

The Relationship Between Fear, Loneliness, and Depression Among University Students: A Structural Equation Model

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Abstract

The aim of this study was to test the causal relationship among fear of Covid-19, loneliness, and depression from Covid-19. The study sample consisted of 605 undergraduate students recruited from a public university. They completed three scales: fear of Covid-19, depression from Covid-19, and loneliness. The results revealed a good fit index for the proposed path model. The fear of Covid-19 predicted two types of loneliness emotional and social negatively. A positive association between depression and emotional as well as social loneliness was found. A total of 43% of the variance in depression was explained by loneliness. Depression was potentially a mediating factor between a fear of pandemic and the feeling of loneliness. A counseling intervention can be designed based on these results.

INTRODUCTION

The Covid-19 pandemic has affected individuals' emotional and mental well-being, and some of these effects might persist. The unpredictability and uncertainty of pandemic; the associated lockdowns, physical distancing, and other containment strategies; and the resulting economic breakdown increased the risk of mental health problems (Moreno et al., 2020). However, these measures were critical to decreasing the infection rate; individuals had felt a severe short-term disruption across the globe. The pandemic caused a state of fear, anxiety, and depression as well as changing social life patterns among individuals (Arslan, 2021; Chandra, 2021; Lichner et al., 2021). Individuals experienced feelings of loneliness because of limiting social interactions, connections, or activities. When such social relationships were lost, loneliness occurred (Arslan, 2021; Chandra, 2021; Lichner et al., 2021).

Loneliness has been reported as one of the main public health concerns. It causes several negative effects on both physical and mental health problems, such as depression, stress, and decreased memory (Hämmig, 2019). The researcher described that loneliness entails unpleasant emotional and social experiences. It can manifest itself in individuals of all ages (Tiwari, 2013). According to Gierveld & van Tilburg (2010), loneliness reflects individuals' subjective cognitive evaluation of their social participations or isolations against the standards held for optimal embeddedness in a social network. Loneliness consists of two components: emotional loneliness, which refers to the absence of intimacy, and social loneliness, which refers to the absence of one's social network with family, friends, and neighbors (Weiss, 1998).

Social distancing and quarantine that imposed during the health crisis of Covid-19 had effects on individuals' emotional and psychological well-being, resulting in higher rates of loneliness. Fear and panic about Covid-19 led to experiences of stigmatization and social exclusion of confirmed patients, survivors, their families, and others associated with the disease which cause an increased risk of developing mental health problems (Elemo et al., 2023). For instance, 54% of individuals reported fear of contracting the disease (Cerdeira & García, 2022). Further, in a study conducted by Tsang et al. (2021), individuals stated somewhat or very concerned about being infected with Covid-19 (82.5%), and almost a similar percentage indicated being somewhat or very concerned about their household member getting sick from Covid-19 (81.1%). Feeling extreme fear was the most significant risk factor for psychological distress (Tang et al., 2020). Both a fear of Covid-19 and dispositional loneliness represented major risk factors for the development of anxiety and following symptoms of depression (Rodríguez-Hidalgo et al., 2020; Rossi et al., 2020). The more the fear of Covid-19 increased, the less individuals tended to make use of their inner strengths to remain productive and to flourish (Elemo et al., 2022).

Although fear has been linked to mental health problems, it could act as a motivational factor to perform a behavior that facilitates Covid-19 prevention. Findings suggested that fear and anxiety had a functional role and are related to increased compliance for improving public wellbeing (Harper et al., 2021). As documented, greater levels of fear will be aroused if individuals perceive themselves to be vulnerable to a serious health threat and this will improve individuals' motivation to engage in protective behavior. In the fight against the coronavirus epidemic, moderate fear made individuals alert and developed protective habits such as wearing masks, following physical distance measures, and washing hands frequently, thereby reducing the risk of infection (Apisarnthanarak et al., 2020; Chao & Wang, 2020). Being confined in the home where individuals may feel

a greater sense of safety and protection might decrease the level of fear though a feeling of reduced vulnerability, reduced exposure, and a sense of personal or situational control (Eder et al., 2021; Martínez-Lorca et al., 2020). If a connection induces fear, then the recipient will be motivated to reduce the unpleasant emotional state (Floyd et al., 2000; Coco et al., 2021; Eklund & Tenenbaum, 2014). The increased fear of Covid-19 in individuals did not adversely affect their sense of control (Elemo et al., 2022). Individuals according to Bartrés-Faz et al. (2021) realized that there was nothing to be done about the limitation on social contacts, and that everyone was in the same situation. Therefore, during lockdown, contact with close family members and friends had been more easily maintained either within a shared household or using online methods, even though wider community life stopped, and this contributed to reduce feelings of social exclusion.

Various factors associated with depression and loneliness, including fear, were documented in the literature. For instance, a positive correlation was found among fear of Covid-19, depression, anxiety, and stress (Bakioğlu et al., 2021; Elemo et al., 2022; Rodríguez-Hidalgo et al., 2020). Being quarantined for 14 days due to Covid-19 and using the internet were significant predictors of depression, stress, and anxiety (Al Omari et al., 2023). According to Izgar (2009), loneliness scores predicted 15.3% of depression. Several studies also reported empirical evidence that loneliness and depression often co-occur. Correlations between loneliness and depression range from .41 to .70 (Aylaz et al., 2012; Atilgan Erozkhan, 2011; Ouellet & Joshi, 1986; Weeks et al., 1980). In addition, loneliness scores explained about 8% of the unique variance in depression scores, suggesting it is an independent risk factor for depressive symptoms (Beeson, 2003). The single mediation path through loneliness was also significant for both depression and anxiety (Harrison et al., 2022; Kılınç et al., 2020).

Moreover, the correlation between Covid-19 exposure and depression was partially mediated by fear of Covid-19. The exposure to Covid-19 increased fears and depression, and that depressive feeling increased with fear of Covid-19 (Tsang et al., 2021). Furthermore, in a study conducted by Rodríguez-Hidalgo et al. (2020) depression was related directly and positively to a fear of Covid-19 and stress, as well as indirectly positively mediated by anxiety. Indeed, depression from Covid-19, caused by fear of Covid-19, as a mediator, had a significant indirect impact on the relationship between fear and future career (Mahmud et al., 2021). Similarly, Rehman et al. (2021) found that loneliness increased the fear that had impact on mental well-being as well as loneliness inflated Covid-19 fear that led to disrupt wellbeing. Al Omari et al. (2020) reported that individuals had moderate to moderately high degrees of loneliness during the time of Covid-19. Depression and dissatisfaction with life were significant predictors of loneliness among individuals. Similarly, there was a bidirectional positive association between loneliness and symptoms indicative of depressive disorder. Loneliness predicted higher depressive symptoms and depressive symptoms predicted higher loneliness (Groarke et al., 2021).

The risk factors associated with either loneliness or depression were identified from various studies (Beeson, 2003; Harrison et al., 2022; Kılınç et al., 2020). Although, studies confirmed correlation relationship between depression and loneliness with respect to the mixed results and the variation of the effect size, findings of this study would contribute to understand the psychological variables related to Covid-19. Moreover, future research on the negative health consequences of the Covid-19 pandemic according to (Coco et al., 2021) should be examined among different ages and groups and, consequently, to take actions to help those at most risk. Hence, the present study aims to test a structural equation model of loneliness in relation to a fear of Covid-19 and depression. Specifically, the study tests the following hypotheses: (1) A fear of Covid-19 would negatively predict emotional and social loneliness, (2) Depression would positively predict emotional and social loneliness, and (3) Depression would mediate the relationship between fear of Covid-19 and loneliness. Understanding such relationships might provide meaningful suggestions for supporting public health efforts in containing the psychological negative effects of Covid-19.

METHODS

Participants

Using a convenience sampling method, the participants in the current study consisted of 605 students from Sultan Qaboos University (SQU) in the Sultanate of Oman. Of the participants, 43.5 ($n=265$) were males and 56.2 ($n=340$) were females. The participants were distributed according to their year of study. Foundation (42, 6.9%); first year (96, 15.9%); second year (86, 14.2%); third year (94, 15.5%); fourth year (112, 18.5%); and higher than fourth year (175, 28.9). Table 1 showed that about 15.4 ($n=93$) of the participants had been infected with Covid-19, 68.8 ($n=416$) had a family member being infected, 14.7% ($n=89$) had lost a family member due to Covid-19. Most participants, 54.5% ($n=512$) believed that Covid-19 would not end soon.

Instruments

The instruments were prepared as one questionnaire using a Google form. The questionnaire was divided into four sections. The first section focused on demographic information about the participants including gender, year of study, whether they infected with Covid-19, had a family member infected with Covid-19, lost a family member due to Covid-19, and whether they think that Covid-19 would not end soon. The remaining three sections covered items related to the three scales: Fear of Covid-19 (Ahorsu et al., 2022), depression from Covid-19 (Mahmud et al., 2021), and loneliness (Gierveld & Van Tilburg, 2006). Three bilingual experienced faculty members translated the instruments into Arabic. A back translation from English to Arabic was conducted and distinctions were resolved.

Table 1. Participants' characteristics (N=605)

Variables	N (%)
<i>Gender</i>	
Male	265(43.8)
Female	340(56.2)
<i>Study year</i>	
Foundation	42(6.9)
1 st	96(15.9)
2 nd	86(14.2)
3 rd	94(15.5)
4 th	112(18.5)
<i>Infected with the Covid-19</i>	
Yes	93(15.4)
No	512(84.6)
<i>A family member infected with Covid-19</i>	
Yes	416(68.8)
No	189(31.2)
<i>Lost a family member due to Covid-19</i>	
Yes	89(14.7)
No.	516(85.3)
<i>Covid-19 would not end soon</i>	
Yes	330(54.5)
No	275(45.5)
<i>Having a chronic illness</i>	
Yes	33(5.5)
No	572(94.5)

Fear of Covid-19 Scale

This scale consisted of seven items asking participants to assess their fear of Covid-19 by indicating their level of agreement with each item on a 4-point Likert Scale ranging from strongly disagree to strongly agree. The total score ranges from 7 to 28, and the higher score indicates greater fear of Covid-19. As reported by Ahorsu et al. (2020), the reliability of the scale was 0.82 as measured by Cronbach's alpha. In the current study, the scale had an acceptable reliability (Cronbach's $\alpha = 0.85$), and the corrected item-total correlation ranged from 0.48 to 0.67. Confirmatory Factor Analysis (CFA) was also used to assess scale construct validity. The indices showed a unidimensional model with a good fit to the sample responses (GFI = 0.99, CFI = 0.99, RMSEA = 0.05).

Depression from Covid-19

Depression is a mood disorder that causes a persistent feeling of sadness and loss of interest. The scale was developed by Mahmud et al. (2021). It consisted of six items using a 4-point Likert-type scale in which 0 = never, 1 = sometime, 2 = often, and 3 = always, with a total score ranging from 6 to 24. In the original study, the reliability measured by Cronbach's alpha equaled 0.88 (Mahmud et al., 2021). In the current study, the scale had acceptable reliability (Cronbach's $\alpha = 0.82$), and the corrected item-total correlation ranged from 0.50 to 0.64. Confirmatory Factor Analysis (CFA) was also used to assess scale construct validity. The indices showed a unidimensional model with a good fit to the sample responses (GFI = 0.97, CFI = 0.95, RMSEA = 0.012).

Loneliness Scale

This is an 11-item scale developed by Gierveld and Tilburg (2006). The scale was divided into two dimensions: emotional loneliness (6 items) and social loneliness (5 items). The items were measured on a 5-point Likert Scale ranging from (not lonely) to (extremely lonely). A higher score indicated a higher level of loneliness. The scale was applied in different countries (Gierveld & Van Tilburg, 2010) and it proved to be reliable and valid. The Cronbach's alpha was documented as 0.88 (Gierveld & Tilburg, 2006). In the current study, the scale had acceptable reliability (Cronbach's $\alpha = 0.82$), and the CFA indices for two correlated dimensions model were GFI = 0.95, CFI = 0.95, and RMSEA = 0.069.

Procedure

Based on the procedure followed in conducting research in Oman, approval was obtained from the Deanship of Research at Sultan Qaboos University. The participants were informed that their participation was voluntary and that they could withdraw

Table 2. Prevalence of loneliness ($N=605$)

Variables		Not lonely	Moderate	Sever	Very sever
Gender	Male	126(47.5)	128(48.3)	8(3)	3(1.1)
	Female	156(45.9)	146(42.9)	20(8.8)	8(2.4)
Study Year	Foundation	21(50)	20(47.6)	0	1(2.4)
	First	45(46.9)	41(42.7)	7(7.3)	3(3.1)
	Second	35(40.7)	46(53.5)	4(4.7)	1(1.2)
	Third	40(42.6)	43(45.7)	11(11.7)	0
	Forth	55(49.1)	47(42)	5(4.7)	5(4.7)
	> Forth	86(49.1)	77(44)	11(6.3)	1(0.6)
Covid-19 would not end soon	Yes	147(53.5)	111(40.4)	13(4.7)	4(1.5)
	No	135(40.9)	163(49.4)	25(7.6)	7(2.1)
Total		282(46.6)	274(45.3)	38(6.3)	11(1.8)

Table 3. Independent sample t-test of fear of Covid-19, depression, and loneliness

Variables		Fear of Covid-19		Depression		Loneliness	
		M(SD)	t (p)	M(SD)	t (p)	M(SD)	t (p)
Gender	Male	7.69(4.64)	-0.44(.658)	4.18(3.78)	-1.59(.112)	3.12(3.54)	-1.77(.077)
	Female	7.85(3.99)		4.67(3.79)		3.54(3.07)	
Lost a family member due to Covid-19	No	7.54(4.12)	-3.42(.001)	4.33(3.71)	-1.99(.047)	3.38(2.85)	0.40(.692)
	Yes	9.20(4.92)		5.19(4.15)		3.25(3.05)	
Covid-19 would not end soon	No	7.22(4.02)	-2.96(.003)	4.06(3.61)	-2.36(.019)	3.03(2.81)	-2.59(.01)
	Yes	8.25(4.44)		4.78(3.91)		3.63(2.90)	

from the study at any point or choose not to answer any question. Participants were informed that the data would be kept private and that their personal information would not be shared. Data collection took place between March 2021 and May 2021.

Data Analysis

Data were exported from Excel to SPSS version 25 for the analysis. Descriptive analyses were used to determine the frequencies, means, and standard deviations of the demographic variables of the sample. The Structure Equation Model (SEM) was applied to test the relations among the structures as presented in figure 1.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2 showed the prevalence of loneliness was 53.4% in the sample. 54.1% of them were females and 52.5% of them were males. The prevalence of loneliness ranged between a minimum of 50.9% among fourth year students and a maximum of 59.3% among second year students. As presented in table 3, an independent sample t-test was conducted to compare the level of fear between two groups of students those who reported that they lost a member in their family because of Covid-19 and those who did not (Yes: $M = 9.2$, $SD = 4.92$; No: $M = 7.54$, $SD = 4.12$; $t = -3.42$, $p = 0.001$). Further, the level of fear of Covid-19 was higher among students who lost a person from their family compared to students who did not. Additionally, there were also significant differences in the depression related to Covid-19 between students who lost a member in their family and those who did not (Yes: $M = 5.19$, $SD = 4.19$; No: $M = 4.33$, $SD = 3.71$; $t = -1.99$, $p = 0.047$). The level of depression was higher among students who lost a member of their family due to Covid-19 infection than students who did not.

Predicting Loneliness Factors

In this analysis, we combined the three measurement models and developed the path model, as shown in figure 1. The fit indices for the path model produced good fit indices ($\chi^2[239] = 588.629$, $CFI = 0.93$, $RMSEA = 0.049$). The coefficient, which linked fear to depression, was significant (0.78 , $p < 0.01$). Fear predicted emotional and social loneliness negatively ($p < 0.01$). The more respondents expressed fear of Covid-19, the less they felt socially and emotionally lonely. Depression predicted both loneliness factors positively ($p < 0.01$). The more respondents were depressed, the more they felt socially and emotionally lonely. Fear's indirect effect on social loneliness was 0.41 and indirect effect on emotional loneliness was 0.60 . Further, depression is potentially a mediating factor between a fear of Covid-19 and the feeling of loneliness. The model explained 61% of the variance in the depression scores. The depression variance explained in the social loneliness and emotional loneliness, and they were 14% and 29% respectively. The social and emotional loneliness correlated significantly ($p < 0.01$), indicating a moderate association between the two types of loneliness.

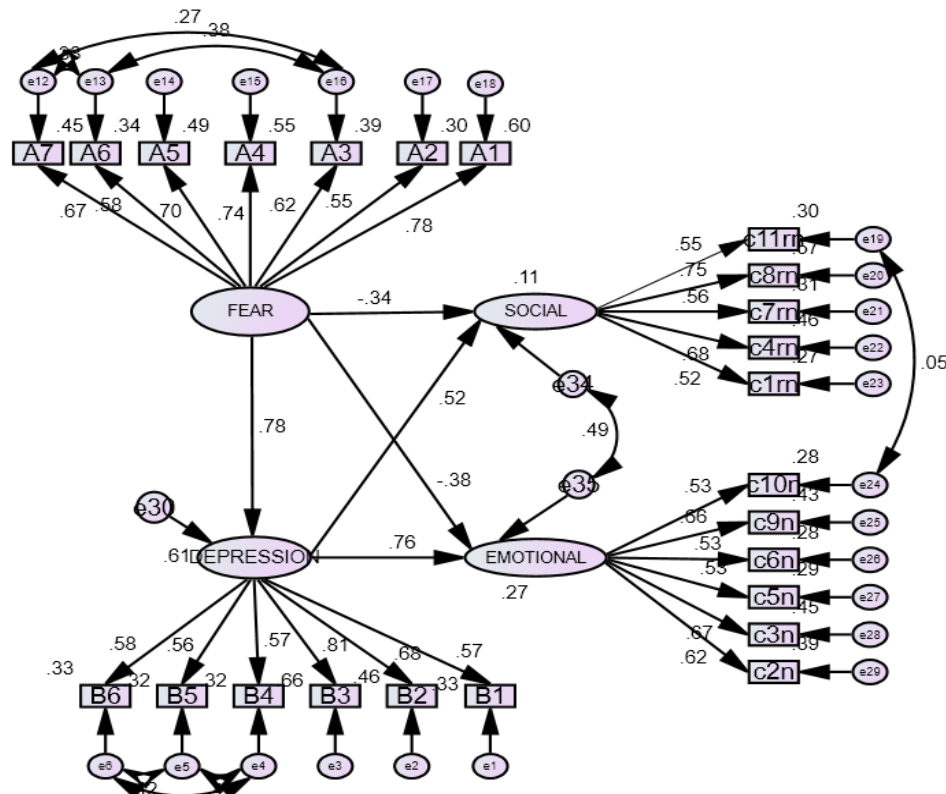


Figure 1. Path model of the relations among fear, loneliness, and depression

Discussion

The descriptive findings of the current study showed that the prevalence of loneliness was 53.4% among participants. This was an expected result as loneliness is an emotional and psychological experience that was noticed globally among university students. As documented in previous studies, the occurrence of loneliness among the younger population was reported between 20% and 71% (Al Omari et al., 2021; Hawthorne, 2008; Luhmann & Hawkey, 2016; Rönkä et al., 2014). Similarly, 60.2% of university students expressed feelings of loneliness (Özdemir, 2008), and 56.7% experienced moderate levels of loneliness as well as 23.6% reported severe levels of loneliness during the period of mandatory lockdown (Labrague et al., 2021). Likewise, 56.7% of university students reported moderate levels of loneliness and 23.6% felt severely lonely. Students had higher levels of emotional loneliness than social loneliness (Labrague et al., 2021).

The study aimed to examine the proposed model of the relationship of loneliness, fear, and depression. Looking at the type of correlation in this study, fear predicted loneliness negatively. Students who reported more fear, had expressed less loneliness. However, in related research, individuals reported higher fear of Covid-19 and sense of loneliness (Coco et al., 2021). During the lockdown approximately 23% of the variance of fear of the virus could be predicted based on variables such as worrying about food shortages and germ aversion. Further, 82.1% of individuals indicated their concern was about being infected with Covid-19 or their household member getting sick (Eder et al., 2021; Tsang et al., 2021). Moreover, this finding partially supports previous research that showed individuals who had an elevated level of fear of Covid-19 tended to suffer loneliness to a lesser extent and tended also to feel the lack of companionship (Coco et al., 2021). Within this perspective, the decision to take protective action is a positive function of severity because if individual believes that there is some harm (e.g., infected with virus), and that one is vulnerable to this harm, these considerations override the rewards, both intrinsic (e.g., enjoyment) and extrinsic (e.g., peer approval). This appraisal of threat supplies the motivation to initiate the coping process (Floyd et al., 2000). Indeed, the negative emotions in response to the Covid-19 predicted adaptive public health-compliant behavior change such as hand washing and social distancing (Harper et al., 2021).

In addition, the lockdown as highlighted by some researchers offered people time to reflect positively on their lives. For example, 39.8% of individuals and 36.6% of family members expressed they were able to focus more on things that were important to them (Schellekens & van der Lee, 2020). The negative relationship between fear and loneliness was found in this study, suggested the importance of interventions targeting not only the reduction of negative affect but also the transformation of adversities into growth and increasing positive affect. In this sense, protective effects can be applied within two different mechanisms: By lessening the emergence of all types of psychological distress and by acting as a moderator between hardship and such symptoms. Therefore, promoting meaning-centered coping intervention can be a positive experience and can provide input for helping individuals and families to cultivate resilience (Eisenbeck et al., 2021; Rodríguez-Hidalgo et al., 2020; Schellekens

Van der Lee, 2020). Additionally, based on the negative relationship between fear and loneliness that found in this study suggests more research should be conducted to explore this association within various contexts and ages.

The results of the current path model revealed that depression had a significant positive effect on loneliness. Indeed, loneliness and depression were viewed in some studies as a highly interrelated set of problems (e.g., Adams, Sanders & Auth, 2004; Aylaz et al., 2012; Erozkhan, 2011; Ouellet & Joshi, 1986; Weeks et al., 1980). Depression could contribute to loneliness. Feelings of loneliness were positively associated with subsequent depressive symptoms, and that depressive symptoms were also positively associated with subsequent feelings of loneliness (Groarke et al., 2021). For example, depressed people sometimes drive away from those who had been their close friends. This loss of social support can aggravate depression and create intense feelings of loneliness. The lonely individual attempts to alleviate loneliness by forming relationships, whereas the depressed individual surrenders to distress (Dill & Anderson, 2004; Heinrich & Gullone, 2006; Santini et al., 2020). Another explanation could be that as social isolation reduced interpersonal communication, people's feelings of loneliness increased, which resulted in depressive symptoms (Tang et al., 2020). Even among adolescents, loneliness is associated with physical inactivity (Pinto et al., 2020). Thus, distancing threatens to intensify feelings of loneliness that will produce negative long-term health consequences (Matias et al., 2020). Therefore, Diehl et al. (2018) documented that physical activity to be a protective factor for social loneliness. In addition, establishing support networks, self-efficacy courses, and counselling may be valuable.

Depression is potentially a mediating factor between a fear of pandemic and the feeling of loneliness. Fear's indirect effect on social loneliness was 0.41 and its indirect effect on emotional loneliness was 0.60. The model explained 61% of the variance in the depression scores, 14% of the social loneliness scores, and 29% of the emotional loneliness scores. These findings were consistent with the results of previous studies of university students. For instance, Diehl et al. (2018) found emotional and social loneliness were both associated with feelings of depression. Similarly, Loades et al. (2020) reported a strong association between loneliness and depression. This link between loneliness and depression could partially be explained by the high value put on social provision by college students, subsequent feelings of social loneliness may translate into mental health problems. Friends are the first resource most individuals use to soothe loneliness feelings triggered by a crisis. This in turn could cause further alienation and more loneliness (DiTommaso & Spinner, 1997; Weiss, 1998). In this sense, the advent of Covid-19 generated intense fear and anxiety about contagion, disease, and thoughts of death in the general population. Therefore, both fear and loneliness represent major risk factors for the development of symptoms of anxiety and following symptoms of depression (Rodríguez-Hidalgo et al., 2020; Rossi et al., 2020).

More importantly, depression as a subjective emotion more strongly predicts emotional loneliness than social loneliness. As documented by Russell et al. (1984) social loneliness led to feelings of anxiety and depression, whereas depression was best predicted by the level of emotional loneliness. Emotional loneliness results from the lack of a close, intimate attachment to another person. Individuals who have experienced the loss of significant others such as a spouse and friends

may experience this form of loneliness. According to the findings of this study, 68.8% of the participants reported that members of their families had been infected with Covid-19 and 14.7% of them had lost a family member due to the Coronavirus. It is also possible that this pattern is consistent with the feeling expressed by many of the bereaved persons who explained that although their friends were a great help, they obviously could not replace the loved one (Stroebe et al., 1996). Missing an attachment person, missing the daily structuring element of an attachment person in the household, missing the person as mediator of the size, and functioning of the social network, was shown to be a risk factor for emotional loneliness (Adams, Sanders & Auth, 2004; Gierveld & Van Tilburg, 2006). Further, previous studies showed a higher tendency of younger individuals to feel emotionally lonely during the Corona virus pandemic (Labrague et al., 2021). This possibility could have important implications for the treatment or prevention of depression. The mediator role of depression between fear and loneliness was found in this study, thus counseling intervention should target depression to relief loneliness and fear.

The results of the current study corroborated the results of prior studies that were conducted within the context of Covid-19, such as Rodríguez-Hidalgo et al. (2020) who found a positive association between fear and depression. Furthermore, the main contribution of this study is the result of the role of depression in function of fear and loneliness factors, which is considered novel. The present study would add to the extent literature the idea that a fear of the pandemic may have positive outcomes on loneliness during the health crisis such as Covid-19. However, some limitations were recognized. The age of the present sample is one limitation as all respondents were college students. It is important that the negative association between fear and loneliness be investigated further with more heterogeneous samples, which may produce more variability regarding a fear of Covid-19 and feelings of loneliness. Particularly, the current literature on loneliness and relational needs suggests that there may be variations among different age groups and in different social contexts (Labrague et al., 2020; Coco et al., 2021).

CONCLUSION

The participants in the study demonstrated a considerable incidence of loneliness, particularly among females and second-year students. Comparatively to other students, those who lost a family member to Covid-19 reported higher levels of anxiety and depression. According to the investigation, feelings of loneliness diminished as fear of Covid-19 rose, but these sentiments became stronger while depression levels rose. Between loneliness and dread in the Covid-19, depression seems to

fill the void. Overall, the research emphasizes the pandemic's severe psychological consequences on students, underlining how closely connected anxiety, despair, and loneliness are.

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AUTHOR CONTRIBUTION STATEMENT

All authors agree to the final version of this article.

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