahmad, A.; Lsmail, H.; Rashid, R.A.; et al. Polysubstance use among adolescents in Malaysia: Findings from the national health and morbidity survey 2017. *PLoS ONE* **2021**, *16*, e0245593. [[CrossRef](#)]
10. Dorn, L.D.; Hostinar, C.E.; Susman, E.J.; Pervanidou, P. Conceptualizing puberty as a window of opportunity for impacting health and well-being across the life Span. *J. Res. Adolesc.* **2019**, *29*, 155–176. [[CrossRef](#)]
11. De Sousa Junior, I.; Nunes, R.S.M.; de Luca Corrêa, H.; Vieira, E. Functional training program: The impact on depression, anxiety and sleep quality in adolescents. *Sport Sci. Health* **2021**, *17*, 233–242. [[CrossRef](#)]

12. De Faria, F.R.; Neves Miranda, V.P.; Howe, C.A.; Sasaki, J.E.; dos Santos Amorim, P.R. Behavioral classes related to physical activity and sedentary behavior on the evaluation of health and mental outcomes among Brazilian adolescents. *PLoS ONE* **2020**, *15*, e0234374. [CrossRef] [PubMed]
13. Rodriguez-Ayllon, M.; Cadenas-Sánchez, C.; Estévez-López, F.; Muñoz, N.E.; Mora-Gonzalez, J.; Migueles, J.H.; Molina-García, P.; Henriksson, H.; Mena-Molina, A.; Martínez-Vizcaíno, V.; et al. Role of physical activity and sedentary behavior in the mental health of preschoolers, children and adolescents: A systematic review and meta-analysis. *Sport. Med.* **2019**, *49*, 1383–1410. [CrossRef] [PubMed]
14. Dale, L.P.; Vanderloo, L.; Moore, S.; Faulkner, G. Physical activity and depression, anxiety, and self-esteem in children and youth: An umbrella systematic review. *Ment. Health Phys. Act.* **2019**, *16*, 66–79. [CrossRef]
15. Bolanis, D.; Orri, M.; Castellanos-Ryan, N.; Renaud, J.; Montreuil, T.; Boivin, M.; Vitaro, F.; Tremblay, R.E.; Turecki, G.; Côté, S.M.; et al. Cannabis use, depression and suicidal ideation in adolescence: Direction of associations in a population based cohort. *J. Affect. Disord.* **2020**, *274*, 1076–1083. [CrossRef] [PubMed]
16. Bui, C.; Lin, L.Y.; Wu, C.Y.; Chiu, Y.W.; Chiou, H.Y. Association between emotional eating and frequency of unhealthy food consumption among Taiwanese adolescents. *Nutrients* **2021**, *13*, 2739. [CrossRef]
17. Moitra, P.; Madan, J.; Shaikh, N.I. Eating habits and sleep patterns of adolescents with depression symptoms in Mumbai, India. *Matern. Child Nutr.* **2020**, *16*, e12998. [CrossRef]
18. Xu, H.; Guo, J.; Wan, Y.; Zhang, S.; Yang, R.; Xu, H.; Ding, P.; Tao, F. Association Between Screen Time, Fast Foods, Sugar-Sweetened Beverages and Depressive Symptoms in Chinese Adolescents. *Front. Psychiatry* **2020**, *11*, 458. [CrossRef] [PubMed]
19. Kim, H.; Jeong, W.; Jang, S.; Kim, Y.; Park, E. Association between sexual behavior and depression in south korean adolescents: A cross-sectional study. *Int. J. Environ. Res. Public Health* **2021**, *18*, 4228. [CrossRef]
20. Luseno, W.K.; Field, S.H.; Iritani, B.J.; Odongo, F.S.; Kwaro, D.; Amek, N.O.; Rennie, S. Pathways to depression and poor quality of life among adolescents in Western Kenya: Role of anticipated HIV stigma, HIV risk perception, and sexual behaviors. *AIDS Behav.* **2021**, *25*, 1423–1437. [CrossRef]
21. Escobar, D.F.S.S.; Noll, P.R.e.S.; de Jesus, T.F.; Noll, M. Assessing the mental health of brazilian students involved in risky behaviors. *Int. J. Environ. Res. Public Health* **2020**, *17*, 3647. [CrossRef]
22. Sinclair, R.; Millar, L.; Allender, S.; Snowdon, W.; Waqa, G.; Jacka, F.; Moodie, M.; Petersen, S.; Swinburn, B. The cross-sectional association between diet quality and depressive symptomology amongst fijian adolescents. *PLoS ONE* **2016**, *11*, e0161709. [CrossRef] [PubMed]
23. Genta, F.D.; Rodrigues Neto, G.B.; Velletri Sunfeld, J.P.; Porto, J.F.; Xavier, A.D.; Moreno, C.R.C.; Lorenzi-Filho, G.; Genta, P.R. COVID-19 pandemic impact on sleep habits, chronotype and health-related quality of life among high school students: A longitudinal study. *J. Clin. Sleep Med.* **2021**, *17*, 1371–1377. [CrossRef] [PubMed]
24. Ahmed, M.Z.; Ahmed, O.; Aibao, Z.; Hanbin, S.; Siyu, L.; Ahmad, A. Epidemic of COVID-19 in China and associated psychological problems. *Asian J. Psychiatry* **2020**, *51*, 102092. [CrossRef] [PubMed]
25. Elbay, R.Y.; Kurtulmuş, A.; Arpacioğlu, S.; Karadere, E. Depression, anxiety, stress levels of physicians and associated factors in Covid-19 pandemics. *Psychiatry Res.* **2020**, *290*, 113130. [CrossRef] [PubMed]
26. Chawla, N.; Tom, A.; Sen, M.S.; Sagar, R. Psychological impact of COVID-19 on children and adolescents: A systematic review. *Indian J. Psychol. Med.* **2021**, *43*, 294–299. [CrossRef]
27. Ahsan Khodami, M.; Hassan Seif, M.; Sadat Koochakzadeh, R.; Fathi, R.; Kaur, H. Perceived stress, emotion regulation and quality of life during the Covid-19 outbreak: A multi-cultural online survey. *Ann. Med. Psychol.* **2021**, *43*, 2–6. [CrossRef] [PubMed]
28. Nobari, H.; Fashi, M.; Eskandari, A.; Villafaina, S.; Murillo-Garcia, Á.; Pérez-Gómez, J. Effect of COVID-19 on health-related quality of life in adolescents and children: A systematic review. *Int. J. Environ. Res. Public Health* **2021**, *18*, 4563. [CrossRef]
29. Mastorci, F.; Piaggi, P.; Doveri, C.; Trivellini, G.; Casu, A.; Pozzi, M.; Vassalle, C.; Pingitore, A. Health-related quality of life in italian adolescents during COVID-19 outbreak. *Front. Pediatr.* **2021**, *9*, 611136. [CrossRef]
30. Rodrigues, P.H.E.; Carius, A.C. The implementation of emergency remote education in brazilian educational systems. *Am. Sci. Res. J. Eng.* **2020**, *74*, 181–194.
31. Chaturvedi, K.; Vishwakarma, D.K.; Singh, N. COVID-19 and its impact on education, social life and mental health of students: A survey. *Child. Youth Serv. Rev.* **2021**, *121*, 105866. [CrossRef]
32. Pacheco, F.D.A.; Nonenmacher, S.E.B.; Cambraia, A.C. Mental illness in vocational and technological education: What do graduates of integrated technical courses think (Adoecimento Mental na Educação Profissional e Tecnológica: O Que Pensam os Estudantes Concluintes de Cursos Técnico Integrados). *Rev. Bras. Educ. Prof. Tecnol.* **2020**, *1*, e9173. [CrossRef]
33. Soares, D.P.; Almeida, R.R. Intervention and anxiety management in integrated high school students (Intervenção e manejo de ansiedade em estudantes do ensino médio integrado). *Res. Soc. Dev.* **2020**, *9*, e3789106457. [CrossRef]
34. Barreiro, C.B.; Mogarro, M.J. Teaching and professional education in Brazil and Portugal (Docência e ensino profissional no Brasil e em Portugal). *Educ. Rev.* **2021**, *37*, 1–21. [CrossRef]
35. Brazil School Census of Basic Education 2016. 2017. Available online: [http://download.inep.gov.br/educacao\\_basica/censo\\_escolar/notas\\_estatisticas/2017/notas\\_estatisticas\\_censo\\_escolar\\_da\\_educacao\\_basica\\_2016.pdf](http://download.inep.gov.br/educacao_basica/censo_escolar/notas_estatisticas/2017/notas_estatisticas_censo_escolar_da_educacao_basica_2016.pdf) (accessed on 5 November 2021).
36. Tsunematsu, J.D.P.J.; Pantoni, R.P.; Versuti, F.M. Student mental health in professional and technological education: Experiences of students and teachers of integrated technical courses (*Saúde mental discente na educação profissional e tecnológica: Experiências de estudantes e docentes dos cursos técnicos integrado*). *Educ. Prof. Tecnol. Rev.* **2021**, *5*, 70–90. [CrossRef]

37. Bleicher, T.; Oliveira, R.C.N. Policies in health assistance for students in federal institutes and universities (Políticas de assistência estudantil em saúde nos institutos e universidades federais). *Psicol. Esc. Educ.* **2016**, *20*, 543–549. [CrossRef]
38. Ahadi, Z.; Qorbani, M.; Kelishadi, R.; Ardalan, G. Regional disparities in psychiatric distress, violent behavior, and life satisfaction in Iranian adolescents: The CASPIAN-III study. *J. Dev. Behav. Pediatr.* **2014**, *35*, 582–590. [CrossRef]
39. Vitorino, L.M.; Yoshinari Júnior, G.H.; Gonzaga, G.; Dias, I.F.; Pereira, J.P.L.; Ribeiro, I.M.G.; França, A.B.; Al-Zaben, F.; Koenig, H.G.; Trzesniak, C. Factors associated with mental health and quality of life during the COVID-19 pandemic in Brazil. *BJPsych Open* **2021**, *7*, e103. [CrossRef] [PubMed]
40. Moilanen, S.; Autio, L.; Tolvanen, A.; Sevón, E.; Rönkä, A. From intense to leisurely study days: A diary study of daily wellbeing among students in higher education. *Open Educ. Stud.* **2021**, *2*, 295–311. [CrossRef]
41. Aldridge, J.M.; McChesney, K. The relationships between school climate and adolescent mental health and wellbeing: A systematic literature review. *Int. J. Educ. Res.* **2018**, *88*, 121–145. [CrossRef]
42. Brazilian Institute of Geography and Statistics. Cities@. 2022. Available online: <https://cidades.ibge.gov.br/> (accessed on 5 November 2021).
43. Establishes the Federal Network of Professional, Scientific and Technological Education, Creates the Federal Institutes of Education, Science and Technology, and Takes Other Measures. Available online: [http://www.planalto.gov.br/ccivil\\_03/\\_ato2007-2010/2008/lei/l11892.htm](http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/lei/l11892.htm) (accessed on 10 November 2021).
44. Nascimento, M.M.; Cavalcanti, C.; Ostermann, F. Ten years of institution of the federal network of professional, scientific and technological education: The social role of Federal Institutes (Dez anos de instituição da rede federal de educação profissional, científica e tecnológica: O papel social dos Institutos Federais). *Rev. Bras. Estud. Pedagógicos* **2020**, *101*, 120–145. [CrossRef]
45. Federal Institutes: Revolution in Vocational and Technological Education (Institutos Federais: Uma Revolução na Educação Profissional e Tecnológica. Available online: [https://www.fundacaosantillana.org.br/wp-content/uploads/2019/12/67\\_Institutosfederais.pdf](https://www.fundacaosantillana.org.br/wp-content/uploads/2019/12/67_Institutosfederais.pdf) (accessed on 15 November 2021).
46. Raosoft Inc. RaoSoft®Sample Size Calculator. 2004. Available online: <http://www.raosoft.com/samplesize.html> (accessed on 10 November 2021).
47. Okruszek, Ł.; Aniszewska-Stańczuk, A.; Piejka, A.; Wiśniewska, M.; Żurek, K. Safe but lonely? Loneliness, anxiety, and depression symptoms and COVID-19. *Front. Psychol.* **2020**, *11*, 579181. [CrossRef]
48. Guedes, D.P.; Lopes, C.C.; Guedes, J.E.R.P. Reproducibility and validity of the international physical activity questionnaire in adolescents. *Rev. Bras. Med. Esporte* **2005**, *11*, 151–158. [CrossRef]
49. Craig, C.L.C.; Marshall, A.L.; Sjostrom, M.; Bauman, A.E.; Booth, M.L.; Ainsworth, B.E.; Pratt, M.; Ekelund, U.; Yngve, A. Guidelines for data processing and analysis of the IPAQ-short and long forms. *Med. Sci. Sport. Exerc.* **2004**, *35*, 1–7.
50. Fleck, M.P.A.; Louzada, S.; Xavier, M.; Chachamovich, E.; Vieira, G.; Santos, L.; Pinzon, V. Application of the Portuguese version of the abbreviated quality of life assessment instrument “WHOQOL-bref.” (Aplicação da versão em português do instrumento abreviado de avaliação da qualidade de vida “WHOQOL-bref.”). *Rev. Saude Publica* **2000**, *34*, 178–183. [CrossRef] [PubMed]
51. WHOQOL. WHO Quality of Life Scale (WHOQOL). *Psychol. Med.* **1998**, *28*, 551–558.
52. Gouveia, V.; Barbosa, G.; Almeida, H.; Gaião, A. Childhood Depression Inventory—CDI: Adaptation study with students from João Pessoa (Inventário de depressão infantil—CDI: Estudo de adaptação com escolares de João Pessoa). *J. Bras. Psiquiatr.* **1995**, *44*, 345–349.
53. Wathier, J.L.; Dell’Aglia, D.D.; Bandeira, D.R. Factor analysis of the childhood depression inventory (CDI) in a sample of young Brazilians (Análise fatorial do inventário de depressão infantil (CDI) em amostra de jovens brasileiros). *Av. Psicol.* **2008**, *1*, 75–84.
54. Coutinho, M.d.P.d.L.; Carolino, Z.C.G.; Medeiros, E.D. Inventário de Childhood Depression Inventory (CDI): Evidence of construct validity and internal consistency (Inventário de Depressão Infantil (CDI): Evidências de validade de constructo e consistência interna). *J. Psychol. Assess.* **2008**, *7*, 291–300.
55. Greenland, S.; Daniel, R.; Pearce, N. Outcome modelling strategies in epidemiology: Traditional methods and basic alternatives. *Int. J. Epidemiol.* **2016**, *45*, 565–575. [CrossRef]
56. Barros, A.J.; Hirakata, V.N. Alternatives for logistic regression in cross-sectional studies: An empirical comparison of models that directly estimate the prevalence ratio. *BMC Med. Res. Methodol.* **2003**, *2003*, 21. [CrossRef] [PubMed]
57. Santomauro, D.F.; Mantilla Herrera, A.M.; Shadid, J.; Zheng, P.; Ashbaugh, C.; Pigott, D.M.; Abbafati, C.; Adolph, C.; Amlag, J.O.; Aravkin, A.Y.; et al. Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *Lancet* **2021**, *398*, 1700–1712. [CrossRef]
58. Escobar, D.F.S.S.; De Jesus, T.F.; Noll, P.R.e.S.; Matias, N. Family and school context: Effects on the mental health of Brazilian students. *Int. J. Environ. Res. Public Health* **2020**, *17*, 6042. [CrossRef]
59. Zhang, C.; Ye, M.; Fu, Y.; Yang, M.; Luo, F.; Yuan, J.; Tao, Q. The psychological impact of the COVID-19 pandemic on teenagers in China. *J. Adolesc. Health* **2020**, *67*, 747–755. [CrossRef] [PubMed]
60. Noll, M.; Noll, P.R.e.S.; Tiggemann, C.L.; Custodio, D.C.; Silveira, E.A. Health-risk behavior differences between boarding and non-resident students: Brazilian adolescent National School Health Survey. *Arch. Public Health* **2020**, *78*, 8. [CrossRef] [PubMed]
61. Stephanou, A.T.; Dias, A.C.G. Psychological factors associated with adolescent sexual behavior. *Psico* **2021**, *52*, e36084. [CrossRef]
62. Gazendam, N.; Cleverley, K.; King, N.; Pickett, W.; Phillips, S.P. Individual and social determinants of early sexual activity: A study of gender-based differences using the 2018 Canadian Health Behaviour in School-aged Children Study (HBSC). *PLoS ONE* **2020**, *15*, e0238515. [CrossRef] [PubMed]

63. Pozuelo, J.R.; Desborough, L.; Stein, A.; Cipriani, A. Systematic review and meta-analysis: Depressive symptoms and risky behaviors among adolescents in low- and middle-income countries. *J. Am. Acad. Child Adolesc. Psychiatry* **2021**, *61*, 255–276. [[CrossRef](#)] [[PubMed](#)]
64. Hallfors, D.D.; Waller, M.W.; Bauer, D.; Ford, C.A.; Halpern, C.T. Which comes first in adolescence—Sex and drugs or depression? *Am. J. Prev. Med.* **2005**, *29*, 163–170. [[CrossRef](#)]
65. Armoon, B.; Mokhayeri, Y.; Haroni, J.; Karimy, M.; Noroozi, M. How is the quality of life of students?: The role of depression, anxiety and stress. *Pol. Psychol. Bull.* **2019**, *50*, 43–48. [[CrossRef](#)]
66. Ma, L.; Mazidi, M.; Li, K.; Li, Y.; Chen, S.; Kirwan, R.; Zhou, H.; Yan, N.; Rahman, A.; Wang, W.; et al. Prevalence of mental health problems among children and adolescents during the COVID-19 pandemic: A systematic review and meta-analysis. *J. Affect. Disord.* **2021**, *293*, 78–89. [[CrossRef](#)] [[PubMed](#)]
67. Racine, N.; McArthur, B.A.; Cooke, J.E.; Eirich, R.; Zhu, J.; Madigan, S. Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. *JAMA Pediatr.* **2021**, *175*, 1142–1150. [[CrossRef](#)]
68. Orben, A.; Tomova, L.; Blakemore, S.J. The effects of social deprivation on adolescent development and mental health. *Lancet Child Adolesc. Health* **2020**, *4*, 634–640. [[CrossRef](#)]
69. AlAzzam, M.; Abuhammad, S.; Abdalrahim, A.; Hamdan-Mansour, A.M. Predictors of depression and anxiety among senior high school students during COVID-19 pandemic: The context of home quarantine and online education. *J. Sch. Nurs.* **2021**, *37*, 241–248. [[CrossRef](#)] [[PubMed](#)]
70. Loades, M.E.; Chatburn, E.; Higson-Sweeney, N.; Reynolds, S.; Shafran, R.; Brigden, A.; Linney, C.; McManus, M.N.; Borwick, C.; Crawley, E. 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*, 1218–1239.e3. [[CrossRef](#)] [[PubMed](#)]
71. Askeland, K.G.; Bøe, T.; Breivik, K.; la Greca, A.M.; Sivertsen, B.; Hysing, M. Life events and adolescent depressive symptoms: Protective factors associated with resilience. *PLoS ONE* **2020**, *15*, e0234109. [[CrossRef](#)] [[PubMed](#)]
72. Carpena, M.X.; Costa, F.D.S.; Martins-Silva, T.; Xavier, M.O.; de Mola, C.L. Why Brazilian women suffer more from depression and suicidal ideation: A mediation analysis of the role of violence. *Braz. J. Psychiatry* **2020**, *42*, 469–474. [[CrossRef](#)]
73. Zhang, Z.; Zhai, A.; Yang, M.; Zhang, J.; Zhou, H.; Yang, C.; Duan, S.; Zhou, C. Prevalence of depression and anxiety symptoms of high school students in Shandong province during the COVID-19 epidemic. *Front. Psychiatry* **2020**, *11*, 570096. [[CrossRef](#)]
74. Morssinkhof, M.W.L.; van Wylick, D.W.; Priester-Vink, S.; van der Werf, Y.D.; den Heijer, M.; van den Heuvel, O.A.; Broekman, B.F.P. Associations between sex hormones, sleep problems and depression: A systematic review. *Neurosci. Biobehav. Rev.* **2020**, *118*, 669–680. [[CrossRef](#)]
75. Pfeifer, J.H.; Allen, N.B. Puberty initiates cascading relationships between neurodevelopmental, social, and internalizing processes across adolescence. *Soc. Biol. Psychiatry* **2021**, *89*, 99–108. [[CrossRef](#)]
76. Chauhan, S.; Srivastava, S.; Kumar, P.; Patel, R.; Muhammad, T.; Dhillon, P. Interaction of substance use with physical activity and its effect on depressive symptoms among adolescents. *J. Subst. Use* **2021**, *26*, 524–530. [[CrossRef](#)]
77. Guthold, R.; Stevens, G.A.; Riley, L.M.; Bull, F.C. Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc. Health* **2020**, *4*, 23–35. [[CrossRef](#)]
78. Fruzzetti, F.; Fidicicchi, T. Hormonal contraception and depression: Updated evidence and implications in clinical practice. *Clin. Drug Investig.* **2020**, *40*, 1097–1106. [[CrossRef](#)] [[PubMed](#)]
79. Connor, J.; Madhavan, S.; Mokashi, M.; Amanuel, H.; Johnson, N.R.; Pace, L.E.; Bartz, D. Health risks and outcomes that disproportionately affect women during the COVID-19 pandemic: A review. *Soc. Sci. Med.* **2020**, *266*, 113364. [[CrossRef](#)] [[PubMed](#)]
80. Sumra, M.K.; Schillaci, M.A. Stress and the multiple-role woman: Taking a closer look at the “superwoman”. *PLoS ONE* **2015**, *10*, e0120952. [[CrossRef](#)]
81. Brar, S.K.; Beattie, T.S.H.; Abas, M.; Vansia, D.; Phanga, T.; Maseko, B.; Bekker, L.G.; Pettifor, A.E.; Rosenberg, N.E. The relationship between intimate partner violence and probable depression among adolescent girls and young women in Lilongwe, Malawi. *Glob. Public Health* **2020**, *15*, 865–876. [[CrossRef](#)]
82. Carvalhaes, R.d.S.; Cárdenas, C.M.M. “Dating is pure suffering”: Violence within affective-sexual relationships between adolescents in a school in the Costa Verde, Rio de Janeiro, Brazil. *Cienc. Saude Coletiva* **2021**, *26*, 2719–2728. [[CrossRef](#)]
83. Chi, X.; Liu, X.; Huang, Q.; Huang, L.; Zhang, P.; Chen, X. Depressive symptoms among junior high school students in Southern China: Prevalence, Changes, and Psychosocial Correlates. *J. Affect. Disord.* **2020**, *274*, 1191–1200. [[CrossRef](#)]
84. Gordia, A.P.; Silva, R.C.R.; Quadros, T.M.B.; De Campos, W. Behavioral and sociodemographic variables are associated with the psychological domain of adolescents’ quality of life. *Rev. Paul. Pediatr.* **2010**, *28*, 29–35. [[CrossRef](#)]
85. Finning, K.; Ukoumunne, O.C.; Ford, T.; Danielsson-Waters, E.; Shaw, L.; Romero De Jager, I.; Stentiford, L.; Moore, D.A. The association between child and adolescent depression and poor attendance at school: A systematic review and meta-analysis. *J. Affect. Disord.* **2019**, *245*, 928–938. [[CrossRef](#)]
86. Sawyer, S.M.; Azzopardi, P.S.; Wickremarathne, D.; Patton, G.C. The age of adolescence. *Lancet Child Adolesc. Health* **2018**, *2*, 223–228. [[CrossRef](#)]
87. Bathelt, J.; Vignoles, A.; Astle, D.E. Just a phase? Mapping the transition of behavioural problems from childhood to adolescence. *Soc. Psychiatry Psychiatr. Epidemiol.* **2021**, *56*, 821–836. [[CrossRef](#)]

88. Dush, J.L. Adolescent food insecurity: A review of contextual and behavioral factors. *Public Health Nurs.* **2020**, *37*, 327–338. [[CrossRef](#)] [[PubMed](#)]
89. Pereira, M.; Oliveira, A.M. Poverty and food insecurity may increase as the threat of COVID-19 spreads. *Public Health Nutr.* **2020**, *23*, 3236–3240. [[CrossRef](#)] [[PubMed](#)]
90. Rani, D.; Singh, J.; Acharya, D.; Paudel, R.; Lee, K.; Singh, S. Household food insecurity and mental health among teenage girls living in Urban Slums in Varanasi, India: A cross-sectional study. *Int. J. Environ. Res. Public Health* **2018**, *15*, 1585. [[CrossRef](#)] [[PubMed](#)]
91. Nyundo, A.; Manu, A.; Regan, M.; Ismail, A.; Chukwu, A.; Dessie, Y.; Njau, T.; Kaaya, S.F.; Smith Fawzi, M.C. Factors associated with depressive symptoms and suicidal ideation and behaviours amongst sub-Saharan African adolescents aged 10–19 years: Cross-sectional study. *Trop. Med. Int. Health* **2020**, *25*, 54–69. [[CrossRef](#)] [[PubMed](#)]
92. Elgar, F.J.; Pickett, W.; Pfortner, T.K.; Gariépy, G.; Gordon, D.; Georgiades, K.; Davison, C.; Hammami, N.; MacNeil, A.H.; Da Silva, M.A.; et al. Relative food insecurity, mental health and wellbeing in 160 countries. *Soc. Sci. Med.* **2021**, *268*, 113556. [[CrossRef](#)]
93. Hatem, C.; Lee, C.Y.; Zhao, X.; Reesor-Oyer, L.; Lopez, T.; Hernandez, D.C. Food insecurity and housing instability during early childhood as predictors of adolescent mental health. *J. Fam. Psychol.* **2020**, *34*, 721–730. [[CrossRef](#)]
94. Frömel, K.; Jakubec, L.; Groffik, D.; Chmelík, F.; Svozil, Z.; Šafář, M. Physical activity of secondary school adolescents at risk of depressive symptoms. *J. Sch. Health* **2020**, *90*, 641–650. [[CrossRef](#)]
95. Sampasa-Kanyinga, H.; Sampasa-Kanyinga, H.; Colman, I.; Colman, I.; Goldfield, G.S.; Goldfield, G.S.; Janssen, I.; Wang, J.; Wang, J.; Podinic, I.; et al. Combinations of physical activity, sedentary time, and sleep duration and their associations with depressive symptoms and other mental health problems in children and adolescents: A systematic review. *Int. J. Behav. Nutr. Phys. Act.* **2020**, *17*, 72. [[CrossRef](#)]
96. Chi, X.; Liang, K.; Chen, S.-T.; Huang, Q.; Huang, L.; Yu, Q.; Jiao, C.; Guo, T.; Stubbs, B.; Hossain, M.M.; et al. Mental health problems among Chinese adolescents during the COVID-19: The importance of nutrition and physical activity. *Int. J. Clin. Health Psychol.* **2021**, *21*, 100218. [[CrossRef](#)]
97. Lin, T.-W.; Kuo, Y.-M. Exercise benefits brain function: The monoamine connection. *Brain Sci.* **2013**, *3*, 39–53. [[CrossRef](#)] [[PubMed](#)]
98. Lubans, D.; Richards, J.; Hillman, C.; Faulkner, G.; Beauchamp, M.; Nilsson, M.; Kelly, P.; Smith, J.; Raine, L.; Biddle, S. Physical activity for cognitive and mental health in youth: A systematic review of mechanisms. *Pediatrics* **2016**, *138*, e20161642. [[CrossRef](#)] [[PubMed](#)]
99. Matta Mello Portugal, E.; Cevada, T.; Sobral Monteiro-Junior, R.; Teixeira Guimarães, T.; da Cruz Rubini, E.; Lattari, E.; Blois, C.; Camaz Deslandes, A. Neuroscience of Exercise: From Neurobiology Mechanisms to Mental Health. *Neuropsychobiology* **2013**, *68*, 1–14. [[CrossRef](#)] [[PubMed](#)]
100. DiPietro, L.; Al-Ansari, S.S.; Biddle, S.J.H.; Borodulin, K.; Bull, F.C.; Buman, M.P.; Cardon, G.; Carty, C.; Chaput, J.P.; Chastin, S.; et al. Advancing the global physical activity agenda: Recommendations for future research by the 2020 WHO physical activity and sedentary behavior guidelines development group. *Int. J. Behav. Nutr. Phys. Act.* **2020**, *17*, 143. [[CrossRef](#)]
101. Solomou, I.; Constantinidou, F. Prevalence and predictors of anxiety and depression symptoms during the COVID-19 pandemic and compliance with precautionary measures: Age and sex matter. *Int. J. Environ. Res. Public Health* **2020**, *17*, 4924. [[CrossRef](#)]
102. Assana, S.; Laohasiriwong, W.; Rangseekajee, P. Quality of life, mental health and educational stress of high school students in the northeast of Thailand. *J. Clin. Diagn. Res.* **2017**, *11*, VC01–VC06. [[CrossRef](#)]
103. Geng, Y.; Gu, J.; Zhu, X.; Yang, M.; Shi, D. Negative emotions and quality of life among adolescents: A moderated mediation model. *Int. J. Clin. Health Psychol.* **2020**, *20*, 118–125. [[CrossRef](#)] [[PubMed](#)]
104. Cleofas, J.V. Student involvement, mental health and quality of life of college students in a selected university in Manila, Philippines. *Int. J. Adolesc. Youth* **2020**, *25*, 435–447. [[CrossRef](#)]
105. Moutinho, I.L.D.; Lucchetti, A.L.G.; Ezequiel, O.d.S.; Lucchetti, G. Mental health and quality of life of Brazilian medical students: Incidence, prevalence, and associated factors within two years of follow-up. *Psychiatry Res.* **2019**, *274*, 306–312. [[CrossRef](#)] [[PubMed](#)]
106. Eddolls, W.T.B.; McNarry, M.A.; Lester, L.; Winn, C.O.N.; Stratton, G.; Mackintosh, K.A. The association between physical activity, fitness and body mass index on mental well-being and quality of life in adolescents. *Qual. Life Res.* **2018**, *27*, 2313–2320. [[CrossRef](#)] [[PubMed](#)]