The Japanese adaptation and validation of the COVID-19 Phobia Scale (C19P-S)

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Abstract
There exists a significant need of screening, measuring, and assessing phobic reactions to the negative effects and consequences of coronavirus disease 2019 (COVID-19) across the world. For this purpose, the C19P-S has been developed and adapted to several languages and cultures including Turkish, Russian, Arabic, English, Korean, and so forth. This study aimed to adapt the scale into Japanese. Convenience sampling was used in the recruitment of the participants. The sample involved 310 Japanese-speaking natives from different prefectures of the country (Mean\textsubscript{AGE} = 49.97; SD = 13.07). The scale is a self-report instrument, which includes 20, 5-point Likert-type items. The scale assesses the levels of COVID-19 phobia in four areas: Psychological, Somatic, Economic, and Social. The validity (content, construct, convergent, and discriminant) and reliability (internal consistency) analyses were conducted. Multivariate analysis of variance (MANOVA) was used for group comparisons. MANOVA results show that women scored statistically higher in the psychological area. Furthermore, the participants with a lower educational level scored higher than those with a higher level in the somatic area. Among other scales measuring fear and anxiety, the C19P-S Japanese (C19P-SJ) is the first measurement tool specifically designed and adapted for evaluating coronaphobia. It is suggested that the individuals with psychiatric diagnoses be included to measure and support the construct validity of the scale.
1 | INTRODUCTION

Japan was the second country outside of China, which reported the first cases of coronavirus Disease 2019 (COVID-19) on January 16, 2020. This followed additional positive cases in the February and March of 2020 as the cruise ship called “Diamond Princess” carried passengers from China (Nakazawa et al., 2020). Japanese government announced a nation-wide state of emergency in April 2020, resulting in the prohibition of movement across 47 prefectures of the country. The state of emergency ended in May 2020. Contrary to other countries dealing with the COVID-19 pandemic, this prohibition did not accompany a forced lockdown or penalties in case of a violation (Cai et al., 2021; Suppasri et al., 2021; Tashiro & Shaw, 2020). Another state of emergency was declared in January 2021 as the number of confirmed positive cases was over 7,000 per day along with over 40 deaths per million population (Shimizu et al., 2021; Suppasri et al., 2021). The vaccination scheme has started in February 2021 to combat the recent surge of COVID-19 cases in the country. Currently, the vaccination is being implemented in a slower fashion. This is not due to community prejudices against vaccination, as a recent study reports an 62.1% acceptance rate of vaccination among individuals in Japan, although a lower acceptance among women between 20 and 49 years of age and with lower income (Machida et al., 2021).

The COVID-19 pandemic had a wide range of impacts in Japan (Cai et al., 2021). Preventative measures including temporary closure of public places and services, social distancing, personal hygiene (wearing masks, washing hands frequently) were introduced on a global basis. These measures held psychological effects on mental health due to social distancing, fear of infection, and economic challenges (Shigemura et al., 2020; Suppasri et al., 2021; Yamamoto et al., 2020). As reported by surveys, almost 50% experienced mild to greater levels of psychological distress following the initial state of emergency in Japan (Yamamoto et al., 2020). Higher levels of fear, embarrassment, avoidance, and the infection stigma were also revealed (Cai et al., 2021). The particular factors influencing the severity of corona-related distress included anxiety, sleeplessness, loneliness, economic hardships, work/academic issues, and worsening relationship with the social circle (Yamamoto et al., 2020). The economic impacts of COVID-19 pandemic including a significant reduction in income level, rising unemployment rate, and nonpermanent nature of the contracts had serious psychological consequences such as reduced levels of well-being and life satisfaction among the Japanese population (Chishima & Liu, 2021; Saito et al., 2021; Sugawara et al., 2021; Ueda et al., 2020).

Mental health vulnerability was specifically reported among health-care workers due to the shortage of physicians, nurses, and allied health professionals working in intensive care units (Shimizu et al., 2021; Yamamoto et al., 2020). Frontline nurses in Japan experienced a number of somatic symptoms including pain and insomnia as a result of increased workload during the peak period of COVID-19 (Nishihara et al., 2021). Pre-existing psychological problems (Yamamoto et al., 2020) and respiratory conditions and lower income (Kikuchi et al., 2020) were found to be more likely to lead to severe psychological distress. Poor levels of mental health might be a risk factor for suicide as two recent cross-sectional studies reported that suicide rates increased in Japan last year (Nomura et al., 2021; Sakamoto et al., 2021). These findings highlight the importance of available and appropriate mental health support for psychological distress (Cai et al., 2021; Shigemura & Kurosawa, 2020; Yamamoto et al., 2020).

Psychological distress has strong implications for the clinical management of anxiety disorders including different types of phobias such as specific phobia, social phobia, or agoraphobia (APA, 2013). As the pandemic is still holding its impact worldwide, individuals are at risk of developing excessive or disproportional fear reactions toward COVID-19, which was recently defined as coronophobia (Arpaci et al., 2020). The term identifies and operationalizes these reactions and suggests that it may conform to the diagnostic criteria of specific phobia by diagnostic and statistical manual of mental disorders-V (DSM-V) (APA, 2013).
Various assessment instruments were developed to assess anxiety (Evren et al., 2020; Lee et al., 2020) and fear toward COVID-19 (Ahorsu et al., 2020; Caycho-Rodriguez et al., 2021; Huarcaya-Victoria et al., 2022; Nikopoulou et al., 2020; Reznik et al., 2021; Satici et al., 2021); however, there exists only a single available instrument to assess the levels of phobia in the face of COVID-19 (i.e., the COVID-19 Phobia Scale-C19P-S; Arpaci et al., 2020). The original version of the scale was reported to have adequate psychometric properties; such as internal consistency (Cronbach’s alpha [CA] coefficient = 0.926 for the overall scale), adequate model fit (loadings ranging from 0.63 to 0.81), and discriminant validity (Arpaci et al., 2020). The scale was translated and adapted to several languages, such as English (Arpaci et al., 2022), Persian (Ardestani et al., 2021), Indonesian (Anggraeni et al., 2021), Korean (Bilgiç et al., 2021), Arabic (Alnaddaf & Baloglu, 2021), Portuguese (Leite et al., 2021), and Russian (Baloglu & Gul, 2021). Additional adaptations for German, French, and Spanish are being carried out by various researchers. The aim of this study was to adapt the C19P-S into Japanese and explore the psychometric properties of the Japanese version of the scale (i.e., C19P-SJ).

2 | METHODS

2.1 | Participants and procedure

The target population of the study is the Japanese population. Convenience sampling was used in the selection of study participants. The sample involved 310 Japanese-speaking natives from different prefectures of the country (Mean Age = 49.97; SD = 13.07; range = 15–80 years old). Only a limited number of the participants (n = 4, 1.3%) reported that they were infected with COVID-19 and 20.3% (n = 63) had a chronic disease. Table 1 presents the descriptive statistics of the sample.

| TABLE 1 Descriptive statistics of participants (N = 310) |
|--------------------------------------------------------|
| Gender | n | % |
| Male | 119 | 38.4 |
| Female | 191 | 61.6 |
| Educational level | n | % |
| Secondary school | 11 | 3.5 |
| High school | 86 | 27.7 |
| University student | 17 | 5.5 |
| University graduate | 176 | 56.8 |
| Postgraduate student (MS/PhD) | 8 | 2.6 |
| MS/PhD holder | 12 | 3.9 |
| Marital status | n | % |
| Married | 202 | 65.2 |
| Single | 99 | 31.9 |
| Other | 9 | 2.9 |
| Chronic disease | n | % |
| Yes | 63 | 20.3 |
| No | 247 | 79.7 |
| Diagnosis with COVID-19 | n | % |
| Yes | 4 | 1.3 |
| No | 306 | 98.7 |

Abbreviation: COVID-19, coronavirus disease 2019.
An online survey platform (Qualtrics) was used in data collection. Ethical approval was granted by the Institutional Review Board of the KMU (No. E.9480, Date: March 26, 2020). Before the administrations, participants were informed about the study. They gave consent to take part in the study without receiving any compensation at the end of the administration.

3 | INSTRUMENT

3.1 | The COVID-19 Phobia Scale (C19P-S)

The scale is a self-report instrument and includes 20, 5-point Likert-type items. It assesses the levels of COVID-19 phobia within four domains: Psychological, Somatic, Economic, and Social. The psychological domain involves items referring to reactions of fear and anxiety to coronavirus infection (e.g., “The fear of coming down with coronavirus makes me very anxious.”). The items in the somatic domain inquire any physiological symptoms such as “I experience serious stomachaches out of the fear of coronavirus.” The items related to the economic domain examine any hoarding habits resulting from an excessive fear of consuming all the supplies (e.g., “The possibility of food supply shortage due to the coronavirus pandemic causes me anxiety.”). The items in the social domain refer to how individuals report the impact of coronavirus on their social relationships (e.g., “After the coronavirus pandemic, I feel extremely anxious when I see people coughing.”) (Arpaci et al., 2020, 2022).

3.2 | Data analysis

A set of validity and reliability analyses were conducted. First, content validity of the scale was explored. The items were translated by an expert proficient both in Japanese and Turkish. The translated items were examined by three different experts who provided feedback and suggestions for the linguistic clarity of the items. Content validity index (CVI) was calculated to examine whether there was consistency across the feedback of the experts. The experts were requested to rate each item between 1 and 4 (1 = item is not appropriate, 2 = item needs major revision, 3 = item is appropriate but needs minor changes, and 4 = item absolutely appropriate). All items received the highest rating (4 = absolutely appropriate). Therefore, the CVI value was calculated to be 1.00, which was satisfactory as recommended by Polit and Beck (2006). Following this procedure, the scale was back-translated into Turkish by another expert. Two versions of the scale were contrasted and evaluated in terms of linguistic and cultural equivalence. The final version of the scale was piloted on five Japanese-speaking natives and these individuals reported that there was no problematic issue with the comprehensibility of the scale. The online administration procedure started and ended in March 2021.

In addition to content validity, confirmatory factor analysis (CFA) was conducted as part of structural validity. Moreover, average variance extracted (AVE) and composite reliability (CR) values were calculated to measure convergent and discriminant validity, respectively. CA coefficients were calculated as an evidence of reliability. Finally, group comparisons were carried out by one-way multivariate analysis of variance (MANOVA). All the statistical analyses were conducted via SPSS AMOS and evaluated by \( p < 0.05 \).

4 | RESULTS

The univariate normality of the distributions was examined through the skewness and kurtosis values along with their standard errors. These values showed that the data exhibited normal distribution. Table 2 presents the descriptive statistics of the scale’s four domains.
4.1 | Structural validity

4.1.1 | CFA

CFA was used to explore the structural validity of the scale and observe how the coronaphobia model fit the data in the Japanese population. Table 3 shows the fit indices used to assess the model fit (Tabachnick & Fidell, 2007). The measurement models and the structural model fit of the scale were sufficient (for the structural model, $\chi^2(df = 153, N = 310) = 383.979$ $\chi^2/df=2.510$, $N = 310$, $p < 0.001$). Figure 1 presents the CFA model of the C19P-SJ with factor loadings and variances.

4.2 | Convergent and discriminant validity

The convergent and discriminant validity were identified through AVE and CR values, respectively. Table 4 demonstrates that these values were acceptable. As reported by Fornell and Larcker (1981), convergent validity might be ensured as a result of the factors with AVE values lower than 0.50 on condition that CR is observed to be higher than 0.60. Inter-factor correlations were also statistically significant, showing the convergent validity of the factors ($p < 0.001$).

4.3 | Reliability

CA coefficients were calculated for the internal consistency of the scale. The coefficient for the overall scale was 0.90. The coefficients of four domains were in the following: Psychological (0.812), Somatic (0.688), Social (0.714), and Economic (0.731).

4.4 | Group comparisons

One-way MANOVA was used to conduct comparisons between group means. MANOVA indicated significant differences between men and women ($\lambda = 0.954$, $F(4,305) = 3.656$, $p = 0.006$, partial $\eta^2 = 0.046$, power = 0.877). Gender differences were only detected in the psychological domain in favor of women who scored higher than men ($F(1,308) = 4.816$, $p = 0.029$, partial $\eta^2 = 0.015$). The scores including the Somatic, Social, and Economic domains were not significant between gender groups ($F(1,308) = 1.112$, $p = 0.292$ for Somatic; $F(1,308) = 2.139$, $p = 0.145$ for Social; $F(1,308) = 1.746$, $p = 0.187$ for Economic). Scores did not differ based on chronic disease status ($\lambda = 0.997$ $F(4,305) = 0.223$, $p = 0.925$) or diagnosis status ($\lambda = 0.980$, $F(4,305) = 0.943$, $p = 0.195$).

| Scale     | Subscales (# of items) | Mean (SD) | Skewness (SE = 0.138) | Kurtosis(SE = 0.276) |
|-----------|------------------------|-----------|-----------------------|----------------------|
| CP19-SJ   | Psychological (n = 6)   | 15.36 (4.10) | 0.169                 | −0.159               |
|           | Somatic (n = 5)        | 8.79 (2.58)  | 0.443                 | −0.086               |
|           | Social (n = 5)         | 13.05 (3.10) | 0.327                 | 0.529                |
|           | Economic (n = 4)       | 7.97 (2.31)  | 0.407                 | 0.229                |
TABLE 3 Model fit indices for the measurement models and the structural model

| Fit indices | Psychological | Somatic | Social | Economic | Structural model | Reference values |
|-------------|---------------|---------|--------|----------|------------------|------------------|
| GFI         | ≥0.985        | ≥0.993  | ≥0.976 | ≥0.997   | ≥0.889           | ≥0.90            |
| AGFI        | ≥0.954        | ≥0.963  | ≥0.909 | ≥0.984   | ≥0.848           | ≥0.80            |
| NFI         | ≥0.976        | ≥0.983  | ≥0.944 | ≥0.994   | ≥0.850           | ≥0.90            |
| CFI         | ≥0.988        | ≥0.991  | ≥0.954 | ≥0.998   | ≥0.902           | ≥0.90            |
| TLI         | ≥0.974        | ≥0.971  | ≥0.886 | ≥0.994   | ≥0.879           | ≥0.90            |
| IFI         | ≥0.988        | ≥0.991  | ≥0.955 | ≥0.998   | ≥0.904           | ≥0.90            |
| RMSEA       | ≥0.056        | ≤0.057  | ≤0.110 | ≤0.042   | ≤0.070           | ≤0.08            |

Abbreviations: AGFI, adjusted goodness of fit index; CFI, comparative fit index; GFI, goodness of fit index; IFI, incremental fit index; NFI, normed fit index; RMSEA, root mean squared error of approximation; TLI, Tucker–Lewis fit index.

FIGURE 1 CFA model of the C19P-SJ. CFA, confirmatory factor analysis; C19P-SJ, C19P-S Japanese
MANOVA was also used to examine group differences based on educational level. The findings showed statistically significant differences between groups in terms of coronaphobia levels (those holding degrees under university $n = 97$; university degrees, or who were university students $n = 193$; master/doctorate students or those holding master/doctorate degrees $n = 20$). In general, participants with lower levels of educational attainment scored higher levels of corona-related phobia ($\lambda = 0.921$, $F(4,305) = 3.192$, $p = 0.001$, partial $\eta^2 = 0.040$, power = 0.970). More specifically, participants with a lower educational level scored significantly higher in the somatic domain ($F(2,307) = 4.222$, $p = 0.016$, partial $\eta^2 = 0.027$, power = 0.738); however, mean differences were not significant among remaining three domains: $F(2,307) = 2.354$, $p = 0.097$ for Psychological; $F(2,309) = 0.433$, $p = 0.649$ for Social; and $F(2,307) = 0.818$, $p = 0.442$ for Economic.

### TABLE 4 Convergent and discriminant validity coefficients

|                | CR   | AVE | Psychological | Somatic | Social | Economic |
|----------------|------|-----|---------------|---------|--------|----------|
| Psychological  | 0.815| 0.427|               |         |        |          |
| Somatic        | 0.755| 0.394| 0.592*        |         |        |          |
| Social         | 0.714| 0.342| 0.760*        | 0.491*  |        |          |
| Economic       | 0.730| 0.406| 0.648*        | 0.594*  | 0.562* |          |

Abbreviations: AVE, average variance extracted; CR, composite reliability. $^*p < 0.001$.

5 | DISCUSSION

This study reports the reliability and validity findings of the Japanese version of C19P-S. The COVID-19 pandemic has had a widespread effect on individuals and countries. Understanding the excessive reactions given by individuals to the negative effects and consequences of COVID-19 has been an integral part of this adaptation study. As the scale has been adapted to seven languages (i.e., English, Persian, Indonesian, Korean, Arabic, Portuguese, and Russian) with ongoing adaptation studies in several more languages (Alnaddaf & Baloğlu, 2021; Anggraeni et al., 2021; Ardestani et al., 2021; Arpaci et al., 2022; Baloğlu & Gül, 2021; Bilgiç et al., 2021; Leite et al., 2021). We expected that making this scale available to Japanese population would contribute to research and practice.

Besides other available scales assessing corona-related fear and anxiety, the C19P-SJ is the first measurement tool specifically designed for evaluating the levels of coronaphobia. The validity findings included convergent validity and CFA. Analyses revealed the four-factor structure of the scale, confirming the theoretical construct of the scale appropriate to the intended purpose of assessment. This structure was also reported and confirmed for the Turkish (Arpaci et al., 2020), English (United States; Arpaci et al., 2022), Persian (Ardestani et al., 2021), and Korean (Bilgiç et al., 2021) populations. Moreover, CA values indicated that the scale had a high level of internal consistency for the Japanese population, which was also in line with these studies.

Regarding group comparisons, women scored higher in the psychological domain of the scale than men. This was also consistent with the English adaptation study (Arpaci et al., 2022). The Korean adaptation study reported that women scored higher in the psychological and economic domains (Bilgiç et al., 2021). As explained in the Section 2, the items in the psychological domain inquire whether participants hold concerns regarding coronavirus infection. Therefore, it is possible to conclude that the women in this study showed more severe phobic reactions to a possible coronavirus infection. The study also reported that the participants with higher levels of education scored lower in the somatic domain. This finding was consistent with the Korean adaptation where those with higher educational levels had lower scores in all four domains of the scale (Bilgiç et al., 2021). Two studies using the
Japanese version of State-Trait Anxiety Inventory (STAI) and the Fear of COVID-19 Scale separately also attached gender effects in reactions to coronavirus where women scored higher (Cai et al., 2021; Midorikawa et al., 2021).

The study has several limitations. It might not be possible to generalize the findings of this study since convenience sampling was utilized in the identification and inclusion of the participants. Future studies need to be conducted with larger sample sizes and more diverse backgrounds including various age groups to eliminate this limitation. Furthermore, there were only four participants who reported COVID-19 infection. This was why the present study could not conduct any analyses examining whether the scale was able to discriminate the participants infected with COVID-19 from those without any infection. Third, this scale is a self-report instrument. Therefore, the C19P-SJ is available as a screening tool through which those at risk could be identified. Last, there were modest reliabilities within the somatic, social, and economic domains. Despite the four-factor structure of the scale, these might demonstrate that a number of items are interrelated and associated with more than one factor.

6 | FUTURE RESEARCH

The COVID-19 pandemic has been affecting the entire world. Even if it were ceased to exist in future, people would still carry over their fear, anxiety, and/or phobia triggered by the pandemic. Moreover, its effects have not been proportionate as individuals from vulnerable populations have had to confront with even more severe psychological, economic, somatic, and social consequences. For example, Ardestani et. al (2021) reported that patients with anxiety and panic disorders showed significantly higher COVID-related phobic reactions. Considering the findings of the study, future studies should include individuals with psychiatric diagnoses to measure and support the construct validity of the scale. The scale could also be adapted for early populations because children has had limited interaction with their peers during lockdown and preventative measures have impacted their mental health as well, which has resulted in significant increases in childhood depression symptoms (Bignardi et al., 2021). Finally, the scale may be used to assess after-effects and long-term consequences of COVID-19.

AUTHOR CONTRIBUTIONS

Conception and design of the study, drafting the manuscript, figure and tables: Şevket Özdemir. Conception and design of the study, acquisition and analysis of data, drafting the manuscript: Mustafa Baloğlu. Drafting the manuscript, figure and tables: Rukiye Şahin. All authors reviewed the manuscript and approved it for submission.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data are available upon request.

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