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ORIGINAL RESEARCH

# Psychometric properties of the Iranian version of the quarantine fatigue scale in Iranian congenital heart patients

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## Abstract

**Background:** This study was to examine psychometric properties of the Lockdown Fatigue Scale (COS) in Iranian Congenital Heart Disease Patients.
**Materials and Methods**: All participants were 105 Individual (99 women, 6 men) that were selected by available sampling and completed The Coronavirus Anxiety Scale (CAS), The Fear of COVID-19 Scale (FCV-19S), Depression Scale (DS) and the Lockdown Fatigue Scale (LFS).
**Results**: Confirmatory factor analysis indicated that these factors were well fitted to the data (CFI= 0.96, NFI= 0.95, GFI=0.96). Convergent validity of the COS were examined by correlating scores of the CAS with those FCV-19S, and DS ($p < 0/01$). The LFS was found to have an acceptable internal consistency as shown by a high Cronbach's alpha of 0.899.
**Conclusion**: According to the results, it can be concluded that the Lockdown Fatigue Scale has a good validity and reliability for in Iranian Congenital Heart Disease Patients and can be used in future studies.

**Keywords:** Lockdown fatigue scale, Psychometric, Reliability, Validity

**Introduction**

With the emergence of the coronavirus, research on the impact of quarantine and a wide range of health-related consequences associated with it has increased (1). COVID-19 can have irreparable consequences for society and the healthcare system, especially for high-risk patients such as those with heart disease (2). Some studies have shown that anxiety and depression symptoms are on the rise due to social distancing and the fatigue and burnout resulting from quarantine (3-5). Quarantine fatigue refers to the negative physical and psychological outcomes arising from the isolation and restricted movement of individuals potentially exposed to an infectious disease (6). During the COVID-19 outbreak, quarantine was the most common and effective strategy to prevent the spread of the disease (7). However, quarantine itself also leads to increased psychological distress and fatigue, such as worry, obsessive behaviors, paranoia, depression, and post-traumatic stress. Psychological disorders in quarantined individuals typically manifest as acute stress disorder, post-traumatic stress disorder, substance abuse and dependence, irritability, anxiety, insomnia, poor functioning, emotional numbness, and depression (8-11).

Several studies have examined the psychological outcomes of quarantine and the mental health consequences of COVID-19 (6, 12, 13). Research literature indicates that social isolation is negatively associated with individuals' psychological well-being. Loneliness resulting from quarantine and related fatigue is linked to a higher risk of mental health problems, including anxiety and depression (14). Study findings have reported the psychological effects of quarantine on mental health, including rejection, loneliness, anger, depression, anxiety, low self-esteem, reduced self-control, fear, boredom, emotional problems, disruption in daily activities, and negative impacts on coping and psychological functioning (15,16).

Furthermore, fear of illness, financial problems due to quarantine, temporary or permanent unemployment, limited social interactions, uncertainty about the end of the pandemic, concern for family and loved ones, and fear of the future are among the factors that influence the psychological effects of quarantine fatigue and pandemic-related stress. This stress predicts anxiety and depression in individuals (17). A study by Bartoszek et al. on 471 young adults showed that being alone and initiating new treatments during quarantine was associated with higher levels of fatigue and anxiety (18). In another cross-sectional study, 64% of participants reported experiencing pandemic-related fatigue (19).

Labraque and Ballad conducted a cross-sectional study on college students in the Philippines during the COVID-19 quarantine and found moderate levels of fatigue in terms of physical exhaustion, body pain, headaches, worries, and decreased motivation among the students (20). Similarly, Field et al., in a study on 260 individuals with a history of home quarantine, found that quarantine fatigue was associated with worsened mood and lifestyle (12).

Overall, studies examining psychological disorders in quarantined individuals report numerous indicators of psychological distress, such as emotional dysregulation, anxiety, depression, stress, low mood, irritability, insomnia, impaired attention, post-traumatic stress disorder, anger, and emotional numbness, which are all indicative of quarantine fatigue (7, 21, 22). Findings also indicate that immediately after the end of the quarantine period, quarantine predicted anxiety symptoms and acute stress disorder(15).

Given the importance of examining quarantine fatigue and its psychological consequences, investigating this topic at this time is both significant and necessary.

Considering that COVID-19 mortality is considerably higher in older adults and individuals with underlying conditions, particularly cardiovascular patients, compared to healthy individuals (23), and that individuals with underlying conditions are more vulnerable to the consequences of COVID-19, it is crucial to pay attention to this patient group. Studies have shown that one of the groups at high risk of COVID-19-related death are cardiac patients, especially those with congenital heart

disease. Therefore, attention to this population is essential.

The availability of a standardized scale to measure quarantine fatigue can help assess the level of fatigue in individuals affected by COVID-19, particularly patients with congenital heart disease. If the scale demonstrates good fit, researchers can use it in various studies. Hence, conducting this research is important, and its results will be practical for researchers, psychologists, and healthcare policymakers. Therefore, the research question of this study is whether the Quarantine Fatigue Scale possesses satisfactory validity, reliability, and fit.

**Materials and Methods**

The present study is descriptive-analytical in design and was conducted to examine the psychometric properties of the Quarantine Fatigue Scale in patients with congenital heart disease. The statistical population included all patients with congenital heart disease who referred to Shahid Rajaei Hospital and Tehran Heart Center. To estimate the sample size, the Sample Power software was used. Considering a 90% power, 105 patients with congenital heart disease were selected from the target population using a convenience sampling method and were included in the study. Due to the use of convenience sampling and the researchers' discretion in selecting the sample size, no dropout was observed.

The inclusion criteria for this study were: 1) anatomical congenital heart disease confirmed through echocardiography, cardiac tests, or surgery; 2) ability to read, understand the questionnaire content, and complete the consent form; and 3) age above 18 years. Exclusion criteria included poor physical or mental health that could limit participation, fatigue preventing questionnaire completion, or unwillingness to participate both verbally and in writing. To examine the research hypotheses, four instruments were used: the Coronavirus Anxiety Scale, the Beck Depression Inventory, the Fear of COVID-19 Scale, and the Quarantine Fatigue Scale .The Coronavirus Anxiety Scale (CAS): Developed by Lee et al., this scale identifies potential dysfunctional anxiety related to the COVID-19 crisis. It assesses anxiety history and related components and measures physiological symptoms triggered by COVID-19. The scale is scored on a 5-point Likert scale ranging from 0 (not at all) to 4 (nearly every day during the past two weeks). A high score on a specific item or a total scale score ≥9 may indicate a problem that warrants further assessment or treatment. Confirmatory factor analysis indicated that the CAS reliably measures a unidimensional construct ($\alpha = 0.93$) and is invariant across gender, race, and age. The CAS demonstrates good construct validity and has been reported as a valid and efficient instrument .(9) The Fear of COVID-19 Scale (FCV-19S): Developed by Ahorsu et al. (2020), this self-report scale evaluates fear of the COVID-19 virus. The scale contains 7 items, scored on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), with total scores ranging from 7 to 35. Higher scores indicate greater fear of COVID-19. The scale was validated in a sample of 717 Iranian participants. Item selection was based on comprehensive review of existing fear scales and expert interviews. Pearson correlation coefficients ranged from 0.47 to 0.56, internal consistency was 0.82, and test-retest reliability was 0.72. Concurrent validity with the Hospital Anxiety and Depression Scale was 0.42 and 0.11, and with the Perceived Vulnerability to Disease scale (perceived infectability and germ aversion) was 0.48 and 0.46, respectively(24). The Quarantine Fatigue Scale (The Lockdown Fatigue Scale): Developed by Labrague and Ballad (2020), this 10-item scale evaluates quarantine-related fatigue during COVID-19. Responses are recorded on a 5-point Likert scale from 1 (never) to 5 (always), with a maximum score of 50. Fatigue levels are classified as low (1–12), mild (13–25), moderate (26–37), and severe (38–50). Internal consistency was reported as 0.84, content validity 0.93, and test-retest reliability 0.91 .Beck Depression Inventory (BDI): This 21-item inventory measures the severity of depressive symptoms. Respondents rate each symptom on a 4-point scale from 0 to 3. Completion requires approximately 5–10 minutes. Total scores range from 0 to 63, with scores of 40–50 observed only in cases of severe depression. Typically, clinically depressed and non-clinical individuals score

between 12 and 40. The BDI has undergone extensive psychometric evaluation over the past 30 years (22). High-level analyses of internal consistency have shown coefficients ranging from 0.73 to 0.92, with an average of 0.86. Content, construct, and discriminant validity, as well as factor analysis, generally indicate good psychometric properties. The BDI-II items were developed with expert clinical consensus on depressive symptomatology, covering six of the nine diagnostic criteria for depression according to DSM guidelines (22, 25). In Iran, Dabson and MohammadKhani validated the BDI in a large sample of patients with major depressive disorder, confirming its reliability and applicability for pre- and post-treatment assessment. The overall reliability coefficient for all 21 items was 0.91(26).

Procedure: The study was conducted individually. After obtaining informed consent, the researcher provided participants with the questionnaires and instructions for completion. Questionnaires were collected after a period agreed upon by the participants and their companions. Throughout the study, ethical considerations were strictly observed, including participants' freedom to participate or withdraw. Confidentiality of personal information was ensured, and no actions were taken that could jeopardize the health of participants or others.

Finally, analyses were conducted on 105 completed questionnaires. Descriptive statistics (mean and standard deviation) and inferential statistics (Pearson correlation for convergent validity, Cronbach's alpha for reliability) were used. To assess scale fit, indices such as Normed Fit Index (NFI), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and Root Mean Square Error of Approximation (RMSEA) were calculated using SPSS and LISREL software.

Table 1: Results related to demographic information of the research sample members

| Category | | Frequency(n) | Percentage (%) |
|---|---|---|---|
| Age | 20 to 30 years | 55 | 52/4 |
| | 31 to 40 years | 48 | 45/7 |
| | Over 40 years | 2 | 1/9 |
| Gender | Male | 6 | 5/7 |
| | Female | 99 | 94/3 |
| Marital Status | Single | 5 | 4/8 |
| | Married | 99 | 94/3 |
| | Divorced | 1 | 0/9 |
| Education Level | High school diploma | 9 | 8/6 |
| | Diploma | 46 | 43/8 |
| | Bachelor's degree | 41 | 39 |
| | Master's degree | 8 | 7/6 |
| | PhD | 1 | 0/9 |
| Family history of heart disease | Yes | 46 | 43/8 |
| | No | 59 | 56/2 |

**Results**

Table 1 presents the demographic characteristics of the study sample, including age, gender, marital status, and family history of heart disease.

Confirmatory factor analysis (CFA) was used to examine the factorial structure of the Quarantine Fatigue Scale, and the results are presented below.

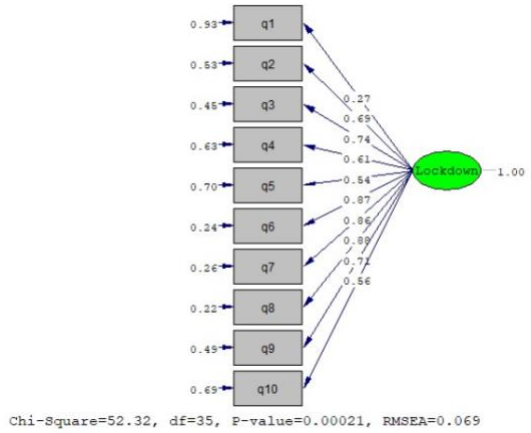



Figure 1 illustrates the CFA model of the Quarantine Fatigue Scale with standardized coefficients. The estimated parameter values for each variable indicate the strength of the factor loading of that variable on its corresponding factor.

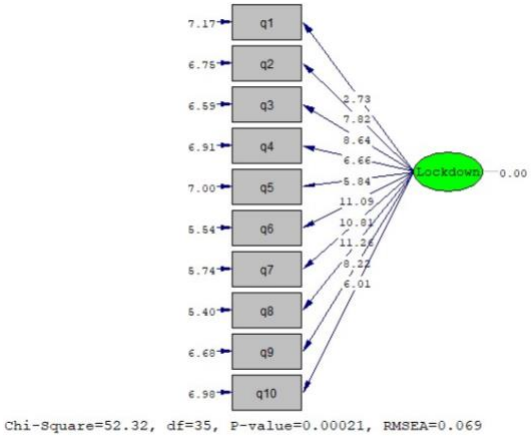



Figure 2 shows the CFA model with significance coefficients. The numbers on the paths represent the t-values for each path. Factor loadings are considered significant if the t-value exceeds 1.96. According to the results, all t-values for model parameters, including factor loadings and standard errors, were greater than 1.96 and statistically significant.

Table 2. Factor Model Fit Indices

| Fit evaluation | Observed Values | Acceptable Ranged | Fit Index |
|---|---|---|---|
| Good | 1/49 | ≤ 3 | $\chi^2$ / df |
| Good | 0/96 | ≥ 0.90 | IFI (Incremental Fit Index) |
| Good | 0/95 | ≥ 0.90 | NNFI (Non-Normed Fit Index) |
| Good | 0/069 | ≤ 0.08 | RMSEA (Root Mean Square Error of Approximation) |
| Good | 0/96 | ≥ 0.90 | CFI (Comparative Fit Index) |
| Good | 0/038 | ≤ 0.08 | SRMR (Standardized Root Mean Square Residual) |

The chi-square to degrees of freedom ratio ($\chi^2$/df) confirmed model fit, with a value less than 3, indicating good fit with the data. The root mean square error of approximation (RMSEA) was 0.069, and the standardized root mean square residual (SRMR) was 0.038, both below the cut-off of 0.08, confirming model fit. Additionally, the IFI, CFI, and NNFI indices exceeded the recommended threshold of 0.90, further supporting the adequacy of the model.

Table 3. Factor Loadings of Items for the Quarantine Fatigue Scale in Confirmatory Factor Analysis

| Component | Item | Unstandardized Coefficient | Standardized Coefficient | Test Statistic(t) | p-value |
|---|---|---|---|---|---|
| Quarantine Fatigue | 1 | 0/32 | 0/27 | 2/73 | 0/01 |
| | 2 | 0/98 | 0/69 | 7/82 | 0/01 |
| | 3 | 1/19 | 0/74 | 8/64 | 0/01 |
| | 4 | 0/77 | 0/61 | 6/66 | 0/01 |
| | 5 | 0/63 | 0/54 | 5/84 | 0/01 |
| | 6 | 1/45 | 0/87 | 11/09 | 0/01 |
| | 7 | 1/38 | 0/86 | 10/81 | 0/01 |
| | 8 | 1/48 | 0/88 | 11/26 | 0/01 |
| | 9 | 1/09 | 0/71 | 8/22 | 0/01 |
| | 10 | 0/87 | 0/56 | 6/01 | 0/01 |

Table 3 presents the factor loadings for the items of the Quarantine Fatigue Scale in both standardized and unstandardized forms, along with the t-values and significance levels for each item. All factor loadings were significant at the 0.01 level.

Table 4: Results of Cronbach's test for examining the consistency of the internal items questionnaire

| Question number | Item-total correlation | Cronbach's alpha if item deleted |
|---|---|---|
| 1 | 0/282 | 0/908 |
| 2 | 0/657 | 0/888 |
| 3 | 0/708 | 0/885 |
| 4 | 0/588 | 0/893 |
| 5 | 0/551 | 0/895 |
| 6 | 0/822 | 0/876 |
| 7 | 0/785 | 0/879 |
| 8 | 0/804 | 0/878 |
| 9 | 0/699 | 0/886 |
| 10 | 0/541 | 0/896 |
| Total | 0/899 | |

Cronbach's alpha for the scale was 0.899, indicating good internal consistency. Deleting any item did not substantially increase reliability.

Table 5: Results related to the convergent validity of the Quarantine Fatigue Scale

| | Quarantine Fatigue Scale | p-value |
|---|---|---|
| Fear of COVID-19 | 0/520 | 0/01 |
| Coronavirus Anxiety | 0/466 | 0/01 |
| Depression | 0/617 | 0/01 |

Based on the obtained results, there is a significant positive correlation between the scores of the Quarantine Fatigue Scale and the scores of the Fear of COVID-19, Coronavirus Anxiety, and Depression questionnaires (P < .01)(T. Considering the significance of the obtained correlation coefficients, the convergent validity of the Quarantine Fatigue Scale is confirmed.

## Discussion

The growing prevalence of COVID-19 has posed challenges to public health and increased concern regarding health outcomes related to quarantine. The present study aimed to evaluate the psychometric properties of the Quarantine Fatigue Scale in patients with congenital cardiovascular disease. Confirmatory factor analysis was used to verify the scale's factorial structure. Overall, model fit indices indicated that the data adequately fit the factor structure of the Quarantine Fatigue Scale. These results are consistent with those of Labrague and Ballad (20), and the items are comparable.

Internal consistency was assessed using Cronbach's alpha. The obtained alpha coefficient (0.90) indicates relatively high internal consistency and measurement stability of the Quarantine Fatigue Scale. Convergent validity was examined by correlating the scale with the Fear of COVID-19 Scale, Coronavirus Anxiety Scale, and Beck Depression Inventory (9, 24, 26). The results showed convergent validity coefficients of 0.52 with fear of COVID-19, 0.46 with coronavirus anxiety, and 0.61 with depression ($p < 0.01$), indicating good convergent validity .To date, no previous studies have developed a tool to assess quarantine fatigue specifically in patients with congenital cardiovascular disease. Therefore, this is the first study in Iran to introduce a specialized scale for measuring quarantine fatigue in this population. This instrument can be used in future research to assess quarantine-related fatigue caused by COVID-19 . Limitations of the present study include its restriction to patients with congenital heart disease, which limits generalizability to other populations. Additionally, the self-report nature of the instruments is a potential limitation. Nonetheless, the Quarantine Fatigue Scale is a valid, reliable, and psychometrically sound tool for assessing the negative outcomes of COVID-19-related quarantine. Its brevity, ease of administration, and capability to capture relevant outcomes make it highly useful for

studies examining relationships between constructs and other variables. Future research is recommended to use diverse samples to enhance the generalizability and comprehensiveness of findings.

**Conflict of interest**

No conflict of interest is declared.

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