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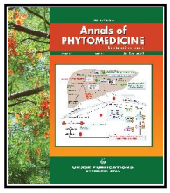

Cross-Sectional Study : Open Access

Quality of life among pharmacy students at King Khalid University after the COVID-19 pandemic: A cross-sectional study

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Abstract

Due to the pandemic's increased workload for students, they described feeling lonely, uneasy, and unhappy as a result of their limited social lives during the pandemic. There has been little research that examines the role of resilience concerning the impact of COVID-19 on the quality of life of pharmacy students. Therefore, this study aimed to determine the level of social isolation, loneliness, and quality of life among pharmacy students at King Khalid University after the COVID-19 pandemic. The study used a cross-sectional design, questionnaire-based, that involved pharmacy students, all batches from the third level to the tenth level, at the College of Pharmacy, King Khalid University. The questionnaire consisted of three parts including socio-demographic data, level of loneliness and social isolation using the UCLA Loneliness Scale Version 3, and quality of life (QoL) after the COVID-19 pandemic using the World Health Organization Quality of Life Questionnaire (WHOQOL-BREF). 172 pharmacy students were included in the study, of which 101 (58.7%) were females. The mean age of the participants was 22.1 ± 4.4 years, and 166 (96.5%) were single. A total of 104 (60.5%) students had a moderately high degree of social isolation and loneliness feeling after the COVID-19 pandemic. The highest QoL score was for psychological health (65.6 ± 19.5% out of 100%). Moderately high/high levels of feelings of loneliness and social isolation after the COVID-19 pandemic were reported among 63.4% of the students and low/moderate levels were reported by 36.6% of the students. The results also showed that the female gender is more vulnerable to higher feelings of loneliness. The COVID-19 pandemic affected the students' feelings of loneliness and quality of life at the colleague of pharmacy at King Khalid University. In addition, living in the family home was found to be protective against feeling of loneliness when compared to living in rental premises. Further, loneliness should be closely monitored with potential risks, protective factors, and health outcomes.

1. Introduction

The novel coronavirus (COVID-19) began in Wuhan, China in December 2019. The virus quickly spread throughout Hubei province and then throughout China. COVID-19 was then exported to the majority of the world's countries. Because the coronavirus disease outbreak spread to numerous countries, the World Health Organization (WHO) declared a global outbreak in January 2020 (Wahab *et al*., 2021a, 2021b). The Kingdom of Saudi Arabia (KSA) is among the countries in western Asia most affected by the COVID-19 pandemic. The KSA recorded 362,741 confirmed COVID-19 cases with 6223 deaths from 2nd March 2020, 31st December 2020. The disease's maximal incidence was attained in a matter of months, peaking on June 17, 2020. Following the start of the COVID-19 epidemic, the Kingdom of Saudi Arabia implemented stringent regulations and standardised mitigation tactics to curtail needless transportation between urban areas. Some limitations include social distance, curfews, lockdowns, isolation, mask wearers, and other methods that lessen the likelihood of viral transmission from recently infected to uninfected individuals (AlFattani *et al*., 2021).

After the pandemic was declared, public health experts implemented a number of measures to slow its spread. Although telework, virtual classrooms, curfews, lockdowns, and other forms of physical and social distancing were initially thought to be temporary, they have become a way of life and have had a significant impact on social interaction (Heinberg and Steffen, 2021). The COVID-19 pandemic has increased the risks of isolation, separation, and loss. Pandemic restrictions have created a schism among families, friends, and coworkers, posing health and well-being challenges. Stressful situations involving these challenges can jeopardize the quality and stability of couples' relationships as well as family functioning (Neff and Karney *et al*., 2017; Prime *et al*., 2020).

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Social distancing is a series of measures taken to slow or stop the spread of disease, which often includes reducing face-to-face contact. Objectively, social isolation is defined as a lack of social contacts. Eventually, loneliness is the perspective of social isolation (Heinberg and Steffen, 2021), and loneliness is described as a state of emotional distress due to the incongruity between actual and desired levels of social interaction (Smoyak *et al*., 1984). Moreover, it is explained as a lack of meaningful social relationships (Fees *et al*., 1999). Another critical aspect greatly affected by the pandemic is the quality of life. Due to various lockdown measures and mobility restrictions, the role of the home, the neighborhood, various modes of transportation, and information and communication technology (ICT), quality of life has shifted (Hu and Chen *et al*., 2021; Sharifi and Khavarian-Garmsir *et al* , 2020).

The COVID-19 pandemic has led to a medico-socio-economic crisis around the world. The association between pandemics with poor mental health outcomes is not a novel feature observed during the COVID-19 outbreak. There has been evidence of Post-Traumatic Stress Disorder (PTSD) among people during the Ebola outbreak. Similarly, Human Immunodeficiency Virus (HIV), which continues to pose a threat to the lives of people, has been associated with higher incidences of mental health issues (Phina *et al*., 2011).

The WHO has also warned countries to be on the lookout for a possible and unavoidable increase in people's mental health issues during and after the pandemic. It has also acknowledged that the mitigation measures used to contain the spread of COVID-19, such as social isolation, quarantine, and lockdown, have resulted in an increase in mental health issues among people, particularly the vulnerable segment of society (Roy *et al*., 2021). As a result, COVID-19 has been linked to a series of negative emotional and cognitive responses. Along with having a negative impact on physical health, it has become a significant contributor to the current rise in mental health dysfunctions such as depression, anxiety, stress, panic, and psychosomatic issues (Choudhari *et al*., 2020).

College students' well-being was having difficulties even before the pandemic (Poots and Cassidy *et al*., 2020). For instance, only one in ten university graduates in the United States scored highly across the board in terms of their overall well-being (Butler *et al*.,1995). Undergraduates were said to be less happy than the general public in the United Kingdom, and their happiness had been declining for a while (Hewitt *et al*., 2019). The epidemic, which has brought pain, suffering, discomfort, anxiety, loss, and other unpleasant feelings and experiences, has surely had a devastating impact on the dismal state of well-being among students. Suddenly, students were expected to work and learn online, which required connectivity, access to quality IT, infrastructure and equipment, and different digital and cognitive skills.

Since the COVID-19 outbreak, studies have examined the psychological effects of the pandemic on college students as well as their coping mechanisms. For instance, the COVID-19 epidemic has caused academic process interruptions that have increased student anxiety (Wang *et al*., 2020), particularly for those who lack enough social support (Cao *et al*., 2020). A study was conducted to find out how resilience influenced the quality of life among nursing students during the COVID-19 pandemic. Results of the study have shown that resilience had a moderate impact on the quality of life of nursing students during the COVID-19 pandemic (Vijayalakshmi e*t al*., 2023). A cross-sectional survey of nursing professors used the Life Balance Inventory and Professional Quality of Life Scale (Farber *et al*., 2023). There have been reports of depression, drug and alcohol use, and eating disorder symptoms among German university students (Kohls *et al*., 2021).

Due to the pandemic's increased workload for students, uncertainty over the end of the semester, and ambiguity surrounding study demands, stress levels have grown (Stathopoulou *et al*., 2020; Van de Velde *et al*., 2021). These students have also described feeling lonely, uneasy, and unhappy because of the limited social life they had during the pandemic (Essadek and Rabeyron *et al*., 2020). Some coping mechanisms have been noted in earlier research; for instance, pupils who seek out knowledge about the epidemic (D'Hondt *et al*., 2020) and a sense of purpose in life (Arslan *et al*., 2022) score better mentally. The consequences of loneliness on physical health, well-being, and mortality are recognized as priority areas for public health research and policy development (National Academies of Sciences and Medicine, 2020), with their relevance particularly acknowledged since the COVID-19 pandemic. Understanding how the experience of loneliness has been impacted by the COVID-19 pandemic and, in particular, in whom this effect has been most pronounced is of the upmost importance. The COVID-19 Social Study (Lampraki *et al*., 2022) measured loneliness levels in participants since the onset of the pandemic using the short De Jong Gierveld loneliness scale. Loneliness was found to be highest among individuals with a smaller number of relatives and friends; individuals who lived alone; Black, women and Minority Ethnic (BAME) groups; people of low socioeconomic status; individuals with diagnosed health conditions; and those residing in urban areas (Allen *et al*., 2022).

Due to the concerns related to the impact of COVID-19 on relationships and the overall quality of life of college students, there is an urgent need for research to address the effect of the COVID-19 pandemic on social isolation, loneliness, and quality of life among students after the pandemic. Therefore, this study was conducted to determine the level of social isolation, loneliness, and quality of life among students at King Khalid University after the COVID-19 pandemic.

2. Materials and Methods

2.1 Research design and setting

This study used a cross-sectional self-administrative online questionnaire that was carried out at the College of Pharmacy, King Khalid University, Abha, Kingdom of Saudi Arabia. The study was carried out from August 2021 to May 2022.

3. Participants

Pharmacy students from Pharmacy College under King Khalid University in the Aseer region of Saudi Araba participated in the study.

3.1 Sample size and sampling procedure

Using an online sample size calculator (Raosoft. Available at http://www.raosoft.com/samplesize.html, the estimated sample size was 306 students, assuming a 95% confidence level, 5% margin of error, and a population size (number of pharmacy students at KKU) of 1500 students. The questionnaire was distributed to 306 students, of which 172 students responded to it, thus giving a response rate of 56%.

A convenience sampling technique was applied to recruit participants of all batches of pharmacy students from the third level to the tenth level at the College of Pharmacy, King Khalid University. Inclusion criteria were the following: students of pharmacy at King Khalid University, male and female gender, and up to level three or more. The exclusion criteria were the following: students with internship at the pharmacy in King Khalid University, students < third level, students not belonging to the college of pharmacy, and those who did not understand the purpose of the study.

4. Data collection tool

The questionnaire consisted of three parts. The first part was designed to gather socio-demographic data including age, sex, marital status, class level, current residence, and living with family/relatives or living alone.

The second part of the questionnaire was intended to determine the level of loneliness and social isolation among participants. Loneliness was assessed using the UCLA Loneliness Scale Version 3 (Russell *et al*., 1996), which is a 20-item scale designed to measure one's subjective feelings of loneliness and social isolation. Participants rate each item on a scale from 1 (Never) to 4 (Often). The total score will be calculated *via* a summation of all individual responses in this section, where it will range from 20 to 80 points, with higher scores indicating higher levels of feelings of loneliness and social isolation. Using 50% and 50% of the participant's total score, the levels of feelings of loneliness and social isolation will be categorized into two categories, namely, low/moderate (score of 1-40 points) and moderately high/high (score of 41-80 points).

The third part was intended to determine the participant's quality of life (QoL) after the COVID-19 pandemic using the World Health Organization Quality of Life Questionnaire (WHOQOL-BREF) (WHO 1996). The WHOQOL-BREF provides a quality-of-life score related to four domains: physical health, psychological health, social relationships, and environment. Moreover, there are two items that were examined: question 1 asks about an individual's overall perception of quality of life, and question 2 asks about an individual's overall perception of their health. The four domain scores indicate an individual's perception of their quality of life in each particular domain. The responses in each domain are either very dissatisfied, fairly dissatisfied, neither satisfied nor dissatisfied, satisfied, or very satisfied, which scored 1, 2, 3, 4, or 5 points, respectively. Domain scores are scaled in a positive direction (*i.e*., higher scores denote a higher quality of life). The mean scores of items within each domain are used to calculate the domain score. Mean scores are then multiplied by 4 to make the domain scores comparable to the scores used in the WHOQOL-100. Finally, the questionnaire was provided to participants in both Arabic and English forms for ease of handling.

4.1 Data collection

After obtaining ethical approval for conducting the study, the researcher collected the data *via* the online Google form questionnaire by sending a link to the leaders of student WhatsApp groups for all batches of pharmacy students from the third level to the tenth level at the pharmacy school of King Khalid University. Each pharmacy student was allowed to answer the questionnaire once. A reanswering questionnaire was not applicable because the response of pharmacy students was linked with his/her university email.

5. Ethical consideration

Ethical approval was obtained from the ethical committee at the College of Pharmacy, King Khalid University, with the approval number ECM#2022-1401. All respondents were asked for their consent before participation in the study, and no identifying information was collected.

6. Data analysis

After the data were collected, it was modified, coded, and entered into the statistical software IBM SPSS version 22 (SPSS, Inc., Chicago, IL, USA). All statistical analyses were performed using two-tailed tests. *p*-values less than 0.05 were considered statistically significant. Categorical variables, including sociodemographic characteristics, were presented as frequency and percentage, and compared using the Chi-square test. Continuous variables were tested for normality using the Kolmogorov-Smirnov test. Normally distributed data were presented as mean ± standard deviations (SDs) and compared using Student's t-test. Continuous data that were found not normally distributed were presented as median ± interquartile ranges (IQRs) and were compared for significance using the Mann-Whitney U test. Quality of life was displayed as a mean score with standard deviation and range.

Loneliness and social isolation were graphed. Cross tabulation was used to test for the distribution of students' loneliness feelings using their biodemographic data. Correlation analysis was performed to assess the relation between the quality of life and loneliness scores.

We acknowledge that the current study has certain limitations, including a cross-sectional survey design, an online survey using self-reported questionnaires, and a convenience sample from King Khalid Universities. The study only investigated the correlation, not the causal impact of resilience and COVID-19, on pharmacy students' quality of life. Additionally, self-reported questionnaires may result in response bias. Therefore, the generalisability of the findings could be improved. The present study nevertheless contributes to a better understanding of the impact of the COVID-19 pandemic on pharmacy students' quality of life. The present study findings may be helpful for pharmacy educators to develop and implement educational programs to strengthen resilience among pharmacy students.

7. Results

A total of 172 students fulfilling the inclusion criteria completed the study questionnaire. Student ages ranged from 18 to more than 26 years, with a mean age of 22.1 ± 4.4 years old. The exact range comprised 101 (58.7%) female and 71 (41.3%) male students. Of 172 students, 166 (96.5%) were single. A total of 45, 30, 40, and 57 students were at levels 10, 9, 8, and 7 or less, respectively. A total of 158 (91.9%) of the students reported living with their families, and only 14 (8.1%) students reported living alone (Table 1).

A total of 104 (60.5%) students had moderately high degrees of social isolation and feelings of loneliness after the COVID-19 pandemic, while 58 (33.7%) had moderate levels and only 5 (2.9%) had low levels (Figure 1). Moderately high/high levels of feelings of loneliness and social isolation after the COVID-19 pandemic were reported among 63.4% of the students. On the other hand, low/moderate levels were reported by 36.6% of the students (Figure 1).

Table 1: Sociodemographic data of faculty of pharmacy students at King Khalid university Saudi Arabia

Socio-demographic data	No	%
Age in years		
18–20	19	11.0%
21–23	115	66.9%
24–26	36	20.9%
>26	2	1.2%
Gender		
Male	71	41.3%
Female	101	58.7%
Marital status		
Single	166	96.5%
Married	4	2.3%
Divorced/widow	2	1.2%
Level		
Third level	13	7.6%
Fourth level	15	8.7%
Fifth level	11	6.4%
Sixth level	8	4.7%
Seventh level	10	5.8%
Eighth level	40	23.3%
Ninth level	30	17.4%
Tenth level	45	26.2%
Current residence		
Family home	144	83.7%
Rented premises	28	16.3%
Living with Family/relatives	158	91.9%
Alone	14	8.1%

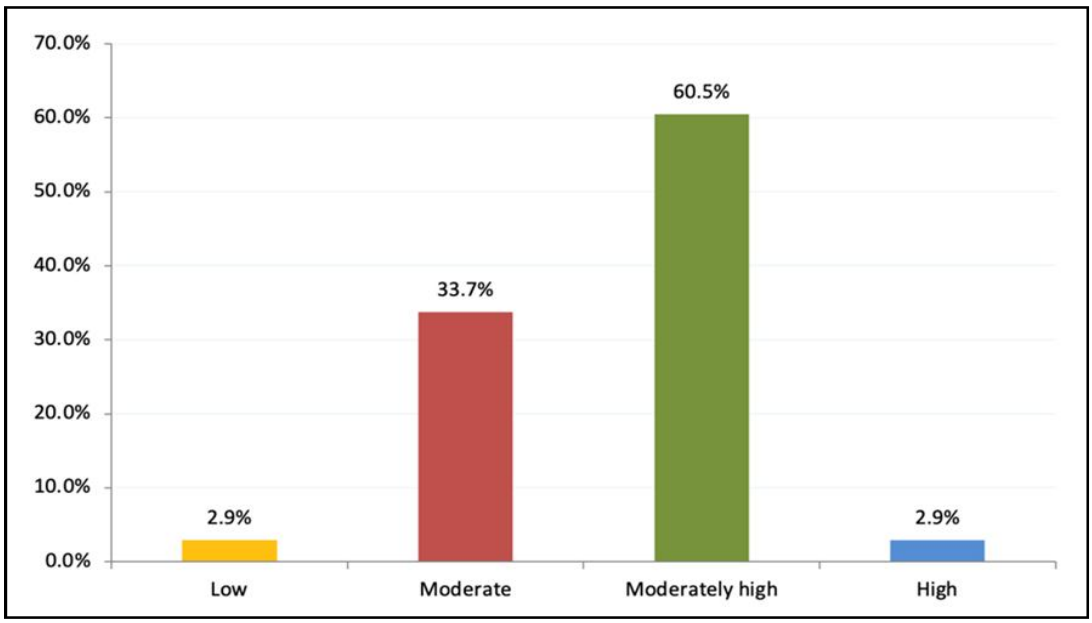

Figure 1: Social isolation and loneliness among students of the pharmacy school at King Khalid University, Saudi Arabia.

The highest QoL score was for psychological health (65.6 19.5% out of 100%), followed by social relationships (65.4 ± 20.8%), environment (63.7 ± 17.7%), and physical health (55.8 ± 18.7%) (Table 2). A total of 70.3% of female students had moderately high/high levels of loneliness feelings compared to 53.5% of males and had recorded statistical significance ($p = 0.025$) (Table 3). Moreover, 82.1% of students who live in rented premises had high levels of loneliness versus 59.7% of students who live in family homes ($p = 0.024$). Other factors showed a non-significant relationship with feelings of loneliness. The physical health score was significantly higher among students with low/moderate loneliness feelings compared to those with a moderately high/high level of loneliness feelings (62.9% vs. 51.7%, respectively) (Table 4).

Table 2: Quality of life among students of the pharmacy school at King Khalid University, Saudi Arabia

QoL domains	Range	Mean	SD
Physical health	20-100	55.8	18.7
Psychological health	20-100	65.6	19.5
Social relationships	20-100	65.4	20.8
Environment	20-100	63.7	17.7

Table 3: Distribution of study students' loneliness feeling level using their socio-demographic data

Socio-demographic data	Loneliness and social isolation level				*p*-Value
	Low/Moderate		Moderately high/High		
	No	%	No	%	
Age in years					0.122 $
18–20	3	15.8%	16	84.2%	
21–23	44	38.3%	71	61.7%	
24–26	16	44.4%	20	55.6%	
>26	0	0.0%	2	100.0%	
Gender					0.025 *
Male	33	46.5%	38	53.5%	
Female	30	29.7%	71	70.3%	
Marital status					0.824 $
Single	61	36.7%	105	63.3%	
Married	1	25.0%	3	75.0%	
Divorced/widow	1	50.0%	1	50.0%	
Level					0.415
Third level	4	30.8%	9	69.2%	
Fourth level	2	13.3%	13	86.7%	
Fifth level	4	36.4%	7	63.6%	
Sixth level	2	25.0%	6	75.0%	
Seventh level	5	50.0%	5	50.0%	
Eighth level	13	32.5%	27	67.5%	
Ninth level	14	46.7%	16	53.3%	
Tenth level	19	42.2%	26	57.8%	
Current residence					0.024 *
Family home	58	40.3%	86	59.7%	
Rented premises	5	17.9%	23	82.1%	
Living with					0.218
Family/relatives	60	38.0%	98	62.0%	
Alone	3	21.4%	11	78.6%	

p: Pearson χ^2 test. $: Exact probability test. * $p<0.05$ (significant).

Table 4: Relation between students' social isolation and loneliness feeling with their quality of life

QoL	Loneliness and social isolation level				*p*-Value
	Low/Moderate		Moderately high/High		
	Mean	SD	Mean	SD	
Physical health	62.9	14.8	51.7	19.6	0.001 *
Psychological health	73.2	16.7	61.2	19.7	0.001 *
Social relationships	76.3	14.6	59.1	21.2	0.001 *
Environment	69.4	13.8	60.4	19	0.001 *

p: Impendent samples *t*-test. *$p<0.05$ (significant).

Furthermore, other domains of quality of life were higher among students with low/moderate loneliness feelings compared to those with moderately high/high levels of loneliness feelings, where the percentages for psychological health, social relationships, and environment were 76.3% vs. 59.1%, 73.2% vs. 61.2%, and 69.4% vs. 60.4%, respectively (Table 4). Table 5 shows that there is a significant inverse correlation between the loneliness score and different quality of life domains.

Table 5: Correlation between students' social isolation and feelings of loneliness with their quality of life

QoL	Loneliness scale scorer(r)	*p*-Value
Physical health	"0.34	0.001 *
Psychological health	"0.33	0.001 *
Social relationships	"0.51	0.001 *
Environment	"0.28	0.001 *

r: correlation coefficient. * $p < 0.05$ (significant).

8. Discussion

Several studies on students' feelings of loneliness and depression in the face of the COVID-19 outbreak in Saudi Arabia have been published (Alateeq *et al*., 2022; Ali *et al*., 2021; Ganji *et al*., 2022; Hakami *et al*., 2021; Loades *et al*., 2020; Mohammed *et al*., 2021; Russell, 1996). However, and to the best of our knowledge, no detailed study has investigated the level of loneliness and social isolation among students after the COVID-19 pandemic. This study showed that, although the authorities have eliminated the restrictions related to COVID-19, students have higher levels of feelings of loneliness and social isolation. During COVID-19, such results would not be surprising, as a Saudi national study discovered that the risk of depression increased by 71.2% during the summer of 2020 compared to the pre-pandemic period (BinDhim *et al*., 2021). During the COVID-19 pandemic, it is rational to see high levels of loneliness, depression, and social isolation, and this can be attributed to the social restrictions calling for physical distancing, which had a negative impact on social activity, networking, and mood (Dahlberg *et al*., 2022). However, after the removal of such restrictions by the end of COVID-19, it is puzzling that the situation continues as it was before, and this certainly calls for more studies aimed at discovering the reason for the increase in the rates of this negative feeling among students despite the removal of constraints.

This study showed that the majority of students (63.4%) had moderately high/high levels of feelings of loneliness and social isolation. It was clear from the results that female students showed higher rates of negative feelings, with 70.3% reporting moderately high/high levels of feelings of loneliness and social isolation and only 29.7% of female students showing low/moderate levels. Similar results were demonstrated in previous studies conducted in Saudi Arabia during the pandemic. The study conducted by Alateeq *et al*. (2022) concluded that during the first COVID-19 summer vacation outbreak, female university students experienced loneliness and depression while quarantined. According to the study, loneliness and depression were reported by 63.3% and 41.1% of female students, respectively, with a significant positive correlation between them (Alateeq *et al*., 2022).

Moreover, a study performed by AlAteeq *et al*. (2021) during the COVID-19 pandemic among students living in Saudi found that more than half of the participants showed moderate levels of stress (55%), while 30.2% registered high levels. The study also reported that females and university students showed a significant association with stress levels. In the same context, another two studies that were carried out during the COVID-19 pandemic among university students in Saudi Arabia showed that this population had marked anxiety (40.8% and 40.3%) and depressive symptoms (48.8% and 56.3%), especially students of a female gender. Among medical students, the same results were obtained. In this regard, a study carried out by AlAteeq *et al*. (2021) reported that, during the COVID-19 pandemic, 94% of medical students suffered from moderate-to-high perceived stress and that 47% of them demonstrated anxiety symptoms.

In this study, the majority of single students (63.3%) reported moderately high/high levels of feeling of loneliness compared to only 36.7% who reported low/moderate levels. The same was also reported among married students. However, the predominance of single students in this study and the inclusion of a very limited number of married students (n=4) make it very hard and unreliable to conclude

the effect of marital status on the level of feelings of loneliness and social isolation. However, previous studies conducted during the COVID-19 pandemic reported that being married was found to predict a slightly lower level of loneliness (Alateeq *et al*., 2022). It was reported that marriage, through building up emotional connectedness, can provide protection against the feeling of loneliness and social isolation (Taniguchi and Kaufman, 2022).

This study showed that class level has no effect on the levels of feelings of loneliness and social isolation (p=0.415). To our knowledge, no previous studies have investigated this variable and its correlation with the levels of feelings of loneliness and social isolation. Of note, some studies reported that depression is slightly lower among students with high GPAs, and this can be related to academic satisfaction (Alateeq *et al*., 2022; Franzen *et al*., 2021).

Furthermore, this study found that living in the family home can be protective against the feeling of loneliness and social isolation, compared to living in rented premises (p=0.024). This can be attributed to several factors. First, living in the family home among family members provides emotional connectedness. In addition, living with the family might relieve financial concerns.

Several studies conducted during the COVID-19 pandemic identified financial concerns as one of several possible causes of mental health problems that could contribute to the general population's feelings of loneliness and social isolation (Franzen *et al*., 2021; Schou-Bredal *et al*., 2021; Skogstad *et al*., 2021).

According to Alateeq *et al*. (2022), loneliness and depression were significantly more prevalent among students from low-income families. This can be attributed to the financial costs of virtual socialization and entertainment, such as internet bills, website fees, and electronic devices, which may contribute to social isolation, loneliness, and depression (Alateeq *et al*., 2022). The study only investigated the correlation, not the causal impact of resilience and COVID-19, on pharmacy students' quality of life. Additionally, self-reported questionnaires may result in response bias. Therefore, the generalisability of the findings could be improved. The present study nevertheless contributes to a better understanding of the impact of the COVID-19 pandemic on pharmacy students' quality of life. The present study findings may be helpful for pharmacy educators to develop and implement educational programs to strengthen resilience among pharmacy students.

9. Limitations

The study's limitations were well known. First, it has the limitation of convenience sampling, which affects the findings' generalizability. Second, while using an online survey may have limited the study due to response bias and the nature of the closed-ended questions in the involved questionnaires, it served as a convenient way to reach university students. Third, the study's cross-sectional design does not illustrate causality relationships and has a lack of pre-pandemic assessment data. Fourth, the predominance of single students and the limited number of married students. This might overestimate the impact of marriage as a protective measure against feelings of loneliness and social isolation. In this regard, it is rational to find such a predominance among this population of students, especially students of pharmacy whose study schedule is busy and marriage together with having children may constitute a constraint against studying and may present a financial burden.

10. Conclusion

This study was designed to address the effect of the COVID-19 pandemic on social isolation, loneliness, and quality of life among students after the pandemic, because of the concerns related to the impact of COVID-19 on relationships and the overall quality of life of pharmacy students. The results also showed that the female gender is more vulnerable to higher levels of feelings of loneliness and social isolation when compared to the male gender. Additionally, living in the family home was found to be protective against feelings of loneliness and social isolation when compared to living in rented premises. Similar to previous studies, we also found that students with greater resilience had a better quality of life. Therefore, it is important to promote students' resilience and improve their quality of life during stressful situations. More studies should conduct to focus on examining knowledge and academic concerns. The present study findings may be helpful for pharmacy educators to develop and implement educational programs to strengthen resilience among pharmacy students.

Author contributions

Conceptualization, T.A.M. and M.F.A.; Methodology, R.M.A. and A.K.; Software, M.F.A.; Formal analysis, A.M.A. and S.A.A.A.; Data curation, M.F.A. and S.A.A.A.; Writing-original draft, T.A.M. and A.M.A.; Writing-review and editing, A.K. and S.W. All authors have read and agreed to the published version of the manuscript.

Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki, the Ethical approval was obtained from the ethical committee at the College of Pharmacy, King Khalid University, with the approval number ECM#2022-1401

Informed consent statement

All respondents were asked for their consent before participation in the study, and no identifying information was collected.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare no conflicts of interest relevant to this article.

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