

# Sexual orientation and depressive symptoms: mediating role of self-esteem and life satisfaction

*Orientação sexual e sintomas depressivos: papel mediador da autoestima e satisfação com a vida*

*Orientación sexual y síntomas depresivos: papel mediador de la autoestima y la satisfacción con la vida*

Moisés Kogien<sup>I</sup> , Samira Reschetti Marcon<sup>I</sup> , Hugo Gedeon Barros dos Santos<sup>II</sup> 

<sup>I</sup>Universidade Federal de Mato Grosso, Cuiabá, Brazil; <sup>II</sup>Hospital Universitário Júlio Müller, Cuiabá, MT, Brazil

## ABSTRACT

**Objective:** to verify whether self-esteem and satisfaction with life exert mediating effects on the relationship between minority sexual orientations and depressive symptoms in a sample of graduate students. **Method:** analytical, cross-sectional study conducted with 321 Brazilian graduate students between March/April 2021. The Patient Health Questionnaire-9 was used to assess depressive symptoms, was used too, Rosenberg's Self-Esteem Scale and the Life Satisfaction Scale. Simple mediation analyzes were conducted using the PROCESS macro. **Results:** graduate students with minority sexual orientations had more severe depressive symptoms and lower indicators of self-esteem and life satisfaction than their heterosexual peers. Self-esteem and satisfaction with life partially mediated the relationship between sexual orientation and severity of depressive symptoms in a proportion of, respectively, 48.26% and 37.54%. **Conclusion:** self-esteem and life satisfaction were important mediators of the relationship between minority sexual orientations and depressive symptoms among graduate students.

**Descriptors:** Sexual Behavior; Depression; Self Concept; Mediation Analysis.

## RESUMO

**Objetivo:** verificar se autoestima e satisfação com a vida exercem efeitos mediadores na relação entre orientações sexuais minoritárias e sintomatologia depressiva em amostra de pós-graduandos *stricto sensu*. **Método:** estudo analítico, transversal, conduzido com 321 pós-graduandos *stricto sensu* entre março/abril de 2021. Utilizou-se o *Patient Health Questionnaire-9* para avaliação de sintomas depressivos, Escala de Autoestima de Rosenberg e Escala de Satisfação com a Vida. Análises de mediação simples foram conduzidas por meio da macro PROCESS. **Resultados:** pós-graduandos de orientações sexuais minoritárias apresentaram maior severidade de sintomas depressivos e menores indicadores de autoestima e satisfação com a vida do que seus pares heterossexuais. Autoestima e satisfação com a vida mediarão parcialmente a relação entre orientação sexual e severidade de sintomas depressivos em uma proporção de, respectivamente, 48,26% e 37,54%. **Conclusão:** autoestima e satisfação com a vida apresentaram-se como importantes mediadores da relação entre orientações sexuais minoritárias e sintomas depressivos entre pós-graduandos.

**Descritores:** Orientação Sexual; Depressão; Autoestima; Análise de Mediação.

## RESUMEN

**Objetivo:** verificar si la autoestima y la satisfacción con la vida ejercen efectos mediadores en la relación entre las orientaciones sexuales minoritarias y la sintomatología depresiva en una muestra de estudiantes de posgrado *stricto sensu*. **Método:** estudio transversal analítico realizado junto a 321 estudiantes de posgrado *stricto sensu* entre marzo y abril de 2021. Para evaluar los síntomas depresivos, se utilizó el *Patient Health Questionnaire-9*, la Escala de Autoestima de Rosenberg y la Escala de Satisfacción con la Vida. Los análisis de mediación simple se realizaron utilizando la macro PROCESS. **Resultados:** los estudiantes de posgrado con orientaciones sexuales minoritarias presentaron síntomas depresivos más severos y menores indicadores de autoestima y satisfacción con la vida que sus pares heterossexuales. La autoestima y la satisfacción con la vida mediaron parcialmente la relación entre la orientación sexual y la severidad de los síntomas depresivos en una proporción de, respectivamente, 48,26% y 37,54%. **Conclusión:** la autoestima y la satisfacción con la vida fueron importantes mediadores de la relación entre la orientación sexual minoritaria y los síntomas depresivos entre estudiantes de posgrado.

**Descriptorios:** Conducta Sexual; Depresión; Autoimagen; Análisis de Mediación.

## INTRODUCTION

A minority group, or simply a minority, can be understood as a group of individuals who, when compared to another one that is privileged and considered more prevalent (majority), show significant harms as a result of the stigmatization process associated with them<sup>1</sup>. Regarding their sexual orientation, gays, lesbians, bisexuals and asexuals are considered minority sexual orientations because contemporary society understands heterosexuality as the norm for all sexual behaviors<sup>1</sup>. As they are characterized as a social minority due to their sexual orientation, these individuals end up being exposed to a series of specific stressors<sup>2</sup> which, when combined with other daily stressors experienced by society in general, make them more vulnerable to negative biopsychosocial outcomes, as well as to mental distress<sup>3</sup>.

Corresponding author: Moisés Kogien. E-mail: [mkogien@gmail.com](mailto:mkogien@gmail.com)  
Editor in chief: Cristiane Helena Gallasch; Associate editor: Thelma Spindola

When it comes to mental distress, diverse evidence has pointed to the existence of a close connection between depressive symptoms and minority sexual orientations, consistently showing that these individuals are at greater vulnerability to this condition when compared to their heterosexual peers<sup>4,5</sup>, which includes greater tendency towards chronicity and manifestation of these symptoms throughout their life<sup>3</sup>. The most common explanation for this harmful connection is anchored in the continuous exposure of sexual minorities to stigmatization, discrimination, prejudice, rejection and homophobia in various social spaces of which these individuals are part<sup>3-5</sup>.

This scenario may become even more worrying, as severity of the relationship between minority sexual orientations and depression may possibly worsen when relocated to contexts with significant stressogenic potential and that are likely to cause mental distress, such as the experience of going through *stricto sensu* graduate studies<sup>6</sup>. It is known that most graduate students face a series of specific and highly exhausting demands during their educational paths, which seem to expose them to greater distress and, consequently, to an increased risk of depression and other mental distress outcomes when compared to the general population<sup>6,7</sup>.

The experience of depressive symptoms is not a simple phenomenon to explain. Generally, there is a complex range of factors that act in a mutual and additive way during the life story of an individual, which can come together and lead to the genesis and/or worsening<sup>8</sup> of the referred condition. Thus, it can be conjectured that it is unlikely to find a direct and single causal link when investigating complex psychological phenomena such as depression. It is more plausible to find elements with mediating potential (mediating variables) that contribute, at some level, to explaining the relationship between depressive symptoms and sexual orientation<sup>8,9</sup>. A mediating variable refers to any intermediate elements that may exist in a relationship between exposure and outcome and that explain/are responsible, at least partially, for such relationship<sup>10</sup>. A significant number of biopsychosocial-emotional elements that act in the relationship between minority sexual orientations and depressive symptoms have been demonstrated in the literature<sup>11</sup>. Among them, potentially positive mental health aspects such as self-esteem and satisfaction with life have been revealed as important mediators to understand the complex relationships between psychosociological variables and outcomes in the mental health-illness process<sup>11,12</sup>.

Self-esteem and satisfaction with life refer to constructs related to the cognitive judgment or assessment of an individual's positive/negative attitudes regarding themselves<sup>13</sup> or aspects of their lives. They are closely linked to people's subjective well-being and mental health, thus affecting them both negatively and positively. Low self-esteem and/or dissatisfaction with life are associated with negative mental health outcomes<sup>14</sup>. On the other hand, when experienced at high levels, these variables act in a protective way, thus relieving the harmful effects of stress and mental ailments<sup>13</sup>.

In this context, admission to a *stricto sensu* graduate course, along with the exhausting demands that students with minority sexual orientations go through and the elements that might mediate them, thus minimizing mental distress conditions, have been receiving little emphasis in the scientific literature<sup>11</sup>. In this situation, this study aims at verifying whether self-esteem and satisfaction with life exert mediating effects on the relationship between minority sexual orientations and depressive symptoms in *stricto sensu* graduate students.

## METHOD

This is an analytical, cross-sectional and single-center study conducted at a Brazilian public federal university between March and April 2021. The study design followed the guidelines of the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) initiative.

The study population consisted of 597 students newly enrolled in *stricto sensu* graduate courses who, theoretically, have not been previously exposed to the potential stressogenic effects associated with this academic training level. For sample estimation, we considered a population size of 597 subjects, a 95% confidence interval, a 4% sampling error and a 50% outcome proportion, in order to obtain the largest sample size possible. Considering the aforementioned parameters, the estimated minimum sample size would consist of 299 participants; however, 321 students were recruited (53.8% of the eligible population), so as to mitigate the effects of potential data losses. As eligibility criterion, we considered as potential study subjects those students who were starting their graduate studies and were regularly enrolled in the first academic semester of 2021.

The data were collected online using a form generated in the Google Forms® tool, whose access link was made available to the participants via email, social media and WhatsApp® messages, and the students' contact details were provided by the coordination departments of the University graduate courses. The eligible students received an invitation letter and the aforementioned link in the first two weeks of data collection; those who did not respond received a repeated invitation in the third and fifth week of data collection, respectively. The collection phase lasted 45

days. The Free and Informed Consent Form was made available online and electronically signed by the respondents who, after reading it, would check the “Yes” option in the dialog box, thus acknowledging the form and agreeing to take part in the referred study.

The sociodemographic variables and sexual orientation were obtained through a specific questionnaire. Sexual orientation was particularly assessed by the following self-report question: “Which is your sexual orientation?”, with the following possible answers: heterosexual, homosexual, bisexual, asexual or other. For operational purposes, this variable was dichotomized into “heterosexual orientation”, which included those who marked the first answer option available, and “minority sexual orientations”, which included those who marked the other options available.

Depressive symptoms in the final two weeks were assessed using the *Patient Health Questionnaire-9* (PHQ-9), which was duly translated and validated according to the Brazilian context. It refers to a self-administered scale comprised by nine items with answers to a four-point Likert scale, providing a score from zero to 27 points, where the higher the score, the greater the severity of the depressive symptoms<sup>15</sup>. In this study, we obtained internal consistency of 0.86, as measured by McDonald's Omega.

Self-esteem was measured using the Rosenberg Self-Esteem Scale, which was duly translated and validated according to the Brazilian context<sup>16</sup>. It refers to a scale made up of 10 items with answers to a four-point Likert scale, providing a final score that varies from zero to 30 points, where zero indicates the lowest possible level of self-esteem and 30, in turn, the highest level. In this study, we obtained internal consistency of 0.90 (McDonald's Omega).

Satisfaction with life was assessed using the Satisfaction With Life Scale, also duly translated and validated according to the Brazilian context<sup>17</sup>. It refers to a single-factor scale, made up of five statements that evaluate the perception or judgment about a person's level of satisfaction with life. The possible answers are arranged on a seven-point Likert scale from 1 (I strongly disagree) to 7 (I strongly agree). It provides an overall score ranging from 5 to 35 points, where higher scores indicate greater satisfaction with life. In this study, we obtained internal consistency of 0.88 (McDonald's Omega).

The statistical analyses were performed using the *Statistical Package for Social Sciences* (SPSS) software, version 26, and they were used to test the following study hypotheses: Hypothesis 1 (H1): A minority sexual orientation would be a positive predictor for severity of the depressive symptoms in the sample under study; Hypothesis 2 (H2): Self-esteem and satisfaction with life would be negative predictors for severity of the depressive symptoms in the sample under study; Hypothesis 3 (H3): A minority sexual orientation would be a negative predictor for self-esteem and satisfaction with life in the sample under study; and Hypothesis 4 (H4): Self-esteem and satisfaction with life would exert a mediating effect on the relationship between minority sexual orientations and severity of depressive symptoms in the sample under study.

Thus, t-tests for independent measures were applied in order to compare the mean scores of the continuous variables between students with heterosexual orientation and those who identified as sexual minorities; 95% confidence intervals (95%CI) and their equivalent p-values were obtained using the “bootstrapping” method with 1,000 resamples. Based on this method, the 95% Confidence Intervals (95%CI) are called *bias-corrected and accelerated 95% confidence intervals* [BCa 95%CI]).

To determine the correlational analysis, Pearson's r coefficient was calculated with a significance level also obtained using the “bootstrapping” method with 1,000 resamples. This method was chosen to obtain the 95%CI due to its advantages over the traditional technique which include capacity to fix standard deviations of the sampling distribution and differences in the size of the groups compared, as well as the ability to obtain more reliable results<sup>18</sup>.

To verify the potential mediating effects of the “self-esteem” and “satisfaction with life” variables in the relationship between minority sexual orientations and severity of the depressive symptoms, simple regression models were used for each variable of interest, thus presenting unstandardized coefficients, the respective p-value and a 95% CI for the indirect effect of these measures, calculated by the “bootstrapping” method. If the confidence interval for the indirect effect failed to include zero, the existence of a mediating effect in the relationship analyzed was found to be significant<sup>19</sup>.

In situations where there was an indication of a mediating effect for the variables tested, the proportions of this mediating effect (indirect effect/total effect) were calculated to understand the magnitude of the referred mediating path. Mediation analyses were carried out through PROCESS macro for SPSS, version 4.0, using model 4 (simple mediation) for each explanatory variable tested.

This study met the national ethics standards for research with human beings and had its research protocol was approved by a Research Ethics Committee.

## RESULTS

The sample was made up of 321 *stricto sensu* graduate students who were starting their studies at the time of data collection. The sample was mostly comprised by women (72.6%), MSc degree students (82.2%), enrolled in courses offered at the institution's headquarters (86.6%) and aged between 22 and 60 years old, with a mean of 32.94 ( $\pm 7.65$ ). Regarding sexual orientation, 21.2% of the graduate students ( $n = 68$ ) reported identifying with some sexual orientation considered a minority.

Table 1 presents the descriptive and correlational statistics between the “depressive symptoms”, “self-esteem” and “satisfaction with life” variables, both for the general sample and for the groups identified with heterosexual orientation and minority sexual orientations.

**TABLE 1:** Mean values and correlations between study variables regarding the general sample, heterosexual students, and students identified with minority sexual orientations ( $n=321$ ). Cuiabá, MT, Brazil, 2021

Variables	Mean	Standard Deviation	Correlations		
			1	2	3
1. Depressive symptoms	11.94	5.99	-		
2. Self-esteem	30.37	5.44	-0.53 <sup>§</sup>	-	
3. Satisfaction with life	22.20	6.35	-0.39 <sup>§</sup>	0.64 <sup>§</sup>	-
Students identified with minority sexual orientations ( $n = 68$ )					
1. Depressive symptoms	14.44 <sup>*</sup>	6.16	-		
2. Self-esteem	28.21 <sup>†</sup>	5.02	-0.55 <sup>§</sup>	-	
3. Satisfaction with life	19.44 <sup>‡</sup>	6.83	-0.28 <sup>§</sup>	0.46 <sup>§</sup>	-
Heterosexual students ( $n = 253$ )					
1. Depressive symptoms	11.27 <sup>*</sup>	5.77	-		
2. Self-esteem	30.95 <sup>†</sup>	5.41	-0.50 <sup>§</sup>	-	
3. Satisfaction with life	22.94 <sup>‡</sup>	6.02	-0.33 <sup>§</sup>	0.49 <sup>§</sup>	-

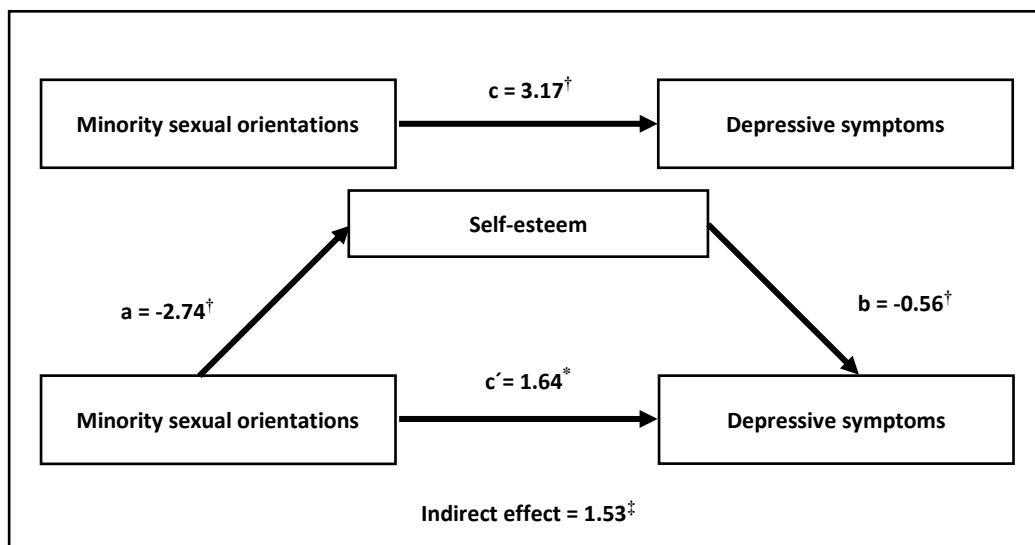
**Notes:** <sup>\*</sup>,<sup>†</sup>,<sup>‡</sup>The t-test results for independent measures between heterosexual students and students identified with minority sexual orientations showed statistically significant differences, with  $p < 0.001$ . Pairs with matching symbols show significant differences between measures. <sup>§</sup>Statistically significant correlational coefficient, with  $p < 0.001$ .

The bivariate comparative analysis of depressive symptoms, self-esteem and satisfaction with life according to the sexual orientation reported demonstrated that students identified with minority sexual orientations had higher scores for depressive symptoms and lower indicators of self-esteem and satisfaction with life when compared to their heterosexual peers.

In the zero-order correlational analysis, in the general sample, it was found that depressive symptoms were negatively correlated with self-esteem and satisfaction with life, whereas the other variables were positively correlated to each other. The correlational analyses carried out only among students with minority sexual orientations or only among heterosexual students showed the same correlational pattern found in the general sample, that is, depressive symptoms correlating negatively to self-esteem and satisfaction with life, and these two variables, again, proved to be positively correlated to each other in both groups. Fisher's  $r$  to  $z$  transformation test was applied to verify differences in the magnitude of correlations between both groups, but no statistically significant differences were found in relation to these measures.

Firstly, the association between minority sexual orientations and depressive symptoms (path  $c$ ) was verified, with a positive and significant relationship between these two variables ( $c = 3.17$ ,  $p < 0.001$ ). It is noteworthy that path  $c$  (total effect) was the same for each of the two simple mediation analyses tested in this study.

The first mediator tested was self-esteem (Figure 1).

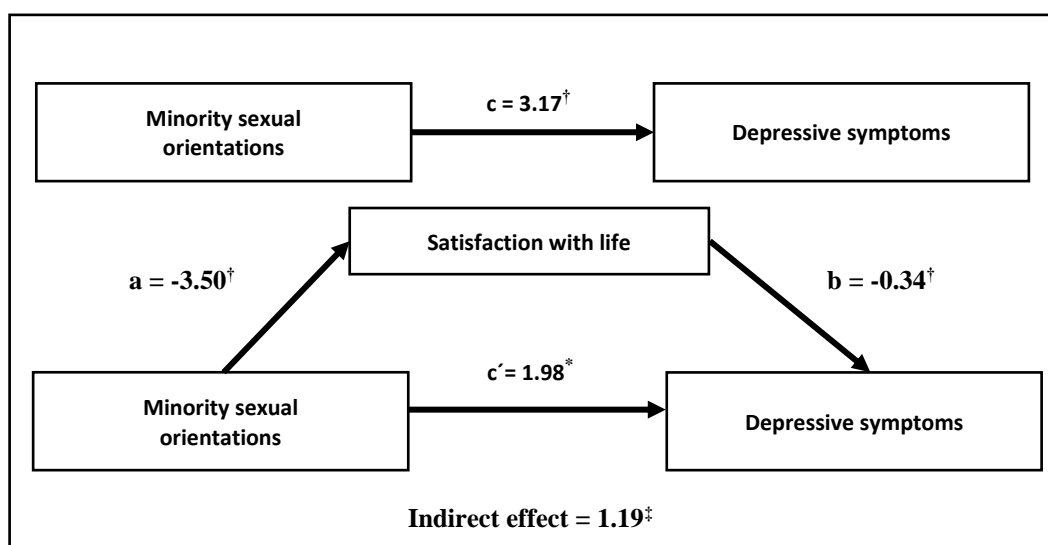


**Note:**\* $p < 0.05$ ; † $p < 0.001$ ; ‡The 95% Confidence Interval for the indirect effect was considered statistically significant.

**Figure 1:** Model of the mediating role of self-esteem in the relationship between minority sexual orientations and depressive symptoms in graduate students. Cuiabá, MT, Brazil, 2021.

The association between minority sexual orientations and self-esteem was negative and significant ( $a = -2.74$ ;  $p < 0.001$ ), as well as the association between self-esteem and depressive symptoms ( $b = -0.56$ ;  $p < 0.001$ ). The indirect effect ( $a \times b$ ), which shows the relationship between minority sexual orientations and severity of the depressive symptoms through self-esteem, was positive and significant ( $a \times b = 1.53$ ;  $BCa\ 95\%CI = 0.73; 2.38$ ) and, as the confidence interval failed to include zero, it is suggested that this variable has a mediating role in the aforementioned relationship. Furthermore, when “self-esteem” entered the model, the direct effect (path  $c'$ ) remained significant ( $c' = 1.64$ ;  $p = 0.02$ ), demonstrating a partial mediation of self-esteem in the relationship analyzed. Finally, the proportion of the total effect regarding the relationship between minority sexual orientations and depressive symptoms mediated by self-esteem was 48.26%.

The second mediator tested was satisfaction with life (Figure 2).



**Note:**\* $p < 0.05$ ; † $p < 0.001$ ; ‡The 95% Confidence Interval for the indirect effect was considered statistically significant.

**Figure 2:** Model of the mediating role of satisfaction with life in the relationship between minority sexual orientations and depressive symptoms in graduate students. Cuiabá, MT, Brazil, 2021.

The association between minority sexual orientations and satisfaction with life was negative and significant ( $a = -3.50$ ;  $p < 0.001$ ), as well as the association between satisfaction with life and depressive symptoms ( $b = -0.34$ ;  $p < 0.001$ ). The indirect effect ( $a \times b$ ), which demonstrates the relationship between minority sexual orientations and severity of the depressive symptoms through satisfaction with life was positive and significant ( $a \times b = 1.19$ ;  $BCa\ 95\%CI = 0.57; 1.98$ ) and, as previously reported, as the confidence interval failed to include zero, it is suggested that this variable has a mediating role in the aforementioned relationship. Furthermore, when “satisfaction with life” entered the model, the direct effect (path  $c'$ ) remained significant ( $c' = 1.98$ ;  $p = 0.01$ ), showing a partial mediation of this variable in the relationship analyzed. The proportion of the total effect regarding the relationship between minority sexual orientations and depressive symptoms mediated by satisfaction with life was 37.54%.

## DISCUSSION

The current study showed that graduate students identified with minority sexual orientations presented greater severity of depressive symptoms when compared to their heterosexual peers (H1). This finding was corroborated by previous evidence which consistently points out that individuals with minority sexual orientations are disproportionately more affected by depression than heterosexual individuals<sup>20</sup>. This disparity has been repeatedly explained based on the theoretical structure of minority stress<sup>2</sup>, that can be associated with the experience of specific stressors to which individuals with minority sexual orientations are commonly exposed, such as discrimination, oppression, stigmatization and homonegativity which, combined with other factors, increase the likelihood of negative mental health outcomes<sup>20</sup>. Thus, knowing that *stricto sensu* graduate students constitute a social group that is widely vulnerable to mental distress and to the experience of depressive symptoms<sup>6</sup>, it is pertinent to predict that, due to the additive effect of stressors, students identified with minority sexual orientations at this academic level may present a greater risk of manifesting severe symptoms compatible with depressive states. It was also evident that, for this sample, self-esteem and satisfaction with life were negatively associated with depressive symptoms (H2).

Low self-esteem is a factor strongly associated with depression<sup>21</sup> or increased severity of the depressive symptoms experienced by people<sup>13</sup>. Although the existence of this relationship has been proved, the way in which these variables interact with each other has not been fully clarified in the literature; in fact, several theoretical models postulate potential interactions but no definitive consensus has emerged from them<sup>22,23</sup>. For example, the Vulnerability Model advocates the concept that low self-esteem leads to greater severity of depressive symptoms, mainly due to the manifestation of self-deprecating feelings and a decrease in the set of coping strategies accessible to subjects<sup>23</sup>. In turn, the Scar Model argues that it is the experience and severity of depressive symptoms that tend to negatively affect self-esteem<sup>22,23</sup>.

With regard to satisfaction with life, as an affective component of subjective well-being, it has also been negatively and strongly correlated with severity of depressive symptoms, that is, the lower the levels of satisfaction with life, the higher the indicators of depression and vice versa<sup>(12)</sup>, with longitudinal evidence pointing to a potential temporality of this relationship: individuals who are unsatisfied with life may manifest future depressive symptoms<sup>24</sup>. The third hypothesis (H3) was also confirmed since, in this sample, it was observed that minority sexual orientations were a negative predictor for self-esteem and satisfaction with life.

Sociometric theory helps us understand the negative relationship between minority sexual orientations and self-esteem. According to this theory, self-esteem would function as a type of internal and subjective indicator of real acceptance and sense of social belonging, which would indicate the intensity with which an individual is being accepted or rejected by others<sup>25</sup>. In this case, it would act as a thermometer that measures the quality of real social interactions established in the social contexts that the individual is involved in, showing that the lower the social acceptance, the lower the self-esteem of an individual would tend to be<sup>26</sup>.

Based on this perspective and knowing that graduate students from underrepresented sexual orientation groups oftentimes experience discrimination and interpersonal violence situations as a result of their sexual orientation during their academic training<sup>27</sup>, it seems plausible to conceive that such students may have greater difficulty in social adaptation. And, in addition, they may experience a diminished sense of belonging in comparison to the majority social groups, which would directly lead to a decrease in their self-esteem, according to the sociometric theory<sup>28</sup>.

Prior literature supports the negative relationship between minority sexual orientations and satisfaction with life<sup>29,30</sup>, and potential explanations for this seem to involve, once again, the experience of minority stress<sup>29</sup>. The experience of specific stressors related to minority sexual orientations (such as homophobia, stigmatization or oppression, for example) can have repercussions on intra- and inter-personal paths, with the potential to negatively



impact the sense of satisfaction with life of individuals identified with minority sexual orientations. The intra-personal path reinforces and recognizes the importance of experiencing low self-esteem as a predisposing mechanism for dissatisfaction with life among individuals with minority sexual orientations, whereas the inter-personal path emphasizes the effects of social isolation and/or low social support from family, friends and other close people to which individuals identified with minority sexual orientations are most vulnerable<sup>30</sup>.

Finally, the fourth hypothesis (H4) was also confirmed, and it was found that self-esteem and satisfaction with life played a mediating role in the relationship between minority sexual orientations and depressive symptoms in *stricto sensu* graduate students, that is, these variables contributed to partially explaining the variance of this main relationship investigated.

This finding is pertinent to the postulate, thus expanding the understanding of the minority stress theory. In this sense, expansion of this theory suggests that the increase in the stressogenic load to which individuals identified with minority sexual orientations are exposed in their everyday lives tends to concomitantly increase the likelihood of constituting maladaptive psychological processes, adopting dysfunctional coping and emotional regulation strategies, in addition to leading to a decrease in perceived social support<sup>9</sup>. In turn, these factors increase the mental distress risk in this population<sup>9</sup>.

This perspective shows that minority sexual orientations constitute a risk factor that acts distally in the genesis of mental distress<sup>8</sup> and that is generally mediated by maladaptive processes<sup>8,9</sup> such as low self-esteem and dissatisfaction with life, as verified with this sample. Both variables play important roles in maintaining people's mental health and have been consistently identified as intermediate factors in determining mental distress in different contexts.

Having confirmed the existence of a mediating effect helps us understand how the complex relationship between minority sexual orientations and depression among *stricto sensu* graduate students is established. Furthermore, it suggests potential intervention possibilities to mitigate mental distress in this population segment, emphasizing the potential benefits of applying strategies that can avoid depletion of self-esteem and life satisfaction throughout the educational pathway of MSc and PhD students.

### Study limitations

This study found some limitations. In the first place, the cross-sectional design limits the possibility of establishing causality inferences between the variables studied. To this, we should also add the fact that the answer to the question on sexual orientation, a complex construct, was assessed based on a single self-report question designed for the context of this study. Self-report bias is an aspect to be considered in studies that use questionnaires to be answered by the participants themselves, as they may have their responses influenced by cognitive processes and social desirability, for example.

Another limitation regarding the "sexual orientation" aspect refers to the way in which the variable was implemented: due to the low occurrence of some categories, it was decided to group the students who declared to be homosexual, bisexual and asexual or who checked the "Other sexual orientation" option into the same comparative group, called "Minority sexual orientations". Although these sexual minorities are more vulnerable to depressive disorders, it is also known that disparities can be found between these different subgroups. Finally, due to the social stigma and prejudice to which sexual minorities are oftentimes exposed, it is possible that some students did not feel comfortable to present themselves as such and avoided participating in the study or perhaps declared to be heterosexual due to subjective issues of self-recognition as a person whose orientation is not the one socially considered as the norm. Despite the existence of this possibility that cannot be controlled by the researchers, it is reinforced that the use of online data collection may have mitigated this potential problem.

### CONCLUSION

The results showed the significant role played by self-esteem and satisfaction with life in terms of mediating severity of the depressive symptoms experienced in the sample under study.

### REFERENCES

1. Paveltchuk FO, Borsa JC. Minority stress theory in lesbian, gay, and bisexual people. Revista da SPAGESP. 2020 [cited 2002 Oct 12]; 21(2):41-54. Available from: <http://pepsic.bvsalud.org/pdf/rspagesp/v21n2/v21n2a04.pdf>.
2. Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. Psychol. Bull. 2003 [cited 2022 Dec 15]; 129(5):674-97. DOI: <https://doi.org/10.1037/0033-2909.129.5.674>.

3. Hu J, Tan L, Huang G, Yu W. Disparity in depressive symptoms between heterosexual and sexual minority men in China: the role of social support. *PLoS One*. 2020 [cited 2022 Nov 15]; 15(1):e0226178. DOI: <https://doi.org/10.1371/journal.pone.0226178>.
4. Wittgens C, Fischer MM, Buspavanich P, Theobald S, Schweizer K, Trautmann S. Mental health in people with minority sexual orientations: a meta-analysis of population-based studies. *Acta Psychiatr. Scand*. 2022 [cited 2022 Oct 15]; 145(4):357-72. DOI: <https://doi.org/10.1111/acps.13405>.
5. Sakharkar P, Friday K. Examining health disparities and severity of depression among sexual minorities in a national population sample. *Diseases*. 2022 [cited 2022 Oct 10]; 10(4):86. DOI: <https://doi.org/10.3390/diseases10040086>.
6. Satinsky EN, Kimura T, Kiang MV, Abebe R, Cunningham S, Lee H, et al. Systematic review and meta-analysis of depression, anxiety, and suicidal ideation among Ph.D. students. *Sci Rep*. 2021 [cited 2022 Oct 14]; 11(1):14370. DOI: <https://doi.org/10.1038/s41598-021-93687-7>.
7. Evans TM, Bira L, Gastelum JB, Weiss LT, Vanderford NL. Evidence for a mental health crisis in graduate education. *Nat Biotechnol*. 2018 [cited 2022 Oct 15]; 36:282-4. DOI: <https://doi.org/10.1038/nbt.4089>.
8. Lattanner MR, Pachankis JE, Hatzenbuehler ML. Mechanisms linking distal minority stress and depressive symptoms in a longitudinal, population-based study of gay and bisexual men: a test and extension of the psychological mediation framework. *J Consult Clin Psychol*. 2022 [cited 2022 Oct 22]; 90(8):638-46. DOI: <https://doi.org/10.1037/ccp0000749>.
9. Hatzenbuehler ML. How does sexual minority stigma "get under the skin"? A psychological mediation framework. *Psychol. Bull*. 2009 [cited 2022 Oct 10]; 135:707-30. DOI: <https://doi.org/10.1037/a0016441>.
10. Igartua JJ, Hayes AF. Mediation, moderation, and conditional process analysis: concepts, computations, and some common confusions. *Span J Psychol*. 2021 [cited 2022 Oct 15]; 14(24):e49. DOI: <https://doi.org/10.1017/SJP.2021.46>.
11. Angyriou A, Goldsmith KA, Rimes KA. Mediators of the disparities in depression between sexual minority and heterosexual individuals: a systematic review. *Arch Sex Behav*. 2021 [cited 2022 Dez 20]; 50(3):925-59. DOI: <https://doi.org/10.1007/s10508-020-01862-0>.
12. Qin Z, Mei S, Gao T, Liang L, Li C, Hu Y, et al. Self-esteem as a mediator between life satisfaction and depression among cardiovascular disease patients. *Clin Nurs Res*. 2022 [cited 2022 Oct 15]; 31(1):115-21. DOI: <https://doi.org/10.1177/10547738211030002>.
13. Orth U, Robins RW. Is high self-esteem beneficial? Revisiting a classic question. *Am Psychol*. 2022 [cited 2022 Nov 18]; 77(1):5-17. DOI: <https://doi.org/10.1037/amp0000922>.
14. Nguyen DT, Wright EP, Dedding C, Pham TT, Bunders J. Low self-esteem and its association with anxiety, depression, and suicidal ideation in vietnamese secondary school students: a cross-sectional study. *Front. Psychiatry*. 2019 [cited 2022 Oct 15]; 10:698. DOI: <https://doi.org/10.3389/fpsy.2019.00698>.
15. Santos IS, Tavares BF, Munhoz TN, Almeida LSP, Silva NTB, Tams BD, et al. Sensitivity and specificity of the Patient Health Questionnaire-9 (PHQ-9) among adults from the general population. *Cad Saude Publica*. 2013 [cited 2022 Oct 21]; 29(8):1533-43. DOI: <https://doi.org/10.1590/0102-311X00144612>.
16. Hutz CS, Zanon C. Revision of the adaptation, validation, and normatization of the Roserberg self-esteem scale. *Aval Psicol*. 2011 [cited 2022 Nov 10]; 10(1):41-9. Available from: <http://pepsic.bvsalud.org/pdf/avp/v10n1/v10n1a05.pdf>.
17. Gouveia VV, Milfont TL, Nunes da Fonseca P, de Miranda Coelho JA P. Life satisfaction in Brazil: testing the psychometric properties of the Satisfaction with Life Scale (SWLS) in five Brazilian samples. *Soc Indic Res*. 2009 [cited 2022 Oct 13]; 90:267-77. DOI: <https://doi.org/10.1007/s11205-008-9257-0>.
18. Haukoos JS, Lewis RJ. Advanced statistics: bootstrapping confidence intervals for statistics with "difficult" distributions. *Acad Emerg Med*. 2005 [cited 2022 Oct 22]; 12(4):360-5. Available from: <https://pubmed.ncbi.nlm.nih.gov/15805329/>.
19. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. 3<sup>rd</sup> ed. NewYork City, NY: Guilford Press; 2022.
20. Escobar-Viera CG, Shensa A, Sidani J, Primack B, Marshal MP. Association between LGB sexual orientation and depression mediated by negative social media experiences: National Survey Study of US Young Adults. *JMIR Ment. Health*. 2020 [cited 2022 Oct 15]; 7(12):e23520. DOI: <https://doi.org/10.2196/23520>.
21. Li C, Liu D, Dong Y. Self-esteem and problematic smartphone use among adolescents: a moderated mediation model of depression and interpersonal trust. *Front Psychiatry*. 2019 [cited 2022 Oct 12]; 10:2872. DOI: <https://doi.org/10.3389/fpsyg.2019.02872>.
22. Rentz-Fernandes AR, Silveira-Viana M, Liz CM, Andrade A. Self-esteem, body image and depression in adolescents with different nutritional conditions. *Rev Salud Pública*. 2017 [cited 2022 Dec 20]; 19(1):66-72. Available from: <https://www.scielo.org/article/rsap/2017.v19n1/66-72/>.
23. Gao W, Luo Y, Cao X, Liu X. Gender differences in the relationship between self-esteem and depression among college students: a cross-lagged study from China. *J Res Pers*. 2022 [cited 2022 Oct 19]; 97:104202. DOI: <https://doi.org/10.1016/j.jrp.2022.104202>.
24. Joshanloo M. Longitudinal relations between depressive symptoms and life satisfaction over 15 years. *Appl Res Qual Life*. 2022 [cited 2022 Oct 15]; 17:3115-30. DOI: <https://doi.org/10.1007/s11482-022-10055-x>.
25. AlHarbi N. Self-esteem: A concept analysis. *Nurs. Sci. Q*. 2022 [cited 2022 Oct 15]; 35(3):327-331. DOI: <https://doi.org/10.1177/08943184221092447>.
26. Cameron JJ, Grange S. Does self-esteem have an interpersonal imprint beyond self-reports? a meta-analysis of self-esteem and objective interpersonal indicators. *Pers Soc Psychol Rev*. 2019 [cited 2022 Oct 15]; 23(1):73-102. DOI: <https://doi.org/10.1177/1088868318756532>.
27. Scheitle CP, Remsburg T, Platt LF. Science graduate students' reports of discrimination due to gender, race, and religion: identifying shared and unique predictors. *Socius*. 2021 [cited 2022 Oct 15]; 7:1-12. DOI: <https://doi.org/10.1177/23780231211025183>.



28. Bridge L, Smith PA, Rimes KA. Sexual orientation differences in the self-esteem of men and women: a systematic review and meta-analysis. *Psychol Sex Orientat Gend Divers*. 2019 [cited 2022 Oct 15]; 6(4):433-46. DOI: <https://doi.org/10.1037/sgd0000342>.
29. Wen G, Zeng L. The influence of internalized homophobia on health-related quality of life and life satisfaction among gay and bisexual men in China. *Am J Mens Health*. 2019 [cited 2022 Oct 15]; 13(4):1557988319864775. DOI: <https://doi.org/10.1177/1557988319864775>.
30. Hung FN, Chan RCH. Differentiation of self, proximal minority stress, and life satisfaction among sexual minorities: intrapersonal and interpersonal pathways to life satisfaction. *Am. J. Orthopsychiatry*. 2022 [cited 2022 Oct 15]; 92(5):552-63. DOI: <https://doi.org/10.1037/ort0000638>.

**Author's contributions:**

Conceptualization, M.K. and S.R.M.; methodology, M.K., S.R.M. and H.G.B.S.; software, M.K.; validation, M.K. and S.R.M.; formal analysis, M.K.; investigation, M.K. and S.R.M.; resources, M.K. and S.R.M.; data curation, M.K.; manuscript writing, M.K., S.R.M. and H.G.B.S; manuscript review and editing, M.K., S.R.M. and H.G.B.S; visualization, M.K., S.R.M. and H.G.B.S; supervision, M.K. and S.R.M.; project administration, M.K.; financial support, M.K. and S.R.M. All authors have read and agreed to the published version of the manuscript.