Background

The COVID-19 pandemic and its consequences have caused fear and anxiety worldwide. This study aimed to determine the relationships among Corona phobia, health anxiety, and social relations in people living with HIV (PLHIV).

Methods

This descriptive study enrolled 300 PLHIV who had records at the Behavioral Diseases Center of Tehran University of Medical Sciences. The data were collected via three questionnaires: the Fear of COVID-19 Scale, social relations questionnaire, and sociodemographic information checklist, and analyzed in SPSS 25 and LISREL 8.8.

Results

Based on the path analysis, among variables that had significant causal relationships with social relations, socioeconomic status (B = -0.14) showed the greatest negative relationship, and health anxiety (B = 0.11) had the greatest positive relationship on the direct path. However, fear of COVID-19 (B = 0.049) displayed the greatest positive relationship on the indirect path. The level of education (B = 0.29) was the only variable showing a significant and positive relationship with social relations on both direct and indirect paths.

Conclusion

This study was conducted during the COVID-19 pandemic when it was necessary to adhere to social distancing and limiting social relations. A better socioeconomic status was related to fewer social relations. Moreover, increased fear and health anxiety related to a higher social relations score. Due to their vulnerability, PLHIV require more support and education to adhere to health protocols.
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Relationships among Corona phobia, health anxiety, and social relations in people living with HIV (PLHIV): A path analysis

Fatemeh Aliverdi ¹, Zahra Bayat Jozani², Nooshin Ghavidel ³, Mostafa Qorbani⁴,⁵*, Nami Mohammadian Khonsari⁴, Farima Mohamadi⁵, Minoo Mohraz⁶, Zohreh Mahmoodi⁷*

¹- Student Research Committee, Alborz University of Medical Sciences, Karaj, Iran
²- PhD student, Department of Reproductive Health and Midwifery, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, IRAN
³- Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran
⁴- a: Non-Communicable Diseases Research Center, Alborz University of Medical Sciences, Karaj, Iran ⁴-b: Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
⁵- Social Determinants of Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
⁶- Iranian Research Center for HIV/AIDS, Iranian Institute for Reduction of High Risk Behaviors, Tehran University of Medical Sciences, Tehran, Iran
⁷- Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran

*Equally contributed as corresponding authors: Zohreh Mahmoodi: Social Determinants of Health Research Center, Alborz University of Medical Sciences, Karaj, Iran

Email: Zohrehmahmoodi2011@gmail.com

Mostafa Qorbani: Non-Communicable Diseases Research Center, Alborz University of Medical Sciences

Email: mqorbani1379@yahoo.com

Abstract:

Background: The COVID-19 pandemic and its consequences have caused fear and anxiety worldwide. This study aimed to determine the relationships among Corona phobia, health anxiety, and social relations in people living with HIV (PLHIV).
**Methods:** This descriptive study enrolled 300 PLHIV who had records at the Behavioral Diseases Center of Tehran University of Medical Sciences. The data were collected via three questionnaires: the Fear of COVID-19 Scale, social relations questionnaire, and sociodemographic information checklist, and analyzed in SPSS 25 and LISREL 8.8.

**Results:** Based on the path analysis, among variables that had significant causal relationships with social relations, socioeconomic status (B = -0.14) showed the greatest negative relationship, and health anxiety (B = 0.11) had the greatest positive relationship on the direct path. However, fear of COVID-19 (B = 0.049) displayed the greatest positive relationship on the indirect path. The level of education (B = 0.29) was the only variable showing a significant and positive relationship with social relations on both direct and indirect paths.

**Conclusion:** This study was conducted during the COVID-19 pandemic when it was necessary to adhere to social distancing and limiting social relations. A better socioeconomic status was related to fewer social relations. Moreover, increased fear and health anxiety related to a higher social relations score. Due to their vulnerability, PLHIV require more support and education to adhere to health protocols.

Keywords: Health anxiety, COVID-19, Corona phobia, Social relations, Path analysis

**1. Background:**

The COVID-19 pandemic has affected people’s psychological status (Fofana, Latif, Sarfraz, Bashir, & Komal). Based on the Inter-Agency Standing Committee (IASC) report, people are, directly and indirectly, impacted by stressful experiences in this period. The most prevalent responses include fear (of illness, death, loss of livelihood, social isolation, and being quarantined)
and fear-related behaviours, e.g., limited social relations, distance from treatment centers, health anxiety, depression, and stress (Porcelli)

Fear is an adaptive feeling needed to cope with potential threats, but excessive fear has negative impacts at the personal (mental health issues and anxiety disorders) and social level (seclusion, isolation, xenophobia) (Mertens, Gerritsen, Duijndam, Salemink, & Engelhard). Researchers have discussed the pathological fear of COVID-19 (corona phobia) due to the nature and wide-ranging impacts of the pandemic (Asmundson & Taylor)

Various factors may affect the degree of psychological vulnerability to corona phobia, including personal variables such as tolerance, lack of trust, vulnerability to the diseases, anxiety, and concerns (Asmundson & Taylor). Reports suggest that older adults and those with underlying diseases, including HIV, run a greater risk (Control & Prevention). It is expected that the COVID-19 pandemic imposes a more significant physical and psychological burden on people living with HIV (PLHIV) (Chenneville, Gabbidon, Hanson, & Holyfield, 2020; Tunçel et al., 2020). This group lives with severe early death anxiety, different types of fears related to this disease, mental disturbances ranging from indifference and hopelessness to severe reactions such as anxiety and depressive disorders (Belir, Ansari Shahidi, & Mohammadi).

Health anxiety is a wide-ranging cognitive disorder formed as incorrect perceptions about physical changes and symptoms resulting from one’s beliefs about illness or health (Solem et al.). According to some researchers, health anxiety is a major psychological factor related to corona phobia (Asmundson & Taylor). Almost everyone has experienced some degrees of health anxiety, low levels of which are not pathological but rather help people perform and commit to preventive behaviours. However, its severe degrees are associated with maladaptive coping behaviours leading to distress, social incompetence, disrupted job performance, and repeat visits to health centers (Salkovskis & Warwick).

People inherently need and thus create opportunities to experience social relations. Social relations also affect mental health, health-related behaviours, and physical health. Studies show that social relations have short- and long-term effects on health that emerge during childhood and throughout one’s life (Umberson & Karas Montez, 2010)
During the COVID-19 pandemic, the World Health Organization (WHO) recommended precautionary measures, including quarantine, limiting social relations by increasing physical distance, wearing a mask when visiting others, and avoiding overcrowding (Cabello et al.). Due to the importance of this topic, the vulnerability of PLHIV, and the absence of a model examining all the mentioned variables together, especially for this group, the current study aimed to determine relationships among Corona phobia, health anxiety, and social relations in PLHIV via path analysis.

Hence in this study, the following questions are addressed using path analysis which is considered as a causal modelling technique; and can be performed on both cross-sectional and longitudinal data. (Plichta, Kelvin, & Munro)

1-What is the effect of Corona phobia (direct/indirect /total) on the social relation of PLHIV?
2- What is the effect of Health Anxiety (direct/indirect /total) on the social relation of PLHIV?
3- What is the effect of demographic factors such as age, social-economic status, number of partners, and number of children) on the social relation of PLHIV?

2. Methods:

2.1. Study design:

This descriptive-analytical study was conducted in 2021 with PLHIV, who had records at the Behavioral Diseases Center of Tehran University of Medical Sciences (the main referral center for PLHIV).

2.2. Study Population

The sample size was calculated as 300 following Maria Pizzirusso et al. (Pizzirusso et al.), type I and type II error of 0.05 and 0.2, respectively, and the correlation of 0.16 for social relations and anxiety, by using the following formula:

Total sample size = N = [(Zα+Zβ)/C] 2 + 3

C = 0.5 * ln [(1+r)/ (1-r)]
Inclusion Criteria

Iranian men/women with records at the Behavioral Diseases Center, minimum literacy, absence of mental and physical problems (as reported by the patient/registered in their records) that would preclude them from participation, and no history of psychotropic medications.

Exclusion criteria

Returning incomplete questionnaires, migration, and hospitalization due to COVID-19.

2.3. Data collection and definition of terms

The data were collected via four questionnaires: The Fear of COVID-19 Scale (Ahorsu et al.); The Health Anxiety Inventory (Salkovskis & Warwick); social relations questionnaire; the Socioeconomic Status Scale (SES) (Eslami, Mahmoudi, Khabiri, & Najafiyan Razavi); as well as a sociodemographic information checklist.

2.3.1 The the Fear of COVID-19 Scale

Pakpour, Griffiths, et al. developed the Fear of COVID-19 Scale in 2020 with seven items (Ahorsu et al.). The responses range from “strongly disagree” (1) to “strongly agree” (5). The sum of scores of all items yields the total score ranging from 7-35. The original version has a Cronbach's alpha of 0.82, test-retest coefficient of 0.88, and appropriate validity. In Iran, its reliability was confirmed with a Cronbach's alpha of 0.86 (Alizadehfard & Alipour). The scale's reliability was confirmed in the current study with a Cronbach's alpha of 0.84.

2.3.2 The Health Anxiety Inventory

The Health Anxiety Inventory was developed by Salkovskis and Warwick (2002) with 18 items to measure health anxiety. The questions are scored on a four-point Likert scale (never = 0 to often = 3). Salkovskis reported the test-retest reliability of 0.90 and Cronbach's alpha of 0.70-0.82. (Salkovskis & Warwick) The Persian version of the inventory showed a Cronbach's alpha of 0.75, demonstrating optimal validity. (DAVOUDI, NARGESI, & MEHRABIZADEH)

2.3.3. Social relations questionnaire
This questionnaire consists of 11 items scored on a five-point Likert scale from very low to very high (1-5). The score ranges from 11 to 55. Its reliability was confirmed with a Cronbach's alpha of 0.87 (Mousavi, 2013). The current study confirmed its reliability with a Cronbach's alpha of 0.89.

2.3.4. Socioeconomic status scale (SES)
SES consisted of 6 questions, including education of mother and father, income, economic class, and housing status, which are scored based on a Likert scale from 1 to 5, and a total score ranging from 6 to 30. Validity and reliability have been performed in Iran with a Cronbach's alpha of 0.83 (2013) (Eslami et al.)

2.3.5. Socio-demographic checklist
This scale included questions on the respondents’ age, duration of the disease, the number of children, sex partners, education, and having insurance.

2.4. Procedure

The study began after obtaining the required permissions and approval from the Ethics Committee of Alborz University of Medical Sciences (IR.ABZUMS.REC.1400.022). The researchers visiting the Behavioral Diseases Centre identified eligible participants and briefed them about the study's objectives. The eligible participants signed a written informed consent form if they were willing to participate. Due to the COVID-19 pandemic and to adhere to distancing and minimal presence at the Center, the questionnaires were sent to those who had Internet access over the Pars Online platform, and they were requested to fill them out in one week. For those who did not have Internet access, a separate room was allocated for filling out the questionnaires. The respondents could ask their questions regarding questionnaire items and resolve any ambiguities by phone for those who used the Internet and in person for those who filled out the questionnaire in the center.

They were all ensured that their data would remain confidential, that participation was not obligatory, and that they would not be deprived of any services if they did not participate.

2.5. Statistical analysis
This study examined the fitness of a conceptual model for the relationship among fear of COVID-19, health anxiety, and social relations in PLHIV (Figure 1). Path analysis is an extension of conventional regression that shows not only the direct effects but also the indirect effects of each variable on the dependent variables, and the results can be used to provide a rational interpretation of the relationships and correlations observed. Data were analyzed in SPSS-25 and Lisrel-8.8. The results were expressed using Pearson’s correlation coefficient for the correlations and in the form of Beta for the path analysis, and the significance level was set at T-value >1.96.

2.6. Research Variables

Socio-demographic characteristics included age, education, child number, SES, partner number, disease duration, and having insurance.

Variables used in the path analysis included Age, education, child number, SES, partner number, health anxiety, corona phobia, and social relation.

3. Results:

The data of 300 PLHIV who had records at the Behavioral Diseases Center of Tehran University of Medical Sciences were investigated. The participants’ mean age (39.4 ± 7.5 years), health anxiety score (20.6 ± 7.3), fear of COVID-19 score (22.4 ± 5.3), and social relations score (35.1 ± 3.80) are presented in Table 1.

Based on Pearson’s correlation analysis, among variables significantly correlated with social relations, education had the strongest significant positive correlation (r ≈ 0.37) and the number of children displayed the strongest significant negative correlation (r ≈ -0.26) (Table 2).

Based on the path analysis, among variables with significant and causal relationships on the direct path with social relations, socioeconomic status (B = -0.14) had a negative relationship while health anxiety (B = 0.11) had a positive relationship. In other words, with a one-score increase in SES, the social relations score decreased, and with a rise in the health anxiety score, the social relations score increased. On the indirect path, the fear of COVID-19 (B ≈ 0.05) had a significant and positive relationship with social relations; in other words, a rise in fear of COVID-19 score was associated with a rise in social relations score. Level of education was the only variable showing a significant and positive relationship with social relations on both direct and indirect
paths (B = 0.29), meaning that a higher level of education was associated with a higher social relations score (Table 3).

The model’s fitness indices demonstrate its goodness of fit, and the reasonably adjusted relationships among the variables (Table 4).

4. Discussion;

This study explored the relationship between fear of COVID-19, health anxiety, and social relations in PLHIV via path analysis. Among variables with significant causal relationships with social relations, SES showed the greatest negative relationship, and health anxiety demonstrated the greatest positive relationship on the direct path. Fear of COVID-19 showed the greatest positive relationship on the indirect path. Level of education was the only variable that had significant and positive relationships with social relations on both direct and indirect paths.

SES had the highest negative relationship with social relations; the poorer the socioeconomic status, the higher the social relations. On the contrary, other studies reported fewer social relations in lower SES groups. (Vonneilich et al.) In another study, patients with HIV who had a lower SES, were poorer, or had lower living standards had fewer social relations than others. (Zhang, Zhang, Aleong, & Fuller-Thomson) This difference in results can be attributed to the pandemic; in our study, those with a higher SES were less in need of being in the society to earn a living or visit healthcare centers, and these factors limit social relations, especially for PLHIV.

Our study revealed that health anxiety had the greatest positive relationship with social relations. We found no similar study on patients with HIV regarding this subject. Nonetheless, a possible cause of this finding could be that patients with greater health anxiety repeatedly visit healthcare centers to check their health status. To ensure the diagnosis, they visit different doctors to make sure they are not infected with COVID-19 (Mohammadi & Shahyad, 2020; Solem et al., 2015), which in turn may increase their social relations. The physical signs and symptoms of health anxiety during the pandemic may resemble the signs and symptoms of COVID-19 itself; in this case, people may mistake these physical changes as symptoms of COVID-19. People with high health anxiety regard any physical change as a sign of a disease, which exacerbates their anxiety and concern, and leads to repeated referrals (Mohammadi & Shahyad).
People with severe immune deficiencies, such as HIV, face numerous side effects. They may be exposed to severe COVID-19 and have a higher mortality risk due to its complications, all of which can cause or exacerbate their stress and concern. (Shiau, Krause, Valera, Swaminathan, & Halkitis)

In the present study, fear of COVID-19 had the strongest positive relationship with social relations through the indirect path. Fear of COVID-19 positively affected health anxiety and thus increased the social relations of the patients. As noted before, PLHIV frequently visit diagnostic and treatment centers due to concerns and fear of COVID-19 complications, which increases their social relations. (Mohammadi & Shahyad, 2020; Solem et al., 2015) COVID-19 research and the media report increased fears of COVID-19. Although fear is a common psychological outcome during the pandemic, it is not limited to morbidity and mortality but may also emerge as social and occupational stress due to the evolving nature of the disease, its prevalence, and its unique risk factors. Corona phobia is a hyper-reactive fear of contracting COVID-19 with three physiological, cognitive, and behavioural components. Ongoing worry can induce symptoms such as tachycardia, tremor, breathing difficulty, vertigo, a changed appetite, obsession, and affective responses (sadness, guilt, anger). To prevent the consequences, people adopt avoidant behaviours that may disrupt the overall quality of their daily functioning. (Arora, Jha, Alat, & Das) Studies show that the complications and mortality caused by this disease are higher in people with chronic diseases, which induces or exacerbates fear and anxiety in them. (Bakioğlu, Korkmaz, & Ercan, 2021; Mahmoudi & Ghavidel, 2021)

In the current study, level of education was the only variable that had significant and positive relationships with social relations on both direct and indirect paths. Likewise, Nojoumi et al. showed that HIV-positive patients who were educated and employed had a better status than other patients in most quality of life dimensions, especially mental health, social functioning, and environmental dimension. (Nojoomi & Anbari) Educated patients have a better attitude towards the disease and are better adjusted to it due to their better occupational and financial opportunities and high cultural status, which expands their social relations and leads to a better quality of life. Studies show that people with a higher level of education run a longer and healthier life compared to people of the same age but with a lower level of education. (Zajacova & Lawrence) Contrary to our study, a study in China demonstrated no significant relationship between the social relations
of patients with HIV and their level of education. (Liping, Peng, Haijiang, Lahong, & Fan) Cultural differences, economic conditions, and living standards could explain these differences.

5. Conclusion:

This study was conducted during the COVID-19 pandemic when it was necessary to adhere to social distancing and limiting social relations. A better socioeconomic status was correlated with fewer social relations. Moreover, increased fear and health anxiety correlated with a higher score of social relations. Based on their vulnerability, PLHIV require more support and education to adhere to health protocols.

List of abbreviations:

AGE=age of participant
PN=partner number
CN=Child Number
HA=Health anxiety
EDU=Education
CP=Corona phobia
SES=Socioeconomic statues
SR=Social relation

Declarations:

Ethical Approval and consent to participate:

Informed consent was obtained from all the participants entering the study. Relevant guidelines and regulations were observed for all methods. All experimental protocols were approved by the Ethics Committee of Alborz University of Medical Sciences (Abzums.Rec.1399.234). All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication:

All Of Authors have Consent for publication.
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The data that support the findings of this study are available from the corresponding author upon reasonable request

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Table 1 – the sociodemographic character of Participants (PLWH)

| Variables (quantitative)       | Mean ± SD | Variables (quantitative)       | Mean ± SD |
|--------------------------------|-----------|--------------------------------|-----------|
| Age                           | 39/4 ± 7/5| Health Anxiety                 | 7.3±20.6  |
| HIV duration                  | 7.88 ± 4.98| Corona Phobia                  | 5.3 ± 22.4|
| Education                     | 10.07 ± 3.65| Social relation                | 3.8 ± 35.1|
| Social-economic status        | 9.5 ± 2.61| Variables (qualitative)        | F (%)     |
| Variables (qualitative)       |           | corona History                 | yes       |
|                                |           |                                | 72 (23.8) |
| Insurance status              | yes       |                                | no        |
|                                | 95 (31.5) |                                | 230 (76.2)|
|                                | no        |                                |           |
|                                | 207 (68.5)|                                |           |
| Number of children            | 0         | Job women                      | Housekeeper|
|                                | 116 (38.4)|                                | 83 (27.5)  |
|                                | 1         |                                | Worker    |
|                                | 81 (26.8) |                                | 84 (27.8)  |
|                                | 2         |                                | Employment|
|                                | 60 (19.9) |                                | 23 (7.6)   |
|                                | 3 and more|                                | Un employment|
|                                | 45 (14.9) |                                | 47 (15.6)  |
|                                |           |                                | retired   |
|                                |           |                                | 11 (3.6)   |
|                                |           |                                | Self-employment|
|                                |           |                                | 54 (17.9)  |
Table 2. The correlation matrix of personal-social variables, Health anxiety, corona phobia, Social relation in PLWH

|          | Age   | Partner number | Child number | HIV duration | Health anxiety | SES          | Corona phobia | Social relation | Education |
|----------|-------|----------------|--------------|--------------|----------------|--------------|---------------|----------------|-----------|
| Age      | 1     | -0.152**       | 0.587**      | 0.448**      | -0.034         | 0.034        | 0.124*        | -0.235**       | -0.356**  |
| Partner number | 1     | -0.129*        | -0.091       | -0.069       | 0.141*         | -0.035       | 0.173**       | 0.153**        |           |
| Child number | 1     | 0.289**        | 0.026        | -0.039       | 0.184**        | -0.255**     | -0.343        |                |           |
| HIV duration | 1     | -0.081         | 0.025        | 0.037        | -0.167**       | -0.170**     |                |                |           |
| Health anxiety | 1     | -0.009         | 0.424**      | -0.108*      | -0.013         |              |                |                |           |
| SES      | 1     |                |              | 0.034        | 0.192**        | 0.184**      |                |                |           |
| Corona phobia |       |                |              |              |                |              |                |                |           |
| Social relation |       |                |              |              |                |              |                |                |           |
| Education |       |                |              |              |                |              |                |                |           |

** : P<0/01  *:P<0/05  , SES: social economic status

Table 3. The direct and indirect effects among personal-social variables, Health anxiety, corona phobia and Social relation in PLWH

|          | Standard B | Unstandardized β | R²  |
|----------|------------|------------------|-----|
| Direct effects | Indirect effects | Total effect | Direct effects | Indirect effects | Total effect |
| Age      | -0.068     | 0.01             | 0.078 | -0.034       | -0.002       | -0.036       | 0.49 |
| Education | 0.276*     | 0.0145*          | 0.2905* | 0.29*    | -0.26*       | 0.03*        |
| Child number | -0.118     | 0.001            | -0.117 | -0.37       | -0.002       | -0.372       |
| SES      | -0.140*    | -0.001           | -0.140* | -0.20*    | -0.0015      | -0.02        |
| Partner number |          | 0.007            | 0.007  | -          | 0.015        | 0.015        |
| Fit Index       | X²    | df  | X²/df | CFI  | GFI  | NFI  | RMSEA |
|----------------|-------|-----|-------|------|------|------|-------|
| Model Index    | 18.47 | 8   | 2.308 | 0.97 | 0.98 | 0.095| 0.048 |
| Acceptable range | X²/df < 5 | > 0.9 | > 0.9 | > 0.9 | < 0.05 |

CFI (comparative fit index), GFI (Goodness of fit index), NFI (Bentler-Bonett Normed fit index), RMSEA (root mean squared error of approximation)
Figure 1: Full Empirical Model (Empirical Path Model between health anxiety, corona phobia, and social relations)

AGE = age of the participants, PN = partner number, CN = Child Number, HA = Health anxiety
EDU = Education, CP = Corona phobia, SES = Socioeconomic statues, SR = Social relation
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Supporting Information
STROBE_checklist_cross-sectional.docx