Research, Society and Development, v. 11, n. 4, e2211426426, 2022
(CC BY 4.0) | ISSN 2525-3409 | DOI: http://dx.doi.org/10.33448/rsd-v11i4.26426

Suicidal ideation among university students during the COVID-19 pandemic: a rapid systematic review with meta-analysis

Ideação suicida entre estudantes universitários durante a pandemia de COVID-19: uma revisão sistemática rápida com meta-análise

Ideación suicida entre estudiantes universitarios durante la pandemia de COVID-19: una revisión sistemática rápida con metanálisis

Received: 02/01/2022 | Reviewed: 02/11/2022 | Accept: 03/01/2022 | Published: 03/09/2022

Karlayle de Oliveira Martins Teixeira
ORCID: https://orcid.org/0000-0002-5069-3293
Federal University of Minas Gerais, Brazil
E-mail: karlayle.teixeira@gmail.com
Jonathan Lopes de Lisboa
ORCID: https://orcid.org/0000-0003-0049-1869
Federal University of Minas Gerais, Brazil
E-mail: jonathanllisboa@hotmail.com
Bárbara Magalhães Figueiredo Dias
ORCID: https://orcid.org/0000-0002-7378-5959
Federal University of Minas Gerais, Brazil
E-mail: barbaramfd26@gmail.com
Eduardo Simonini Lopes
ORCID: https://orcid.org/0000-0002-3078-6994
Federal University of Viçosa, Brazil
E-mail: simonini@ufv.br
Raquel Conceição Ferreira
ORCID: https://orcid.org/0000-0001-8897-9345
Federal University of Minas Gerais. Belo Horizonte, Brasil
E-mail: raquelconceicaoferreira@gmail.com
Patricia Maria Pereira de Araujo Zarzar
ORCID: https://orcid.org/0000-0002-6952-5767
Federal University of Minas Gerais, Brazil
E-mail: patriciamariazarzar@gmail.com
Aline Araujo Sampaio
ORCID: https://orcid.org/0000-0002-8704-5994
Federal University of Minas Gerais, Brazil
E-mail: alinea.sampaioufmg@gmail.com

Abstract
The COVID-19 pandemic brought several behavioral changes in the social, academic and professional spheres, caused numerous deaths and, due to the lack of treatment, imposed social isolation and an adaptation of daily activities, restricted to the remote format, causing emotional and mental instability. in society. Thus, this study aimed to investigate the prevalence of suicidal ideation and associated factors among university students during the COVID-19 pandemic. A Rapid Systematic Review was performed using several databases. Observational studies evaluating suicidal ideation among college students during the COVID-19 pandemic were considered. Articles were assessed for risk of bias by the Joanna Briggs Institute Instrument. Data were extracted for analysis of associated factors and prevalence meta-analysis. Eleven articles were included. The prevalence of suicidal ideation among university students ranged from 1.7 to 19.6%, with a combined prevalence of 12.1% (95% CI: 9.6-15.0%). Factors associated with suicidal ideation were excessive screen time, social isolation, sleep disorders, symptoms of depression, anxiety, post-traumatic stress and being female. The quality of articles ranged from high to low risk of bias. The combined prevalence of suicidal ideation among university students in the period of the COVID-19 pandemic was high, with social isolation and screen time as factors associated with the new context of the pandemic. The findings indicate that support measures should be made available to students during the pandemic to ensure mental health.
Keywords: Suicidal ideation; Mental health; Students; Universities; Pandemics; COVID-19.

Resumo
A pandemia da COVID-19 trouxe várias alterações comportamentais nas esferas social, acadêmica e profissional, provocou inúmeras mortes e, devido à ausência de tratamento, impôs o isolamento social e uma adaptação das

atividades diárias, restritas ao formato remoto, provocando instabilidade emocional e mental na sociedade. Dessa forma, esse trabalho teve como objetivo investigar a prevalência de ideação suicida e fatores associados entre estudantes universitários durante a pandemia de COVID-19. Uma Revisão Sistemática Rápida foi realizada usando vários bancos de dados. Foram considerados estudos observacionais avaliando a ideação suicida entre estudantes universitários durante a pandemia de COVID-19. Os artigos foram avaliados quanto ao risco de viés pelo Joanna Briggs Institute Instrument. Os dados foram extraídos para análise dos fatores associados e metanálise da prevalência. Onze artigos foram incluídos. A prevalência de ideação suicida entre universitários variou de 1,7 a 19,6%, com prevalência combinada de 12,1% (IC 95%:9,6-15,0%). Os fatores associados à ideação suicida foram tempo excessivo de tela, isolamento social, distúrbios do sono, sintomas de depressão, ansiedade, estresse pós-traumático e ser do sexo feminino. A qualidade dos artigos variou de alto a baixo risco de viés. A prevalência combinada de ideação suicida entre universitários no período da pandemia de COVID-19 foi alta, tendo o isolamento social e o tempo de tela como fatores associados ao novo contexto da pandemia. Os achados indicam que medidas de suporte devem ser disponibilizadas aos estudantes durante a pandemia para garantir a saúde mental.
Palavras-chave: Ideação suicida; Saúde mental; Alunos; Universidades; Pandemias; COVID-19.

Resumen

La pandemia del COVID-19 trajo varios cambios de comportamiento en el ámbito social, académico y profesional, provocó numerosas muertes y, por la falta de tratamiento, impuso el aislamiento social y una adaptación de las actividades cotidianas, restringidas al formato remoto, provocando daños emocionales y psíquicos. inestabilidad en la sociedad. Por lo tanto, este trabajo tuvo como objetivo investigar la prevalencia de la ideación suicida y los factores asociados entre estudiantes universitarios durante la pandemia de COVID-19. Se realizó una Revisión Sistemática Rápida utilizando varias bases de datos. Se consideraron estudios observacionales que evaluaron la ideación suicida entre estudiantes universitarios durante la pandemia de COVID-19. Se evaluó el riesgo de sesgo de los artículos mediante el Instrumento del Instituto Joanna Briggs. Los datos se extrajeron para el análisis de los factores asociados y el metanálisis de prevalencia. Se incluyeron once artículos. La prevalencia de ideación suicida entre estudiantes universitarios osciló entre 1,7 y 19,6%, con una prevalencia combinada de 12,1% (IC 95%: 9,6-15,0%). Los factores asociados con la ideación suicida fueron el tiempo excesivo frente a la pantalla, el aislamiento social, los trastornos del sueño, los síntomas de depresión, la ansiedad, el estrés postraumático y el sexo femenino. La calidad de los artículos varió de alto a bajo riesgo de sesgo. La prevalencia combinada de ideación suicida entre estudiantes universitarios en el período de la pandemia de COVID-19 fue alta, con el aislamiento social y el tiempo de pantalla como factores asociados al nuevo contexto de la pandemia. Los hallazgos indican que se deben poner a disposición de los estudiantes medidas de apoyo durante la pandemia para garantizar la salud mental.
Palabras clave: Ideación suicida; Salud mental; Estudiantes; Universidades; Pandemias; COVID-19.

1. Introduction

Since the beginning of the new Coronavirus (SARS-CoV2) pandemic, which first case was diagnosed in Wuhan (Hubei/China) in December 2019, humanity is facing a severe health crisis, characterized as a global public health problem and without any prediction of its duration (Sohrabi et al., 2020). Among the countries with the highest mortality rates to December 2021 we observe the United States of America with more than 792,000 deaths, Brazil, accounting for more than 616,000 deaths, India with more than 474,000 deaths and Mexico with more than 296,000 deaths (WHO, 2021). In this context, a broad vaccination of the population, the use of masks, the rigorous hygiene of hands, the maintenance of distancing measures and social isolation through sanitary restrictions and quarantines are the main prevention strategies (Aquino et al., 2020; Kim & Su, 2020).

As a consequence of the physical and social distancing measures adopted, there is a series of social and behavior changes in the professional and academic spheres (Aquino et al., 2020). The mental health of university students was affected by the changes in study habits, currently restricted to the remote format, increasing screen time and reducing daily social activities (Gundim et al., 2021), besides the postponement or loss of important social milestones such as university admission and graduation The UNESCO Survey (United Nations Educational, Scientific and Cultural Organization) points out that the stoppages of in-person activities of educational institutions due to the pandemic reached 87% of the world's student population in the initial period of the COVID-19 pandemic (UNESCO, 2020) .

According to Auerbach et al. (2016), before the onset of the pandemic, one in five university students had one or more diagnosed mental disorder. The most critical were suicidal behaviors, which include ideation, plans, suicide attempt and

consummate suicide (Auerbach et al., 2016). In Suicidal ideation the individual has plans, desires, attitudes to end his own life (Werlang et al., 2005). If the process advances, suicidal planning emerges, which is the stage in which the subject establishes when, where and how the self-destruction behavior will be carried out. Thereafter, a suicide attempt may occur, resulting in death or not (Perez, 2005). Suicidal ideation has been identified in studies conducted among university students from the US, Poland, China, Bangladesh, France, Thailand, Indonesia, Taiwan, Cuba, Greece over the years (Wilcox et al., 2010; Li et al., 2014; Zhai et al., 2015; Eskin et al., 2016; Peltzer & Pengpid, 2017; Rahman et al., 2020; Cha et al., 2018; Lindsey et al., 2017).

Data show that in the years prior to the pandemic, the prevalence rates of suicidal ideation among young people ranged from approximately 18% to 24% (Cha et al., 2018; Lindsey et al., 2017) and the suicide was the second leading cause of death worldwide among young adolescents (10-24 years old) and being the first or second cause of death among Chinese university students, accounting for 19% of all deaths in this group (Phillips et al., 2002).

During the COVID-19 pandemic the high number of scientific publications on suicidal behavior (ideation, planning and attempt) rekindled the concern about mental health of university students, the risk to of suicidal behaviors, in addition to the need for an awareness of suicidal ideation associated factors, which are atypical and may be directly linked to the conditions imposed by the pandemic. Therefore, the aim of this rapid systematic review was to synthesize evidence on the prevalence of suicidal ideation among university students and to investigate the factors that influenced this behavior during the COVID-19 pandemic.

2. Methodology

This Rapid Systematic Review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses - Extension for systematic Reviews) (Moher et al., 2010) checklist and guided by the document Rapid Reviews to Strengthen Health Policy and Systems: a practical guide by the WHO (World Health Organization) (Tricco et al., 2017), registered in the International Prospective Register of Systematic Reviews (PROSPERO), protocol number CRD4202124376.

Research question

The research question was constructed following the PECO strategy P= population includes university students. E= exposure comprises social isolation/quarantine. C= comparison not performed since only studies performed during the COVID-19 pandemic period were included. O= outcome comprises suicidal ideation. Thus, the main question asked was: *"What is the prevalence and factors associated with suicidal ideation among university students during the COVID-19 pandemic?"*

Search Strategy

The searches were conducted on February 6, 2021, in six databases: PubMed/Medline, Web of Science, Scopus, Scielo, PsycINFO and Google Scholar. Articles published from November 2019 to February 2021 were considered. The bibliography search strategy was obtained by combining three blocks of descriptors or keywords joined by Boolean operators "OR" or "AND" based on the PECO question. The main search strategy was: ("COVID-19" OR "SARS-CoV-2" OR "severe acute respiratory syndrome" OR pandemic" OR "coronavirus" OR "nCoV" OR "2019 novel coronavirus" OR "201 9-nCoV" OR "novel coronavirus") AND (undergraduate OR graduate OR "graduated student" OR "university student" OR "undergraduate student" OR "college student") AND (suicide OR "suicide attempted" OR "suicidal ideation" OR "suicidal behavior"))). This strategy was adapted for each database (Table 1). The identified records were exported to the reference

manager *MyEndNoteWeb*® and duplicates of the articles were removed. The duplicate references that were not identified by the *software* were manually removed. Google Scholar was adopted as the basis of grey literature and the articles of the first 10 pages classified by relevance were investigated.

The studies were selected by two previously trained independent researchers (K.O.M.T and J.L.L). The calibration process of the researchers was initiated with the reading of 10% of the studies, reaching Cohen's kappa of 0.91, indicating high agreement among the researchers.

With respect to the selection of studies, titles and abstracts were initially read and sorted, respecting the eligibility criteria. When the title/abstract did not provide sufficient information to support the decision, the full text was examined. Then, the selected studies were read in full for final selection, quality analysis and extraction of the data of interest. The manual search was done by reading the references of the included articles and underwent all the selection steps mentioned above. In case of disagreement, discussions with the researcher's team with experience on the subject matter (P.M.Z and A.A.S) were held until consensus was achieved.

Eligibility criteria

The articles selected were the ones in which the study population were university students in times of the COVID-19 pandemic, investigating the prevalence and factors associated with suicidal ideation. Observational, cross-sectional, and longitudinal studies were considered. The year of 2019 was adopted as a cut-off point, considering the beginning of the case reports of COVID-19. In addition, only studies written in Portuguese, English and Spanish were eligible.

The exclusion criteria adopted were papers that are an article, articles with another study design, written in a language other than Portuguese, English and Spanish, articles that included individuals who were not university students, articles conducted in the pre-pandemic period or with incomplete/unavailable data.

Methodological quality assessment

The selected articles were evaluated regarding the risk of bias by two independent reviewers, using the critical evaluation instrument of the Joanna Briggs Institute (JBI) for cross-sectional prevalence and analytical studies (studies included in the meta-analysis) (Moola et al., 2020). Any divergences between the researchers (K.O.M.T and J.L.L) were resolved through discussions. Persistent disagreements were resolved in a consensus meeting with the team of researchers (A.A.S, P.M.Z, R.C.F). The quality score was classified as: risk of low bias (70% to 100% of the criteria met), moderate (50% to 69% of the criteria met) or high (0% to 49% of the criteria met).

Data extraction and Statistical analysis

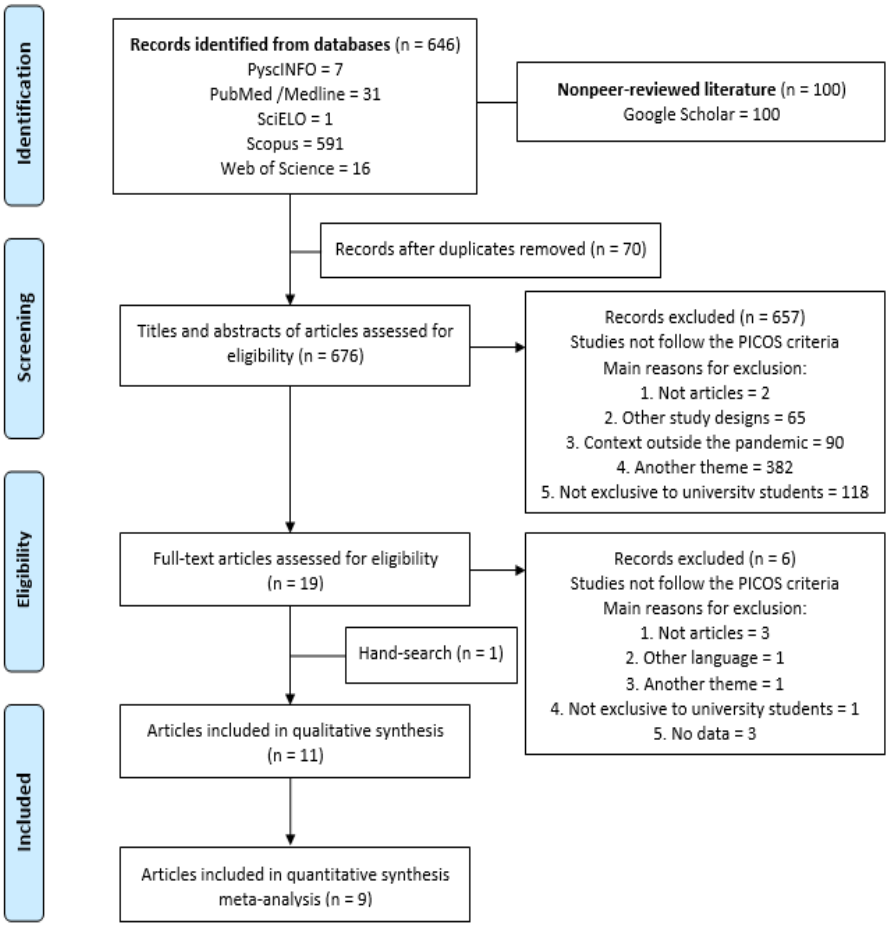
The information extracted from the selected publications were author, year, study location, study design, sample (size, participation rate, profile of participants), instruments and data collection strategy, prevalence data of suicidal ideation and associated factors. Two trained researchers independently performed the data extraction. Possible disagreements were discussed with the group of researchers who had expertise in the methodology and theme.

The data on the prevalence of suicidal ideation and sample size of the study population were exported to Stata v.16, where the random model based on Metaprop was used and a forest graph demonstrated the prevalence of each study and the combined estimate and heterogeneity levels, considering the degree of confidence of 95% (IC).

3. Results

Eleven articles were included for meeting all eligibility criteria, 9 were considered for the meta-analysis of combined prevalence of suicidal ideation and in 6 analytical approaches were observed and considered in the identification of the associated factors. (Figure 1).

Figure 1. Flowchart of screening process, according to PRISMA statement.



Fonte: Autores.

Table 2 summarizes the characteristics of the 11 studies included. Regarding the type of study, classification variations were identified: cross-sectional studies (n=10) and mixed study (n=1), no longitudinal studies were identified. All studies were conducted in a university environment, public and private colleges, online and with the voluntary participation of students. The studies included 397,902 university students (18 to 75 years) and there was a predominance of female university students. The students were in the fields of study, medicine, engineering, economics, literature, art, education, history, agriculture, and legislation. All 11 studies included in this review were published in 2020, the geographic distribution of the selected articles was concentrated in China (n=3), the United States (n=2) and the others distributed among Bangladesh (n=2), Greece, France, Cuba, and Indonesia/Taiwan/Thailand with 1 study each.

Validated instruments were used in most studies. Instruments were used for suicidal ideation, self-mutilation, and

suicide; BECK SSI (Beck Scale for Suicide Ideation) (Abreu et al., 2020) and SHSI (Self-harm or suicidal ideation) (Xin et al., 2020). For anxiety assessment: GAD-7 (Generalized Anxiety Disorder) (Sun et al., 2021), BAI (Beck Anxiety Inventory) (Abreu et al., 2020), STAY (State-Trait Anxiety Inventory) (Pramukti et al., 2020), and DASS 21 (Depression, Anxiety and Stress Scale) (Tasnim et al., 2020). For depression: PHQ-9 (Patient Health Questionnaire) (Chen et al., 2020), BDI13 (Beck Depression Inventory) (Wathelet et al., 2020) and CES-D (Center for Epidemiologic Scale - Depression) (Patsali et al., 3030). For stress, PSS10 (Perceived Stress Scale) (Wathelet et al., 2020).

The factors related to mental health which were significantly associated with suicidal ideation in this review were: social isolation, excessive screen time, sleep disorders, depression, anxiety, and stress. Other associated factors were sociodemographic (female gender, age 18 to 24 years, less favored socioeconomic class), symptoms compatible with COVID-19, previous suicidal thoughts, history of suicide attempt and history of suicide in the family. As possible protective factors associated with suicidal ideation, it was possible to identify being male, having a lower socioeconomic level, living in rural areas, exercising regularly, and having good academic performance.

Table 2. Data description from the included studies (n= 11).

STUDY	LOCATION AND DESIGN STUDY	SAMPLE SIZE / RESPONSE RATE / PARTICIPANTS PROFILE	MEASUREMENT TOOLS / APPLICATION STRATEGY	PREVALENCE / INCIDENCE	ASSOCIATED FACTORS	QUALITY SCORE according JBI Prevalence studies *	QUALITY SCORE according JBI Analytical Cross-sectional studies*
Abreu et al., 2020	Republic of Cuba Municipal Headquarters of Medical Sciences Cross-sectional	59 students 88.1%	Beck Scale for Suicide Ideation (SSI) Vulnerability To Stress Test Beck Depression Inventory (BDI) Beck Anxiety Inventory (BAI) Eysenck Personality Inventory (EPY) Coping Styles Test It is unclear the strategy	Prevalence = 1.7%	Not information	High	-
Chen et al., 2020	China 85 colleges Cross-sectional	361,969 students F = 59.7% M = 40.3% 18 and below - 29,510 (9.1%) 19-24 years old – 189,179 (58.5%) 25 and above years old - 104,800 (32.4%)	Patient Health Questionnaire (PHQ-9) Regulatory Emotional Self-Efficacy Scale (RESE) Online (WeChat)	Prevalence = 7.2%	Not information	High	-
Patsali et al., 2020	Greece Faculty of Medicine, School of Health Sciences, and the	1,535 students F = 71,9% M = 28,1% F = 22.08 ±4.96 years	Center for Epidemiologic Scale - Depression (CES-D) Regulatory Emotional Self-Efficacy Scale (RESE) Online	Not information	Risk factors Females with history of suicidal attempt during the lockdown (X^2 = 17.414; p<0.014) Protective	-	High

	Rector of the Aristotle University of Thessaloniki Cross-sectional	old M = 22.35 ±3.11 years old			factors Not information		
Pramukti et al., 2020	Indonesia, Taiwan, and Thailand 5 public universities Cross-sectional	1,985 students 938 in Indonesia 734 in Thailand 313 in Taiwan F = 80% M = 20%	Question elaborated by the authors about suicidal thought State-Trait Anxiety Inventory (STAI), Health belief model (HBM) Protection motivation theory (PMT) Questions related to COVID-19 Online (popular social media platforms - Facebook, LINE, WhatsApp, and broadcast)	Not information	Risk factors Confidence in pandemic control (r=-.28; P<.001) Perceived satisfactory support / family, friends, or university (r=-.36; p<.001) Sufficient of resources (r=-.21; p<.001) COVID-19 information / internet (r=.06; p=.006) COVID-19 information / family (r=-.12; p<.001) Protective factors Not information	-	Moderate
Rahman et al., 2020	Bangladesh Jahangirnagar University Cross-sectional	407 students 81.4% F = 45.9% M = 54.1% 22.8 ±1.85	Questions about socio-demographic, behavioral, suicidal, and psychological factors from previous studies Depression, Anxiety and Stress Scale	Prevalence = 13.8%	Risk factors Females (OR: 3.833; 95% CI: 1.57-9.323) Lower socio-economic status (OR: 7.655; 95% CI: 2.349-	Moderate	Moderate

		years old	(DASS-21) Online (Google forms)		24.949) Exposure to traumatic events (OR: 2.9061; 95% CI: 1.277-6.613) Family suicidal history (OR: 3.395; 95% CI: 1.143-10.082) Depression (OR: 2.21; 95% CI: 2.24-3.92). Protective factors First year of graduation (OR: 0.187; 95% CI: 0.03–0.65) Second year of graduation (OR: 0.142; 95% CI:0.038–0.5322)		
Son et al., 2020	United States A large university system Mixed methods (qualitative and quantitative)	195 students (undergraduate) 73.3% F = 57% M = 43% 20.7 ±1.7 years old	Questions about stress coping strategies, mental health counseling services, pandemic-specific stressors, impact of COVID-19 on depressive and suicidal thoughts. Perceived Stress Scale-10 (PSS) Online (E-mail e Zoom)	Prevalence = 8%	Not information	High	-
Sun et al., 2021	China 19 university Cross-sectional	1,912 students F = 69.77% M = 30.23% 20.28 ±2.10 years old	Patient Health Questionnaire (PHQ-9) Generalized Anxiety Disorder (GAD-7) Impact of Events scale (IES)	Prevalence= 19.6%	Not information	High	-

			Mindful Attention Awareness Scale (MAAS) Multidimensional Scale of Perceived Social Support (MSPSS) Empathic Responding to SARS scale and Prosocial Ness Scale Ebola-related Self-Efficacy scale Perceived External Stigma Subscale of the Ebola-related Stigma Questionnaire Online (WeChat)				
Tasnim et al., 2020	Bangladesh Different universities (including public, private, and national universities located in different administrative units) Cross-sectional	3,331 students M = 59.4% F = 40.6% 21.4 ±1.9 years old	Questions about socio-demographic, behavioral, suicidal, and psychological factors from previous studies Depression, Anxiety and Stress Scale (DASS-21) Online (Google forms)	Prevalence= 12.8%	Risk factors Less sleep (OR: 2.078; 95% CI: 1.541-2.802) Excess sleep (OR: 1.419; 95% CI:1.015-1.982) Cigarette smoking (OR: 2.300; 95% CI: 1.683-3.144) Past suicidal thoughts (OR: 3.964; 95% CI: 3.022-5.200) Suicide attempt history (OR: 1.551; 95% CI: 1.062-2.263) Family history of suicidality (OR: 2.666; 95% CI: 1.593-4.462) Depression	High	Low

					(OR: 4.085; 95% CI: 2.484-6.716) Anxiety (OR: 1.806; 95% CI: 1.220-2.674) Stress (OR: 2.743; 95% CI: 1.817-4.143) Protective factors were: Lower socio-economic status (OR: 0.486; 95% CI: 0.313-0.754) Living in rural areas (OR: 0.734; 95% CI: 0.540-0.998) Regular physical exercise (OR: 0.761; 95% CI: 0.589-0.983) Satisfactory study (OR: 0.674; 95% CI: 0.496-0.917)		
Wang et al., 2020	United States Texas A&M University Cross-sectional	2,031 students (undergraduate and graduate) F = 61.6% M = 38.4 % 22.88 ±5.52 years old	Patient Health Questionnaire (PHQ-9) Generalized Anxiety Disorder (GAD-7) Questions related to COVID-19-related stress Questions about mechanisms and barriers Online (E-mail)	Prevalence = 18.0%	Not information	High	-
Wathelet et	France	69,054	Impact of Events Scale–Revised (IES-R-	Prevalence =	Risk factors Female gender	High	Moderate

al., 2020	82 universities Cross-sectional	students 4.3% F = 72.8% M = 27.1% Non-Binary = 1% 18-22 years old Median = 20 years	22) Perceived Stress Scale (PSS-10) Beck Depression Inventory (BDI-13) State-Trait Anxiety Inventory State subscale (STAI Y-2) Online (E-mail)	11.4%	(OR: 1.23; 95% CI: 1.16-1.31) or non-binary gender (OR: 3.90; 95% CI: 3.30-4.61) Precariousness (loss of income: OR: 1.16; 95% CI: 1.09-1.23), low-quality housing: OR: 1.38; 95% CI: 1.22-1.56) History of psychiatric follow-up (OR: 3.98; 95% CI: 3.74-4.23) Symptoms compatible with COVID-19 (OR: 1.55; 95% CI: 1.46-1.63) Social isolation (weak sense of integration low: OR: 5.05; 95% CI: 4.65-5.48) Low quality of social relations: OR: 1.95; 95% CI: 1.82-2.09) Low quality of the information received (OR: 1.21; 95% CI: 1.12-1.30) Protective factors Not information

Xin et al., 2020	China 26 universities Cross-sectional	24,378 students 71.5% M = 32.3% F = 67.7% 19.9±1.6 years old	Self-harm or suicidal ideation (SH-SI) Mandatory quarantine status (MQS), Patient Health Questionnaire (PHQ-9), Online (WeChat)	Prevalence = 12.9%	Risk factors Mandatory quarantined status (OR: 4.49; 95% CI: 3.75-5.39) Protective factors Not information	Moderate	Low

* Lack of information due to missing article data. Source: Authors.

The analysis of the risk of bias of the prevalence studies showed that seven studies had high risk and two moderate risk. While an analytical cross-sectional study obtained high risk, three moderate risk and two low risk. (Table 2-3)

Table 2. Quality assessment using the Joanna Briggs Institute standardized Critical appraisal instrument for prevalence studies

Study	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
Abreu et al., 2020	Y	N	N	Y	Y	Y	NA	N	NA	44,4%
Chen et al., 2020	Y	N	Y	U	U	Y	NA	N	U	33,3%
Rahman et al., 2020	Y	Y	Y	Y	Y	N	NA	N	NA	55,6%
Son et al., 2020	Y	Y	N	Y	Y	U	NA	N	NA	44,4%
Sun et al., 2021	Y	N	Y	U	U	Y	NA	N	U	33,3%
Tasnim et al., 2020	Y	N	Y	Y	U	Y	NA	N	U	44,4%
Wang et al., 2020	Y	Y	Y	Y	U	U	NA	N	U	44,4%
Wathelet et al., 2020	Y	Y	Y	U	N	Y	NA	N	N	44,4%
Xin et al., 2020	Y	N	Y	Y	Y	Y	NA	N	NA	55,6%

Note. N: No; U: Unclear; Y: Yes; NA: Not applicable. Fonte: Autores.

1. Was the sample frame appropriate to address the target population? 2. Were study participants sampled in an appropriate way? 3. Was the sample size adequate? 4. Were the study subjects and the setting described in detail? 5. Was the data analysis conducted with sufficient coverage of the identified sample? 6. Were valid methods used for the identification of the condition? 7. Was the condition measured in a standard, reliable way for all participants? 8. Was there appropriate statistical analysis? 9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

Table 3. Quality assessment using the Joanna Briggs Institute standardized Critical appraisal instrument for analytical cross-sectional studies

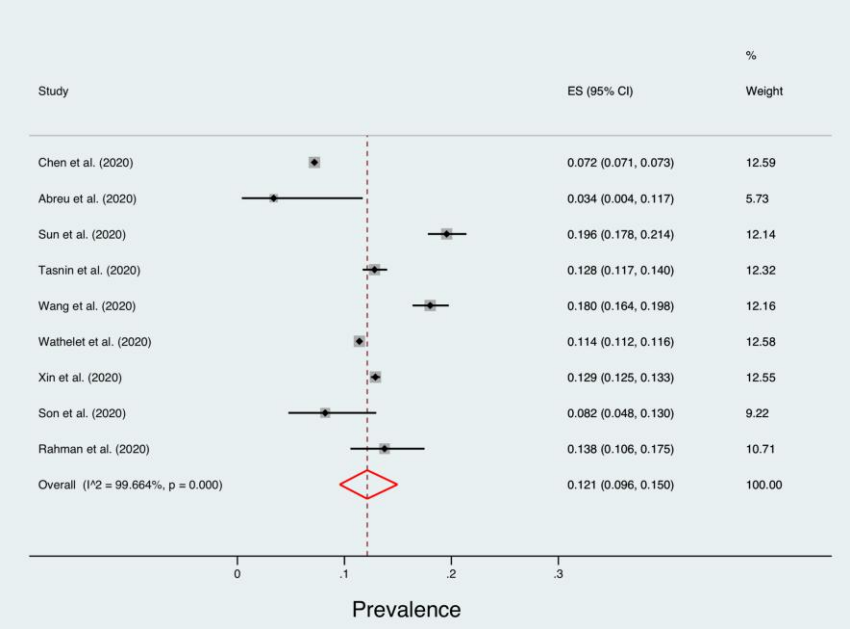
Study	1	2	3	4	5	6	7	8	Total
Patsali et al., 2020	N	Y	Y	Y	N	N	Y	N	50%
Pramukti et al., 2020	U	Y	Y	Y	Y	N	U	N	50%
Rahman et al., 2020	U	Y	U	Y	N	Y	N	Y	50%
Tasnin et al., 2020	Y	Y	Y	Y	N	Y	Y	Y	87.5%
Wathelet et al., 2020	N	U	N	Y	N	Y	Y	Y	50%
Xin et al., 2020	Y	Y	U	Y	Y	Y	Y	Y	87.5%

Note. N: No; U: Unclear; Y: Yes. Fonte: Autores.

1. Were the criteria for inclusion in the sample clearly defined? 2. Were the study subjects and the setting described in detail? 3. Was the exposure measured in a valid and reliable way? 4. Were objective, standard criteria used for measurement of the condition? 5. Were confounding factors identified? 6.Were strategies to deal with confounding factors stated? 7.Were the outcomes measured in a valid and reliable way? 8. Was appropriate statistical analysis used?

The combined prevalence of suicidal ideation was estimated at 12.1%, CI 95%: 9.6% - 15.0%, with heterogeneity among studies of I^2 = 99.6%; p<0,001. (Figure 2)

Figure 2. Forest-Plot



CI = Confidence Interval; I^2 = Heterogeneidade estatística. Fonte: Autores.

4. Discussion

University students are particularly vulnerable to mental health problems; in this regard, this Rapid Systematic Review seems to be the first to map the literature on suicidal ideation in this population during the COVID-19 pandemic period and we observed a high combined prevalence in the studies, which is associated with several important factors.

Similar results described in other studies that evaluated different population groups during the pandemic also suggest a possible association of suicidal ideation with the scenario of intense social isolation and long periods of mandatory quarantine (Mamun et al., 2020; Reger et al., 2020; Nelson et al., 2020).We observed that suicidal ideation among university students has been investigated in several countries during this period (Tasnim et al., 2020; Wang et al., 2020; Debowska et al., 3030; Elmer et al., 2020; Faro et al., 2020; Maia & Dias, 2020; Tang et al., 2020), and by integrating the different results, our meta-analysis showed a combined prevalence of suicidal ideation of 12.1% (9.6% - 15.0%). Our results were higher than those found in the meta-analysis developed before the pandemic by Li et al. (2014), which showed a combined overall prevalence among Chinese university students of 10.7% (95% CI: 8.4% - 13.3%).

Female students presented more mental health problems and suicidal ideation, as recently demonstrated by Patsali et al. (2020) and Wathelet et al. (2020); in addition to other studies that revealed a higher psychological impact and higher levels of depression, anxiety and stress, before and during the COVID-19 outbreak for students of this gender (Rahman et al., 2020; Wang et al., 2020). Nevertheless, gender differences and their association with symptoms of depression, anxiety and stress as well as their higher occurrence among females seem to precede the pandemic, as demonstrated in previous studies (Li et al., 2014; Gentry et al., 2007; Hammem et al., 2018).

The age group may be one of the factors associated with suicidal ideation, and early adulthood (18 to 30 years) is apparently the most vulnerable time (Arafat, 2019). According to Hollenstein & Lougheed. (2013), the period of adolescence, which comprises up to 22 years of age, is a time for developing identity, autonomy and establishing relationships with people, and in which some adolescents develop mental or behavioral health problems. In a recent CDC survey it was reported higher rates of suicidal ideation among young adults aged 18-24 years than in general population during the pandemic (25.5% versus 10.7%). As identified in the study by Debowska et al. (2020), university students aged 18-24 years, starting their academic career, presented more symptoms of depression, anxiety, and suicidal ideation than adult students over 25 years of age, confirming the theoretical considerations of psychological distress in young adult university students, also proposed by other researchers (Arnett et al., 2014; Dusselier et al., 2015). Therefore, it is important to design college-specific intervention programs associated with suicidal ideation, especially for this age group. In this review, we identified only one study that included university students of middle and high age group.

Studies conducted in Bangladesh during the early stages of the COVID-19 pandemic, in university students, suggested that previous history of suicidal thoughts and attempts, family history of suicide, traumatic life event exposure, and smoking may be associated with higher levels of suicidal ideation (Rahman et al., 2020; Tasnim et al., 2020). Simultaneously, the recent results of Wathelet et al (2020) obtained when investigating a French population indicate that the most significant risk factors associated with suicidal ideation include having low-income, psychiatric history, symptoms consistent with COVID-19, social isolation, low socio economic level. A lower socioeconomic level was also a risk factor associated with suicidal ideation observed in the studies by Rahman et al (2020) and Tasnim et al (2020). These studies analyzed together, reveal that despite the presence of factors constantly associated with the occurrence of suicidal ideation, a number of factors that may be acting simultaneously make the comprehension of this scenario of suicidal ideation highly challenging in the context of university students.

It is also important to highlight that our review revealed that anxiety, depression and stress appear as factors strongly associated with suicidal ideation in young adult university students. It is clearly seen that mental health problems during this period of public health emergency are highly prevalent (Tasnim et al., 2020; Wang et al., 2020; Ge et al., 2020).

The negative consequences of COVID-19 may extend far beyond the number of deaths, with a significant impact on mental health. Previous studies have already indicated that past pandemics are associated with high suicide rates. A study with the fall cohort of the 2020-2021 in undergraduate and graduate students in the U.S. (n = 16,315) observed the associations between COVID-19 infections, hospitalizations, and suicide-related outcomes was reported the prevalence suicidal ideation by n = 2190 (13.4%), suicide plans by n = 885 (5.4%), and suicide attempts by n = 209 (1.3%).

An important associated factor observed was insomnia. A study conducted in Bangladesh during the early stages of the COVID-19 pandemic with 3,331 students, suggested that sleep disorders were factors associated with the risk of suicidal ideation (Tasnim et al., 2020). Suicidal ideation is more strongly predicted by the severity of insomnia than by fears related to the pandemic, as the effects of COVID-19 concerns about suicidal thinking are fully conveyed through its effects on sleep. In the study by Ge et al. (2020) a two-way relationship was observed between suicidal ideation and insomnia symptoms. In addition, sleep disorders in general and insomnia were risk factors for suicidal ideation found in a population-based longitudinal study (Suh et al., 2013), as well as in the meta-analysis that showed a two-way association of insomnia symptoms with psychotic experiences and symptoms of insomnia with suicidal ideation (Pigeon et al., 2017). It is important to highlight that different studies have demonstrated high rates of sleep disorders during the pandemic period (Huang & Zhao, 2020; Li et al., 2020). Excessive exposure to electronic devices by college students as a result of the exacerbated number of school activities and synchronous class hours can trigger a number of problems, ranging from mood alteration, insomnia and anxiety. Excessive screen time seems to have a detrimental effect on health, affecting sleep patterns. This is due to the suppression of melatonin production, which helps induce sleep through the blue light emitted by screens of appliances when used at night (Calvo-Sanz & Tapia-Ayuga, 2020; Christensen et al., 2016). Exposure to blue light before bedtime is associated with sleep inefficiency and reduced sleep duration (Vallance et al., 2015). These previous results are in line with our findings, which have demonstrated a significant association between sleep alterations and the occurrence of suicidal ideation among university students, thus suggesting that sleep quality may impact the prevalence of suicidal ideation.

Little is known about possible suicide prevention programs for college students during the pandemic and pre-COVID-19 intervention programs. During the COVID-19 pandemic new challenges to student mental health were identified and require public policy to prevent youth suicide. Emerging interventions and proliferation of telepsychiatry and digital tools can offer the opportunity to reach at-risk college students who face barriers to mental health services.

During the quality analysis of the studies included in this systematic review, some methodological limitations were observed, and thus the risk of bias varied from high to low, especially the small sample size used in some studies, the non-evaluation of mental health problems of students by demographic characteristics (age, gender, academic year, specialization) or personal and social contexts (income, religion, substance use), the network research method used due to the quarantine, online and with voluntary sampling, thus making it possible the existence of bias and samples with female predominance. In addition, the online format of some studies, however, the research may not be considered representative due to the non-use of a non-probabilistic sampling. Some studies also could not clarify whether the results were influenced by a population of interviewees with pre-existing or high levels of distress. Our results are also limited by the use of data collected from cross-sectional studies, preventing comparisons over time, and the lack of data collected before the pandemic prevents an adequate comparison with the scenario that precedes the health emergency.

However, we highlight that this review included the main databases of scientific journals in the areas of interest using a comprehensive research strategy, including gray literature, so that there was no evidence of publication bias. In addition, the

reading of the abstract and data extraction were performed by two researchers independently, and the authors of the articles that did not have data available were contacted, leading to an accurate data acquisition process. Therefore, it is suggested for future studies with longitudinal design seek to examine the trajectory of psychiatric symptoms as the COVID-19 pandemic extends.

5. Conclusion

A high prevalence of suicidal ideation was observed in the included studies and several associated factors, with emphasis on excessive screen time, sleep disorders, social isolation, depression, anxiety, post-traumatic stress, sociodemographic factors (female gender, young adults, less favored socioeconomic class), previous suicidal thoughts, history of suicide attempt and history of suicide in the family indicating that supportive measures should be made available to university students during the COVID-19 pandemic to ensure the mental health of this susceptible population.

Therefore, we suggest that monitoring the mental health of university students be constant, in pandemic and non-pandemic periods. Hence, future studies with a longitudinal design will allow us to examine the psychiatric symptoms manifestations as the pandemic extends.

References

Abreu, M. R. P., Tejeda, J. J. G., Velázquez, O. T., Tamayo, A. E. I. & Arjona, E. D. B. (2020). Alteraciones psicológicas en estudiantes de medicina durante la pesquisa activa de la COVID-19. *Medisan*, 24(4):537-540.

Aquino, E. M. L., Silveira, I. H., Pescarini, J. M., Aquino, R., Souza-Filho, J. A., Rocha, A. S., et al. (2020). Social distancing measures to control the COVID-19 pandemic: potential impacts and challenges in Brazil. *Cien Saude Colet* 25(suppl 1):2423-2446.

Arafat, S. M. Y. (2019). Females are dying more than males by suicide in Bangladesh. *Asian J Psychiatr*; 40:124-125.

Arnett, J. J., Žukauskiene, R. & Sugimura, K. (2014) The new life stage of emerging adulthood at ages 18-29 years: implications for mental health. *Lancet Psychiat*; 1:569-576.

Auerbach, R. P., Alonso, J., Axinn, W. G., Cuijpers, P., Ebert, D. D., Green, J. G., et al. (2016). Mental disorders among college students in the World Health Organization World Mental Health Surveys. *Psychol Med*; 46(14):2955-2970.

Calvo-Sanz, J. A., Tapia-Ayuga, C. E. (2020). Blue light emission spectra of popular mobile devices: The extent of user protection against melatonin suppression by built-in screen technology and light filtering software systems. *Chronobiol Int*; 37(7):1016-1022.

Cha, C. B., Franz, P. J. M., Guzmán, E., Glenn, C. R., Kleiman, E. M, Nock, M. K. (2018). Annual Research Review: Suicide among youth-epidemiology, (potential) etiology, and treatment. *Journal of Child Psychology and Psichiatry*; 59(4), 460-482.

Chen, R. N., Liang, S. W., Peng, Y., Li, X. G., Chen, J. B., Tang, S. Y., Zhao, J. B. (2020). Mental health status and change in living rhythms among college students in China during the COVID-19 pandemic: A large-scale survey. *J Psychosom Res*; 137:110219.

Christensen, M. A., Bettencourt, L., Kaye, L., Moturu, S. T., Nguyen, K. T., Olgin, J. E., Pletcher, M. J., Marcus, G. M. (2016). Direct Measurements of Smartphone Screen-Time: Relationships with Demographics and Sleep. *PLoS One*; 11(11): e0165331.

Debowska, A., Horeczy, B., Boduszek, D., Dolinski, D. (2020). A repeated cross-sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland. Psychological Medicine; 2:1–4.

Dusselier, L., Dunn, B., Wang, Y., Shelley, M. C. 2nd, Whalen, D. F. (2005). Personal, health, academic, and environmental predictors of stress for residence hall students. *J Am Coll Health*; 54(1):15-24.

Elmer, T., Mepham, K. & Stadtfeld, C. (2020) Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *PLoS One*; 15(7): e0236337.

Eskin, M., Sun, J. M., Abuidhail, J., Yoshimasu, K., Kujan, O., Janghorbani, M., Flood. C, Carta, M. G., et al. (2016). Suicidal Behavior and Psychological Distress in University Students: A 12-nation Study. *Arch Suicide Res*; v.20, n.3, p. 369-388.

Faro, A., Bahiano, M. A., Nakano, T. C., Reis, C., Silva, B. F. P., Vitti, L. S. (2020). COVID-19 and mental health: the emergence of care. Psychol Stud; 37: e200074.

Ge, F., Zhang, D., Wu, L. & Mu, H. (2020). Predicting Psychological State Among Chinese Undergraduate Students in the COVID-19 Epidemic: A Longitudinal Study Using a Machine Learning. *Neuropsychiatr Dis Treat*; 16: 2111-2118.

Gentry, L. A., Chung, J. J., Aung, N., Keller, S., Heinrich, K. M., Maddock, E. (2007). Gender differences in stress and coping among adults living in Hawaii. *Calif J Health Promot*; 5(2):89-102.

Gundim, V. A., Encarnação, J. P., Santos, F. C., Santos, J. E., Vasconcellos, E. A., Souza, R. C. (2021). Mental health of university students during the covid-19 pandemic. *Rev Baiana Enferm*; 35: e37293.

Hammen, C. (2018). Risk factors for depression: an autobiographical review. *Annu Rev Clin Psychol*; 14:1-28.

Hollenstein, T. & Lougheed, J. P. (2013). Beyond storm and stress: Typicality, transactions, timing, and temperament to account for adolescent change. American Psychologist, 68(6), 444-454.

Huang, Y. & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*; 288:112954.

Kim, S. W. & Su, K. P. (2020). Using psychoneuroimmunity against COVID-19. *Brain Behav Immun*; 87:4-5.

Li, W., Yang, Y, Liu, Z. H., Zhao, Y. J., Zhang, Q., Zhang, L., Cheung, T., Xiang, Y. T. (2020). Progression of Mental Health Services during the COVID-19 Outbreak in China. *Int J Biol Sci*; 16(10):1732-1738.

Li, Z. Z., Li, Y. M., Lei, X. Y., Zhang, D., Liu, L, Tang, S. Y., et al. (2014). Prevalence of suicidal ideation in Chinese college students: a meta-analysis. *PLoS One*, v.9, n.10, p. e104368.

Lindsey, M. A., Sheftall, A. H., Xiao, Y., Joe, S. (2017). Trends of suicidal behaviors among high school students in the United States: 1991-2017.*Pediatrics*; 144(5), e20191187.

Maia, B. R. & Dias, P. C. (2020). Anxiety, depression, and stress in university students: the impact of COVID-19. Psychol Stud; 37: e200067.

Mamun, M. A., Misti, J. M., & Griffiths, M. D. (2020). Suicide of Bangladeshi medical students: Risk factor trends based on Bangladeshi press reports. *Asian J Psychiatr*; 48:101905.

Moher, D., Schulz, K. F., Simera, I., Altman, D. G. (2010). Guidance for developers of health research reporting guidelines. *PLoS Med*; 7(2): e1000217.

Moola, S., Munn, Z., Tufanaru, C., Aromataris, E., Sears, K., Sfetcu, R., Currie, M., et al. (2020). Chapter 7: Systematic reviews of etiology and risk. In: Aromataris E, Munn Z (Editors). Explanation of Cohort Studies Critical Appraisal. *JBI Manual for Evidence Synthesis.*

Nelson, B. W., Pettitt, A., Flannery, J. E., Allen, N. B. (2020). Rapid assessment of psychological and epidemiological correlates of COVID-19 concern, financial strain, and health-related behavior change in a large online sample. *PLoS One*; 15(11): e0241990.

Patsali, M. E., Mousa, D. V., Papadopoulou, E. V. K, Papadopoulou KKK, Kaparounaki CK, Diakogiannis I, Fountoulakis KN. (2020). University students' changes in mental health status and determinants of behavior during the COVID-19 lockdown in Greece. *Psychiatry Res*; 292:113298.

Peltzer K, Yi S & Pengpid S. (2017). Suicidal behaviors and associated factors among university students in six countries in the Association of Southeast Asian Nations (ASEAN). *Asian J Psychiatr*, p.26:32-38.

Perez, W. V. (2005). The relationship between seriously considering, planning, and attempting suicide in the youth risk behavior survey. *Suicide and Lifethreatening Behavior*; 35: 35–49.

Phillips, M. R., Li, X. & Zhang, Y. (2002). Suicide rates in China, 1995-99. *Lancet*; v.360, n.9329, p.344.

Pigeon, W. R., Bishop, T. M., Krueger, K. M. (2017). Insomnia as a Precipitating Factor in New Onset Mental Illness: a Systematic Review of Recent Findings. *Curr Psychiatry Rep*; 19(8):44.

Pramukti, I., Strong, C., Sitthimongkol, Y., Setiawan, A., Pandin, M. G. R., Yen, C. F., et al. (2020). Anxiety and Suicidal Thoughts During the COVID-19 Pandemic: Cross-Country Comparative Study Among Indonesian, Taiwanese, and Thai University Students. *J Med Internet Res*; 22(12): e24487.

Rahman, M. E., Saiful, M. I., Mamun, M. A., Moonajilin, M. S., Yi, S. (2020). Prevalence and Factors Associated with Suicidal Ideation Among University Students in Bangladesh. Arch Suicide Res.

Reger, M. A., Piccirillo, M. L., Buchman-Schmitt, J. M. (2020). COVID-19, Mental Health, and Suicide Risk Among Health Care Workers: Looking Beyond the Crisis. *J Clin Psychiatry*; 81(5):20com13381.

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *Int J Surg*; 76:71-76.

Son, C., Hegde, S., Smith, A., Wang, X., Sasangohar, F. (2020). Effects of COVID-19 on College Students' Mental Health in the United States: Interview Survey Study. *J Med Internet Res*; 22(9):e21279.

Suh, S., Kim, H., Yang, H. C., Cho, E. R., Lee, S. K., Shin, C. (2013). Longitudinal course of depression scores with and without insomnia in non-depressed individuals: a 6-year follow-up longitudinal study in a Korean cohort. *Sleep*; 36(3):369-376.

Sun, S., Goldberg, S. B., Lin, D., Qiao, S., Operario, D. (2021). Psychiatric symptoms, risk, and protective factors among university students in quarantine during the COVID-19 pandemic in China. *Global Health*; 17(1):15.

Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., Chen, S., Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *J Affect Disord*; 274:1-7.

Tasnim, R, Islam, M. S., Sujan, M. S. H., Sikder, M. T., Potenza, M. N. (2020). Suicidal ideation among Bangladeshi university students early during the COVID-19 pandemic: Prevalence estimates and correlates. *Child Youth Serv Rev*; 119:105703.

Tricco, A. C., Langlois, E. V. & Straus, S. E. (2017). *Rapid reviews to strengthen health policy and systems: a practical guide*. Geneva: World Health Organization.

United Nations educational, scientific and cultural organization. (2020). COVID-19 educational disruption and response. Paris: UNESCO; 2020.

Vallance, J. K., Buman, M. P., Stevinson, C., Lynch, B. M. (2015). Associations of overall sedentary time and screen time with sleep outcomes. *Am J Health Behav*; 39(1):62-67.

Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., Sasangohar, F. (2020). Investigating Mental Health of US College Students During the COVID-19 Pandemic: Cross-Sectional Survey Study. *J Med Internet Res*; 22(9):e22817.

Wathelet, M., Duhem, S., Vaiva, G., Baubet, T., Habran, E., Veerapa, E., et al. (2020). Factors Associated With Mental Health Disorders Among University Students in France Confined During the COVID-19 Pandemic. *JAMA Netw Open*; 3(10): e2025591.

Werlang, B. S. G., Borges, V. R. & Fensterseifer, L. (2005). Risk and Protection Factors in Suicide Ideation Adolescents. *Interamerican Journal of Psychology*; v. 39, n.2, p.259- 266.

Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., O'GRADY, K. E. (2010). Prevalence and predictors of persistent suicide ideation, plans, and attempts during college. *J Affect Disord*; v. 127, n.1-3, p. 287-294.

World Health Organization. (2021). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 25 June 2021*. Geneva: WHO. 2021.

Xin, M., Luo, S., She, R., Yu, Y., Li, L., Wang, S., et al. (2020). Negative cognitive and psychological correlates of mandatory quarantine during the initial COVID-19 outbreak in China. *Am Psychol*; 75(5):607-617.

Zhai, H., Ba, B., Chen, L., Han, D., Wang, L., Qiao, Z., et al. (2015). Correlation between family environment and suicidal ideation in university students in China. *Int J Environ Res Public Health*; v.12, n.2, p. 1412-1424.