

COVID-19 risk perception among students at a state university in Chile

Shadye Matar-Khalil* ^{1,a}; José González-Campos ^{2,b}; Melissa Ortiz-Barrero ^{3,c}; Carola Rosas ^{4,d}; Miguel Ángel Karam Calderón ^{5,e}

ABSTRACT

Objective: To evaluate the level of COVID-19 risk perception (PCR-CV19) by returning to in-person classes and to analyze this perception with sociodemographic and health variables associated with such disease.

Materials and methods: A cross-sectional and prospective study. The questionnaire was adapted to assess the PCR-CV19 among 532 university students. Moreover, an association analysis of the four dimensions of the PCR-CV19 (*cognitive vulnerability*, *emotional vulnerability*, *risky-protective behaviors* and *severity*) and the perception index was performed with sociodemographic and health variables. The following statistical methods were used: one-way analysis of variance (ANOVA), Shapiro-Wilk test for normality, Levene's test for homogeneity of variances and Tukey's honest significant difference or Games-Howell post hoc tests. These analyses were performed using the Jamovi statistical software, version 1.2.2.

Results: A moderate level of PCR-CV19 was found, where the most relevant dimensions were *risky-protective behaviors* and *severity*. In addition, there was an association between the dimensions of the PCR-CV19 and the perception index with the variables *age*, *gender*, *alcohol consumption*, physical and mental health indicators (anxiety and depression) and experiences with COVID-19. *Cognitive vulnerability* and *emotional vulnerability* were the most sensitive dimensions in the evaluation of the PCR-CV19.

Conclusions: We continue to face constant risk conditions, thus making it necessary to maintain a surveillance scheme of the PCR-CV19 experienced by the population. In university students, *cognitive vulnerability* and *emotional vulnerability* were the most sensitive dimensions in the evaluation of PCR-CV19 and experiences with COVID-19 (illness or death). The fact that university students do not feel vulnerable and/or do not perceive the severity associated with COVID-19 transmission may affect their self-care behaviors. These results have key implications for public health; therefore, an intersectoral approach is required to have relevant information in order to face future pandemics.

Keywords: COVID-19; Public Health; Perception; Risk; Communicable Diseases; Pandemics (Source: MeSH NLM).

INTRODUCTION

A fundamental factor for pandemic control is the population's engagement in their self-care to prevent further transmission. Effective risk communication that is understandable to the population, regardless of their social, economic or educational status, is crucial for ensuring appropriate action. However, to structure an effective risk communication program, it is essential to understand people's perception of the risks they face ^(1,2).

Risk perception (RP) refers to the subjective assessment individuals make regarding the understanding-perception of vulnerability-susceptibility, potential for harm and effect-consequences of environmental risks ^(1,2). However, RP is a dynamic concept and vary across different groups of individuals and contexts ^(2,3).

University students exhibit risky behaviors that may heighten their susceptibility to transmission ^(2,4,5). Studies have extensively examined RP in relation to communicable diseases, especially sexually transmitted diseases ⁽⁶⁾, and more recently COVID-19 transmission dynamics ⁽³⁻⁵⁾. Research in this area predominantly focuses on students of health programs ^(7,8) and other studies focused on analyzing RP's impact on academic performance ⁽⁹⁾.

Moreover, vaccination programs may have altered people's perception by providing new information that modifies the initial understanding of the pandemic, potentially influencing preventive behaviors to mitigate transmission risks. This is particularly relevant for younger population who may perceive the elderly as highly vulnerable to COVID-19 ⁽¹⁰⁻¹⁴⁾.

1 Universidad del Sinú, School of Health Sciences, Psychology Program. Colombia.

2 Universidad Católica del Maule, School of Basic Sciences. Talca, Chile.

3 Universidad Nacional Abierta y a Distancia, School of Social Sciences, Arts and Humanities, Psychology Program. Colombia.

4 Universidad Austral de Chile, School of Medicine, Nursing Institute. Chile.

5 Universidad Autónoma del Estado de México, School of Medicine. Mexico.

^a PhD in Psychology; ^b PhD in Statistics; ^c Master's degree in Psychology; ^d PhD in Health Sciences; ^e PhD in Social Sciences.

*Corresponding author.

Furthermore, in the face of the return to in-person classes during the COVID-19 pandemic, assessing students' psychological responses to potential transmission is crucial ⁽¹¹⁾. This facilitates an analysis of how preventive behaviors function in perceived threatening situations and how the perception of an event as threatening influences subsequent behaviors ⁽¹²⁾. These elements are necessary to prevent infecting oneself and spreading a disease to others. Therefore, this information is relevant for public health in the face of possible future pandemics.

Therefore, this study aims to evaluate the level of COVID-19 risk perception (PCR-CV19) by returning to in-person classes and to analyze this perception with sociodemographic and health variables.

MATERIALS AND METHODS

Study design and population

A cross-sectional and prospective study was conducted with students from a Chilean regional state university between September and November 2021. The sample of 532 university students was determined in a stratified way using Namakforoosh's formula (2000), with a 95 % confidence interval and a 5 % margin of error ⁽¹⁵⁾.

Variables and measurements

The PCR-CV19 questionnaire, designed and standardized in Colombia by Matar, Ortiz and González ⁽¹⁶⁾, was adapted for this study. In the PCR-CV19, vulnerability refers to the probability of catching a disease, analyzed from both personal and comparative dimensions. This encompasses the likelihood of being affected by a hazard-danger in relation to other individuals of the same age and gender. Risky-protective behaviors are associated with self-care practices and adherence to biosafety protocols. Severity is understood as the perception of harm to health, death and the socioeconomic impact of the COVID-19 pandemic ⁽¹⁶⁾.

Statistical analysis

The original questionnaire comprised 40 items. During its adaptation for the university population, it was reduced to 26 items with the approval of the original authors. The items were evaluated using a 5-point Likert scale: for the vulnerability dimensions, 1 represents "very low" and 5 represents "very high"; for the risky-protective behaviors dimension, 1 is "never" and 5 is "always"; and for the severity dimension, 1 means "not at all serious" and 5 means "very serious." Although the original instrument demonstrated positive metric properties, these were reassessed in the study population, yielding a Cronbach's alpha of 0.716 and McDonald's omega of 0.806. Table 1 presents the reliability estimates for each dimension.

Table 1. Indicators of internal consistency of the RP index and the dimensions of the PCR-CV19 questionnaire adapted for Chilean university students

Dimensions	Cronbach's alpha	McDonald's omega
Cognitive vulnerability	0.765	0.783
Emotional vulnerability	0.790	0.799
Risky-protective behaviors	0.838	0.863
Severity	0.869	0.878
RP	0.716	0.806

To verify the dimensionality of the instrument, a confirmatory factor analysis was used. This was supported by the Kaiser-Meyer-Olkin (KMO) test (all values above 0.5) for sample adequacy, along with the comparative fit index (CFI) (0.814), root mean square error of approximation (RMSEA) (0.08) and chi-square test (1,534) for goodness of fit ($p < 0.001$). The analysis established that the data provided evidence supporting each dimension, with significant factor loadings for each factor ($p < 0.001$). Thus, the adaptation of the instrument exhibits the desired metric characteristics for replicability and validates the conclusions derived from it.

Additionally, to contrast factor levels and establish dependencies, one-way analysis of variance (ANOVA) was

used, following verification by the Shapiro-Wilk test for normality, Levene's test for homogeneity of variances and Tukey's honest significant difference or Games-Howell post hoc tests. These analyses were performed using the Jamovi statistical software, version 1.2.2.

A supplementary questionnaire was administered to gather information on sociodemographic and health variables, as well as COVID-19-related questions. This included data on age, gender, COVID-19 vaccination status, previous diagnosis of COVID-19 infection, diagnoses of COVID-19 among close contacts, COVID-19-related deaths among close contacts, tobacco or alcohol consumption, physical activity, pregnancy, obesity, and symptoms of anxiety, depression and stress.

Ethical considerations

Questionnaires and informed consent were administered using Google Forms. The study adhered to the ethical principles for medical research involving human subjects, as outlined in the Declaration of Helsinki. This included obtaining informed consent, ensuring confidentiality and maintaining anonymity in handling information exclusively for research purposes.

RESULTS

Characteristics of the sample

The sample consisted of 532 university students, aged 18 to 40 years. Out of these, 24.4 % identified as males, 72 % as females and 3.6 % as non-binary. The predominant age range was 17 to 21 years (48.8 %), followed by 22 to 26 years (33.9 %). A total of 79.8 % of the population reported not using tobacco; however, 52.2 % consumed alcohol. Moreover, 55.8 % did not engage in physical activity. Regarding mental health symptoms, 35.7 % reported symptoms of anxiety, 15.4 % symptoms of depression and 33.2 % symptoms of stress (Table 2).

Table 2. Descriptive data from the sociodemographic and health data sheet (n = 532)

Variables	n	%
Gender	Female	382 72.0
	Male	130 24.4
	Non-binary	20 3.6
Age	18-21	256 48.8
	22-26	178 33.9
	27-31	51 9.7
	32-36	22 4.2
	≥ 37	18 3.4
COVID-19 vaccination status	No	6 1.1
	Yes	408 76.8
	No response	118 22.0
Previous diagnosis of COVID-19 infection	No	464 88.4
	Yes	61 11.6
Diagnoses of COVID-19 among close contacts	No	244 46.5
	Yes	281 53.5
COVID-19-related deaths among close contacts	No	457 87.0
	Yes	68 13.0
Tobacco consumption	No	419 79.8
	Yes	106 20.2
Alcohol consumption	No	251 47.8
	Yes	274 52.2
Weekly physical activity over 150 minutes	No	293 55.8
	Yes	232 44.2
Current pregnancy or becoming a parent	No	523 99.6
	Yes	2 0.4
Obesity	No	449 85.5
	Yes	76 14.5
Symptoms of depression	No	444 84.6
	Yes	81 15.4
Symptoms of anxiety	No	338 64.3
	Yes	187 35.7
Symptoms of stress	No	351 66.8
	Yes	174 33.2

Analysis of RP in the sample

The university population under study was categorized as having a “moderate” RP according to the RP index: very low (0.0; 0.602), low (0.602; 0.645), moderate (0.645; 0.68), high (0.68; 0.729) and very high (0.729; 1).

Table 3 presents the descriptive results of the PCR-CV19 instrument by dimension. It is noted that students exhibit a low perception of the probability of reinfection with COVID-19 but a high perception of concerns about infecting their household members, teachers and classmates.

Overall, students show high perception in the severity dimension, particularly concerning the development or exacerbation of new mental illnesses and the potential loss of an academic semester.

Furthermore, comparing the four dimensions, the risky-protective behaviors dimension shows significantly higher scores, together with the severity dimension (repeated measures ANOVA-Friedman $p < 0.001$, Mauchley’s test of sphericity $p < 0.001$).

Table 3. Descriptive results of the PCR-CV19

Dimensions and indicators	Media	Standard deviation
Cognitive vulnerability		
My risk of contracting COVID-19 is	2.7	0.9
My concern about contracting COVID-19 is	3.4	1.2
My risk of contracting COVID-19 when approaching unmasked individuals is	3.7	1.2
My concern about a new suspension of in-person classes due to increased infections is	3.4	1.3
My probability of reinfection with COVID-19 is	1.9	1.2
My concern about infecting my household members with COVID-19 is	4.0	1.2
My concern about infecting my professors and classmates is	3.8	1.1
Emotional vulnerability		
My fear of contracting COVID-19 is	3.5	1.3
My stress about contracting COVID-19 is	3.2	1.3
My uncertainty about returning to in-person classes due to the COVID-19 pandemic is	3.7	1.2
My sadness about returning to in-person classes is	2.5	1.3
My anxiety about returning to in-person classes is	2.9	1.4
My risk of losing or reducing interpersonal relationships due to COVID-19 is	3.1	1.3
Risky-protective behaviors		
I use a mask permanently	4.7	0.6
I frequently wash and/or disinfect my hands with gel or alcohol	4.6	0.7
I keep a social distance of one meter	4.3	0.9
I follow prevention protocols in all open spaces I visit	4.6	0.7
I follow prevention protocols in all enclosed spaces I visit	4.7	0.6
I follow prevention protocols in public transportation	4.6	0.8
I use a mask covering my mouth and nose	4.8	0.5
I follow prevention protocols in social and family gatherings	3.9	1.2
Severity (How would you describe returning to in-person classes due to COVID-19 in terms of):	2.4	1.3
Severity		
Complications (hospitalization, intensive care unit or sequelae)	2.3	1.2
Loss of academic semester	2.2	1.2
Physical illness (new or worsening condition)	2.4	1.2
Mental illness (new or worsening condition)	2.1	1.2

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Associations in sociodemographic and health questionnaires

Table 4 shows the results of the associations between sociodemographic and health variables with the RP index and each of the dimensions of the PCR-CV19. Regarding

context variables, significant differences were found in the severity dimension across different age ranges. Specifically, those aged 27 to 31 years and ≥ 37 years ($p < 0.046$ in both cases) had a significant higher perception of severity compared to those aged 17 to 21 years.

Table 4. Comparison analysis of the RP index and the dimensions of the PCR-CV19 based on sociodemographic and health variables related to COVID-19

Variables	Dimensions				RP index
	Cognitive vulnerability	Emotional vulnerability	Risky-protective behaviors	Severity	
Age	0.363	0.246	0.788	0.003**	0.892
Gender	0.025*	< 0.001***	0.001**	0.013	0.004**
COVID-19 vaccination status	0.269	0.931	0.132	0.767	0.151
Previous diagnosis of COVID-19 infection	0.001***	0.738	0.558	0.154	0.612
Diagnoses of COVID-19 among close contacts	< 0.001***	0.030*	0.011*	0.066	0.029*
COVID-19-related deaths among close contacts	0.004**	0.007**	0.627	0.012*	0.079
Tobacco consumption	0.260	0.852	0.064	0.647	0.375
Alcohol consumption	0.040*	0.058	< 0.001***	0.394	0.008**
Weekly physical activity over 150 minutes	< 0.001***	< 0.001***	0.099	0.002**	0.002**
Current pregnancy or becoming a parent					
Obesity	0.669	0.325	---	0.924	0.563
Symptoms of depression	0.037*	0.045*	0.235	0.011*	0.211
Symptoms of anxiety	0.003**	0.013*	0.935	< 0.001***	0.355
Symptoms of stress	0.379	0.006**	0.126	0.312	< 0.001***
	0.025*	< 0.001***	0.076	0.011*	0.014*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$: at least one factor level has a significant effect on the respective dimension or index. One-way ANOVA, Tukey’s honest significant difference or Games-Howell post hoc tests, depending on Levene’s test for homogeneity of variances.

Regarding the gender, significant overlaps were found in all dimensions between the female and male categories ($p < 0.05$). Similarly, the non-binary category overlaps with the male category in the emotional vulnerability dimension and RP index ($p < 0.05$).

Concerning the diagnosis of COVID-19, significant differences were observed only in the cognitive vulnerability dimension, in favor of those who reported a previous diagnosis of COVID-19 infection ($p < 0.001$). Additionally, regarding diagnoses of COVID-19 among student’s close contacts, significant differences were observed in the emotional vulnerability dimension ($p < 0.001$) and the risky-protective behaviors dimension ($p = 0.046$).

When asked, “Has someone close to you died because of COVID-19?,” significant differences were found in cognitive

vulnerability, emotional vulnerability and RP index for those who reported COVID-19-related deaths among close contacts ($p = 0.003$, 0.002 and 0.042 , respectively). For the severity dimension, students who did not report COVID-19-related deaths among close contacts had significantly higher scores ($p = 0.013$).

In terms of the relationship between the cognitive vulnerability dimension, risky-protective behaviors dimension and RP index, significant differences were found in favor of those who did not consume alcohol ($p = 0.016$, < 0.001 and 0.008 , respectively). For the relationship between the cognitive vulnerability dimension, emotional vulnerability dimension and RP index, students who were not engaged in physical activity had significantly higher scores than those who were engaged ($p < 0.001$, < 0.001 and 0.002 , respectively). In the severity dimension, significantly higher scores were found

for students who engaged in weekly physical activity over 150 minutes ($p = 0.002$).

Regarding obesity, significant differences were found in cognitive vulnerability, emotional vulnerability and severity dimensions among those who reported obesity ($p = 0.007$, 0.006 and 0.003 , respectively).

Concerning the variables associated with mental health, in the emotional vulnerability dimension, significantly higher scores were observed in students reporting symptoms of anxiety compared to those who did not report any symptom ($p < 0.001$). In the severity dimension, the results favored those with no symptoms of anxiety ($p = 0.002$). Similarly, significantly higher scores in emotional vulnerability were found in students with symptoms of depression compared to those with a family history of depression ($p < 0.049$). For the RP index, students with symptoms of depression had significantly higher scores than those without such symptoms ($p = 0.023$). Additionally, students with a family history of depression and those with no previous diagnosis of COVID-19 infection had significantly higher scores compared to those without a previous diagnosis ($p = 0.003$).

Regarding the symptoms of stress, no significant differences were observed in the risky-protective behaviors dimension. However, in other dimensions and the RP index, students reporting symptoms of stress had significantly higher scores than those who did not ($p < 0.003$).

Finally, no associations were found with the tobacco consumption and current pregnancy or becoming a parent variables.

DISCUSSION

In the study population, a moderate RP was found regarding the return to in-person classes. The cognitive vulnerability and emotional vulnerability dimensions showed the greatest statistical differences among the surveyed students. This may be due to their experiences during the pandemic, such as diagnoses of COVID-19 among close contacts and COVID-19-related deaths among close contacts. These experiences have likely influenced their perception and increased the uncertainty about returning to in-person classes ⁽¹⁷⁾.

These findings align with reports on RP, where previous experiences play an important role in shaping this perception. As is well known, emotional responses and cognitive representations about disease transmission may have changed since the beginning of the pandemic, mainly due to how the risk of the disease was communicated. These aspects influence RP and the preventive measures that people implement to avoid transmission ⁽¹⁸⁻²⁰⁾.

An important point of this study is that students consider infection to be serious, particularly because of the possibility of infecting others. However, they do not feel personally vulnerable, which may be due to their perception of risk control. This is a substantial element in people's perception of the risks they face. This finding is consistent with other studies and the theoretical basis of RP, which suggests that the more people feel they can control a risk, the lower their RP. Not feeling vulnerable or failing to recognize the seriousness of transmission may affect RP and lead to an increase in transmission, which could negatively impact the social, political and economic conditions of populations ⁽²¹⁾.

Significant differences were also observed in both the RP index and each dimension of the PCR-CV19 in relation to the variables, particularly gender, alcohol consumption, physical activity, obesity and symptoms of depression and stress. Females and non-binary individuals tend to perceive a higher PCR-CV19 by returning to in-person classes during the pandemic. Similarly, studies related to vaccination have shown that both females and non-binary individuals have greater RP. This heightened RP may stem from their increased sense of vulnerability and greater fear and distrust in the face of new health challenges ⁽²²⁾.

It is worth mentioning that understanding risky behaviors requires considering the symbolic dimension of risk and its meanings. These behaviors are influenced by the social context in which risk is produced and managed. Social expectations, cultural patterns and pressure from groups, peers or family shape how threats or dangers are constructed and perceived. Social expectations and cultural patterns are mediated by a socialization system that emphasizes differences and inequalities between males and females. Over the years, evidence has shown a strong relationship between gender identity and the risky behaviors young individuals may adopt. For instance, males often engage in unhealthy behaviors as a way to assert their virility. Courtenay ⁽²³⁾ indicates that males who adhere to traditional beliefs about manhood are more likely to have poor health habits compared to their non-traditional counterparts. These gender considerations are crucial for understanding RP and behaviors, which are essential for developing effective health programs and risk communication strategies. As suggested, gender is an important predictor of fear ^(16,23-27).

Another important contribution of this study is the examination of the health conditions of young people and their relationship with RP, particularly concerning the risk of COVID-19 infection. This includes symptoms related to depression and stress, which showed significant differences ($p < 0.001$) in the RP index, especially in terms of emotional vulnerability. These findings demonstrate that the COVID-19 pandemic has had not only physical but also

mental repercussions⁽²⁸⁾. Some authors have even suggested that we are facing an epidemic of mental health issues, with significant consequences for both individuals and societal health. Therefore, the data from this study can be beneficial for developing health promotion and risk communication programs aimed at providing formal support to improve psychological and social well-being⁽²⁹⁻³²⁾.

Another key element contributed by this study is related to the consumption of legal substances. A significant difference was found between young people who consume alcohol and those who do not ($p < 0.05$). Notably, Chilean youths exhibit moderate to high levels of alcohol consumption⁽¹⁹⁾. Adolescence is a stage where the RP differs from that of adults, i.e., adolescents often see the dangers of behaviors like drug or alcohol use as less significant compared to adults, who would perceive these behaviors as highly risky to their health^(2,33-36).

In addition, studies on the psychological effects of COVID-19 and mass isolation have found an increased rate of anxiety and depression, as well as hazardous and harmful alcohol consumption⁽³⁶⁻³⁸⁾. These findings align with our results, which suggest that pandemic control measures, lacking in health promotion and adequate risk communication, may have created a vicious cycle. Consequently, such measures may have contributed to the emergence of mental health issues like anxiety, depression and stress, leading some individuals to consume alcohol or other substances or to increase their consumption. This likely exacerbated mental health issues by prolonging social isolation and reducing social interaction, ultimately affecting their RP and behavior.

This research has key implications for public health and education. Effective risk communication is a fundamental strategy for controlling a pandemic and must be based on people's RP. We continue to face constant risk conditions, making it necessary to maintain a surveillance scheme of the PCR-CV19 experienced by the population, particularly regarding transmission risk, a significant contribution of this study. Additionally, the COVID-19 pandemic has tested global health systems, highlighting the urgent need for public health to redefine and adapt its practices to new social, political, economic and health demands^(8,36).

Despite the participation of students from a state university, it would be beneficial to extend this study to a larger population, including private universities, educators and the broader educational community. The information obtained would enable higher education institution managers to establish guidelines, measures and policies supported by public health. This would allow for better anticipation and management of scenarios posed by COVID-19 and other possible communicable diseases, as well as exploring differences in RP.

In conclusion, university students who do not feel vulnerable or do not perceive the seriousness of transmission may neglect self-care behaviors; these findings have key implications for public health and therefore require an intersectoral approach.

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BIBLIOGRAPHIC REFERENCES

1. Brewer NT, Weinstein ND, Cuite CL, Herrington JE. Risk perceptions and their relation to risk behavior. *Ann Behav Med [Internet]*. 2004;27(2):125-30.
2. García del Castillo JA. Concepto de percepción de riesgo y su repercusión en las adicciones. *Health and Addictions/Salud y Drogas [Internet]*. 2012;12(2):33-151.
3. Santana González Y, Sagaró del Campo NM, Valdés García LE. Percepción de riesgo vs. COVID-19 en centros hospitalarios de Santiago de Cuba. *Universidad y Sociedad [Internet]*. 2021;13(4):195-206.
4. Juárez Nájera M, Bustos Aguayo JM, Carreón Guillén J, García Lirios C. La percepción de riesgo en estudiantes universitarios ante la propagación del coronavirus SARS-COV-2 y la enfermedad COVID-19. *Revista de Psicología de la Universidad Autónoma del Estado de México [Internet]*. 2020;9(17):94-107.
5. Germani A, Buratta L, Delvecchio E, Gizzi G, Mazzeschi C. Anxiety severity, perceived risk of COVID-19 and individual functioning in emerging adults facing the pandemic. *Front Psychol [Internet]*. 2020;11:567505.
6. Huarcaya-Victoria J. Consideraciones sobre la salud mental en la pandemia de COVID-19. *Rev Peru Med Exp Salud Publica [Internet]*. 2020;37(2):327-34.
7. Piñel Pérez CS, Gómez-Roso Jareño MJ, López Galián JJ. Percepción y ansiedad de los estudiantes de medicina en su rotación clínica en obstetricia durante la pandemia por COVID-19. *Rev Esp Edu Med [Internet]*. 2021;2(1):13-21.
8. Ortiz-Magdaleno M, Bermeo Escalona JR, Gaitán-Cepeda LA, Cepeda-Bravo JA, Sánchez-Vargas LO. Impacto del conocimiento/percepción sobre COVID-19 en el riesgo de contagio en estudiantes de Odontología y Dentistas. *Rev Odontol Mex [Internet]*. 2022;25(2):115-29.
9. Miranda Valdivieso MA, Burbano Pantoja VM, Burbano Valdivieso AS. Percepción de estudiantes universitarios colombianos sobre el efecto del confinamiento por el coronavirus, y su rendimiento académico. *Cienc Tecnol Desarro [Internet]*. 2020;41(42):269-81.
10. Tamayo García MR, Miraval Tarazona ZE, Mansilla Natividad P. Trastornos de las emociones a consecuencia del COVID-19 y el confinamiento en universitarios de las diferentes escuelas de la Universidad Nacional Hermilio Valdizán. *Rev Comun Salud [Internet]*. 2020;10(2):343-54.
11. Collins FE. Measuring COVID-19-related fear and threat in Australian, Indian, and Nepali university students. *Pers Individ Dif [Internet]*. 2021;175(110693):110693.
12. Cori L, Bianchi F, Cadum E, Anthonj C. Risk perception and COVID-19. *Int J Environ Res Public Health [Internet]*.

- 2020;17(9):3114.
13. Mansilla Domínguez JM, Font Jiménez I, Belzunegui Eraso A, Peña Otero D, Díaz Pérez D, Recio Vivas AM. Risk perception of COVID-19 community transmission among the Spanish population. *Int J Environ Res Public Health* [Internet]. 2020;17(23):8967.
 14. Guan W-J, Liang W-H, Zhao Y, Liang H-R, Chen Z-S, Li Y-M, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. *Eur Respir J* [Internet]. 2020;55(5):2000547.
 15. Namakforoosh N. El proceso de investigación. Ciudad de México: Prentice-Hall Hispanoamericana; 2000.
 16. Matar-Khalil S, Ortiz Barrero MJ, González-Campos J. Diseño y validación de un cuestionario para evaluar la percepción de riesgo de contagio de COVID-19 en población colombiana. *Rev Peru Med Exp Salud Publica* [Internet]. 2021;38(4):512-20.
 17. Peláez-Ballesteros I, Infante-Castañeda C, Giraldo-Rodríguez L. Comparison between COVID-19 and influenza A(H1N1) pandemic experiences and risk perception in Mexican university. *Salud Publica Mex* [Internet]. 2021;63(5):619-29.
 18. Mant M, Holland A, Prine A. Canadian university students' perceptions of COVID-19 severity, susceptibility, and health behaviours during the early pandemic period. *Public Health Pract (Oxf)* [Internet]. 2021;2(100114):100114.
 19. Ceberio MR, Cocola F, Benedicto G, Jones G, Agostinelli JD, Daverio RF. Evaluación del Grado de Percepción de Riesgo al Contagio del COVID-19. *Rev Caribena Psicol* [Internet]. 2022;e6051.
 20. Sánchez-Herrero H, Montserrat-Capella D, Revuelta-Zamorano M, Santano-Magariño A, Cazallo-Navarro P, Solís-Muñoz M. Percepción del riesgo, información recibida y participación laboral de los trabajadores de un hospital universitario ante la pandemia de la COVID-19. *Rev Esp Salud Pública* [Internet]. 2022;96:e202210079.
 21. Matar-Khalil S, Ortiz-Barrero M, González-Campos J. Percepción de la vacuna contra la COVID-19 en población colombiana. *Revista Cubana de Farmacia* [Internet]. 2023;56(2):e887.
 22. Reznik A, Gritsenko V, Konstantinov V, Khamenka N, Israelowitz R. COVID-19 fear in eastern Europe: Validation of the fear of COVID-19 scale. *Int J Ment Health Addict* [Internet]. 2021;19(5):1903-8.
 23. Courtenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc Sci Med* [Internet]. 2000;50(10):1385-401.
 24. Sabo D. Comprender la salud de los hombres: un enfoque relacional y sensible al género [Internet]. Organización Panamericana de la Salud; 2000. Available from: <https://iris.paho.org/handle/10665.2/804>
 25. Broche-Pérez Y, Fernández-Fleites Z, Fernández-Castillo E, Jiménez-Puig E, Ferrer-Lozano D, Vizcaíno-Escobar A, et al. Female gender and knowing a person positive for COVID-19 significantly increases fear levels in the Cuban population. *Int J Ment Health* [Internet]. 2022;51(2):102-9.
 26. Martínez-Munguía C, Quintana-Rodríguez C, Ortiz-Rueda G. Género y conductas de riesgo para la salud: una aproximación desde un punto de vista interconductual. *J Behav Health Soc Issues* [Internet]. 2015;6(2):57.
 27. Matar-Khalil S. NeuroCOVID-19: efectos del COVID-19 en el cerebro. *Rev Panam Salud Publica* [Internet]. 2022;46:1-5.
 28. Fondo de las Naciones Unidas para la Infancia. El impacto del COVID-19 en la salud mental de adolescentes y jóvenes [Internet]. UNICEF; 2020. Available from: <https://www.unicef.org/lac/el-impacto-del-covid-19-en-la-salud-mental-de-adolescentes-y-j%C3%B3venes>
 29. Lin C, Lin Y. Anxiety and depression of general population in the early phase of COVID-19 pandemic: A systematic review of cross-sectional studies. *Rev Psiquiatr Clin* [Internet]. 2020;47(6):199-208.
 30. Ojeda-Casares H, De Cosío FG. COVID-19 y salud mental: mensajes clave [Internet]. Organización Panamericana de la Salud; 2020. Available from: <https://www.paho.org/es/documentos/covid-19-salud-mental-mensajes-clave>
 31. Organización Panamericana de la Salud. Consideraciones psicosociales y de salud mental durante el brote de COVID-19 [Internet]. OPS; 2020. Available from: <https://www.paho.org/es/documentos/consideraciones-psicosociales-salud-mental-durante-brote-covid-19>
 32. Londoño Pérez C, Carrasco Aravena SF. Creencias acerca del consumo de alcohol en jóvenes colombianos y chilenos. *Acta Colomb Psicol* [Internet]. 2019;22(2):178-85.
 33. Páramo MA, Leo MK, Cortés MJ, Morresi GM. Influencia del bienestar psicológico en la vulnerabilidad a conductas adictivas en adolescentes escolarizados de 15 a 18 años. *Revista Argentina de Clínica Psicológica* [Internet]. 2015;24(2):167-78.
 34. Lippi G, Henry BM, Bovo C, Sanchis-Gomar F. Health risks and potential remedies during prolonged lockdowns for coronavirus disease 2019 (COVID-19). *Diagnosis (Berl)* [Internet]. 2020;7(2):85-90.
 35. Charles NE, Strong SJ, Burns LC, Bullerjahn MR, Serafine KM. Increased mood disorder symptoms, perceived stress, and alcohol use among college students during the COVID-19 pandemic. *Psychiatry Res* [Internet]. 2021;296(113706):113706.
 36. Jackson KM, Merrill JE, Stevens AK, Hayes KL, White HR. Changes in alcohol use and drinking context due to the COVID-19 pandemic: A multimethod study of college student drinkers. *Alcohol Clin Exp Res* [Internet]. 2021;45(4):752-64.

Corresponding author:

Shadye Matar-Khalil

Address: No. 38-153 4536534, Cra. 1W, Montería. Córdoba, Colombia.

Telephone: +57 (604) 7848900

E-mail: sharomakha@gmail.com

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ORCID iDs

Shadye Matar-Khalil

 <https://orcid.org/0000-0002-2250-9794>

José González-Campos

 <https://orcid.org/0000-0003-4610-6874>

Melissa Ortiz-Barrero

 <https://orcid.org/0000-0002-4166-2911>

Carola Rosas

 <https://orcid.org/0000-0001-7693-3278>

Miguel Ángel Karam Calderón

 <https://orcid.org/0000-0001-5970-3219>