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Sisca Mayang Phuspa
Department of Occupational Health and Safety, Faculty of Health Science, Universitas Darussalam Gontor, Ponorogo, Indonesia, siscamayang@unida.gontor.ac.id

Anjarie Dharmastuti
Medical Records & Health Information Study Program, STIKES Buana Husada, Ponorogo, Indonesia, dreameririe@gmail.com

Adi Heru Sutomo
Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Sleman, Indonesia, adiherusutomo@ugm.ac.id

Syahirul Alim
Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Sleman, Indonesia, syahirul_alim@ugm.ac.id

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Development of Pandemic Burnout Inventory for Health Personnel

Sisca Mayang Phuspa[1*], Anjarie Dharmastuti[2], Adi Heru Sutomo[3], Syahirul Alim[3]

[1]Department of Occupational Health and Safety, Faculty of Health Science, Universitas Darussalam Gontor, Ponorogo, Indonesia, [2]Medical Records & Health Information Study Program, STIKES Buana Husada, Ponorogo, Indonesia, [3]Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Sleman, Indonesia

Abstract

The COVID-19 pandemic has increased the workload of health personnel in Indonesia, and the risk of burnout has thus doubled. Several instruments exist to assess burnout, but none have been specifically developed for health personnel during the COVID-19 pandemic. Therefore, to close this gap, developing a Pandemic Burnout Inventory for health personnel is important. This study used mixed methods with a sequential exploratory design at five COVID-19 referral hospitals. A total of 30 informants were employed in the qualitative phase, selected using an intensity sampling approach, and 731 respondents in the quantitative phase were obtained in field trials and online questionnaires. Finally, a Pandemic Burnout Inventory was formed with 14 items. The content validity, based on expert judgment, showed very good results. The assessment of item discrimination and construct validity showed good results. The concurrent validity and reliability of the instrument showed fairly good results. In general, the Pandemic Burnout Inventory meets the criteria for a good instrument according to psychometrics: it is objective, standard, valid, and practical. Health care institutions can use this instrument to evaluate and prevent the deterioration of the mental health condition of health personnel handling COVID-19 or similar health crises.

Keywords: burnout, health personnel, instrument, pandemic

Introduction

At the end of 2019, the world was shocked by an infectious disease outbreak that began in China. The disease, caused by a novel coronavirus (nCoV-19),[1] quickly spread to various continents. In January 2020, the World Health Organization (WHO) declared a global emergency status and named the disease COVID-19.[2] The Indonesian government reported the first case of COVID-19 on 2 March 2020 in an official announcement.[3] As of 14 October 14 2022, there were 6,453,864 confirmed cases of COVID-19 in Indonesia,[4] ranking the 20th highest in the world.[5] Three COVID-19 case peaks occurred in Indonesia between March 2020 and December 2022.[4] To combat COVID-19, the Indonesian government shifted its strategy in response to this.

As a result of the uncertainty surrounding the fluctuation of COVID-19 cases in Indonesia, personal energy is lost, and psychological pressure develops. This condition impacts workload and procedures and is particularly difficult for health personnel at the forefront of the COVID-19 pandemic response. The prevalence of burnout among health personnel has risen because of the strain of carrying out activities during the COVID-19 pandemic conditions.[6-10] End-of-2020 survey findings revealed that 83% of Indonesian health personnel had moderate to severe levels of burnout.[11] The definition of burnout at the time of the term's first use was an expression of emotional exhaustion and cynicism that frequently affects professionals in the social services sector due to interpersonal pressures associated with work.[12] The terms "parental burnout," "student burnout," and, most recently, "pandemic burnout" has evolved because burnout is thought to affect a variety of other occupations and groups.[13]

Based on the results of a literature review on burnout studies in health personnel,[14] several instruments were obtained, such as the Maslach Burnout Inventory (MBI),[13] Oldenburg Burnout Inventory (OLBI),[15] Shirom and Melamed Burnout Measurement (SMBM),[16] Burnout Assessment Tool (BAT),[17] Burnout Measure (BM),[18] and Copenhagen Burnout Inventory (CBI).[19] Existing tools are not always appropriate because health personnel could have been measured when the instruments were being developed. Still, those were not built

Correspondence: Sisca Mayang Phuspa, Department of Occupational Health and Safety, Faculty of Health Science, Universitas Darussalam Gontor, Raya Siman Street, Ponorogo Regency, East Java Province, Indonesia 63471, Email: siscamayang@unida.gontor.ac.id, Phone: +62 857-3693-5463*

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specifically for professionals who front the charge in fighting pandemics. In addition, those instruments were created within the framework of a foreign culture. Language and cultural styles in instrument development may not match the situation in other countries.[19] Each instrument was created expressly for certain groups and purposes, and the validity of measurements with those psychological instruments cannot be generalized to different subjects and situations.[20] This situation raised a question which was the starting point for this study, how to develop a specific instrument for Indonesian health personnel in the pandemic situation. Instrument development is typically driven by a combination of theoretical advancement, empirical advancement, practical application, and market needs.[21] In short, this study aimed to develop a Pandemic Burnout Inventory (PBI) that met the validity and reliability criteria.

Method

This study used a mixed method with a sequential exploratory design, which was suitable for developing an instrument.[22] The development of several previous burnout instruments, such as the MBI,[23] and the BAT,[17] also used the same approach. A qualitative approach was used to explore ideas related to the signs of health personnel burnout,[12] in the COVID-19 pandemic situation. The outcomes of the earlier conception were used to develop the instrument prototype. Furthermore, a quantitative approach was used to test the validity and reliability of the instrument. Qualitative and quantitative data collection was carried out in mixed modes, online and offline. Mixed modes were used for increased coverage, increased response rates, reduced bias, reduced costs, and the potential for better metering.[24]

The population of this study was Indonesian health personnel at five COVID-19 referral hospitals in West Sumatra, East Kalimantan, East Java, South Sulawesi, and Papua Provinces. The study location was selected randomly by random cluster sampling representing five major islands in Indonesia. This approach was taken considering Indonesia's territory is very broad. The number of participants was distinguished at each stage. In the first qualitative stage, in-depth interviews were conducted with 30 health personnel from various regions in Indonesia, selected using an intensity sampling approach. The second stage was a judgment by 17 specialists with expertise in occupational health and safety, psychometry, clinical psychology, psychiatry, and occupational medicine.

The third stage was the qualitative pre-trial stage, or readability test involving 30 potential users. No reference states the minimum number of informants in qualitative study, the number of experts involved in expert judgment, or the minimum number of respondents for the readability test. The fourth stage was a field test with 731 health personnel as participants. This number already exceeds the minimum sample size for instrument trials: some psychometricians argue the minimum sample size was 5-10 times the number of items tested.[20] The number of items in the instrument prototype was 60, then the minimum sample was 300-600 respondents. At this stage, online data was collected via Google Forms, distributed throughout the country, and onsite at five COVID-19 referral hospitals. The inclusion criteria in the first, third, and fourth stages were health personnel who treat patients at the COVID-19 referral hospital.

In the qualitative data analysis stage, textual data content was interpreted using a manual coding classification procedure to systematically identify themes.[17] A dialectical approach was carried out in this analysis. Following classification (coding), the textual data was matched using categories obtained from theoretical sources. To boost data accuracy and dependability, member checking was used at the interview data transcription stage, and peer debriefing was used to determine data saturation during the qualitative content analysis stage. The latent variable in this study was pandemic burnout. Exploration was carried out at a qualitative stage to determine the aspects or dimensions building the concept of pandemic burnout itself. Quantitative data analysis was performed to confirm the validity and reliability of the PBI. This analysis phase included content validity through expert judgment with the Aiken V formula,[25] discrimination of items with item score correlation and total score, construct validity with factor analysis, concurrent validity with the MTBI,[10] and the COVID-19 Anxiety Scale (CAS),[26] and reliability evaluation with the Cronbach alpha coefficient.

Results

Conceptualization of Pandemic Burnout among Health Personnel

The conceptualization of pandemic burnout was carried out using semi-structured in-depth interviews with health personnel from various regions in Indonesia. The 30 participants consisted of various professionals at the COVID-19 referral hospitals with the potential to experience burnout, as well as a group of practitioners (clinical psychologists and psychiatrists) usually carry out assessments and provide care to patients experiencing burnout. The profiles of the participants are described in Table 1.

Screening before in-depth interviews were conducted to ensure that participants could provide strong data regarding burnout experiences among health personnel during the pandemic. The health personnel group was asked the following questions: (1) Have you felt an increased workload since the COVID-19 pandemic? (2)

Table 1. The Profiles of the Participants

Informant's Code	Profession	Origin (City, Province)
B01	Midwife	Madiun, East Java
B02	Midwife	Surabaya, East Java
D01	Physician	Ciamis, West Java
D02	Physician	Cilegon, West Java
D03	Physician	Manokwari, Papua
D04	Physician	Pekanbaru, Riau
D05	Physician	Medan, North Sumatera
D06	Physician	Pekanbaru, Riau
D07	Physician	Surabaya, East Java
D08	Physician	Banjarmasin, South Kalimantan
Kj01	Psychiatrist	Ponorogo, East Java
Kj02	Psychiatrist	Wonosobo, Central Java
Kj03	Psychiatrist	Sleman, the Special Region of Yogyakarta
Kj04	Psychiatrist	Palangka Raya, Central Kalimantan
Kj05	Psychiatrist	Takengon, Aceh
Kj06	Psychiatrist	Bintan, Riau
Ok01	Occupational Therapist	The Special Capital Region of Jakarta
L01	Medical Laboratory Technician	Tuban, East Java
P01	Nurse	Pekanbaru, Riau
P02	Nurse	Madiun, East Java
P03	Nurse	Belitung, Bangka Belitung
P04	Nurse	The Special Capital Region of Jakarta
P05	Nurse	Bandung, West Java
P06	Nurse	Bintuni, West Papua
Ps01	Clinical Psychologist	Surabaya, East Java
Ps02	Clinical Psychologist	Klaten, the Special Region of Yogyakarta
Ps03	Clinical Psychologist	Bogor, West Java
Ps04	Clinical Psychologist	Samarinda, East Kalimantan
Ps05	Clinical Psychologist	Makassar, South Sulawesi
Ps06	Clinical Psychologist	Ambon, Maluku

Table 2. Aspects of Pandemic Burnout Based on Interview Results

Aspect of Pandemic Burnout	Number of Category (15)	Number of Keyword/Code (61)
Emotional exhaustion	4	25
Depersonalization	4	7
Low personal achievement	4	5
Pandemic worry	3	24

Do you feel more physically and mentally tired than before the COVID-19 pandemic? (3) Did these changes affect your performance during the COVID-19 pandemic? The practitioner group was only given the following question: During the COVID-19 pandemic, have you ever treated or are you treating patients with symptoms of burnout? In-depth interviews were conducted at an agreed time with the informants, with a duration of 30-60 minutes, using the interview guidelines that had been prepared. The process of exploring experiences related to pandemic burnout was carried out using a dialectical approach. Qualitative content analysis was carried out simultaneously with the elaboration of the theoretical framework. A total of 61 codes emerged from the interview process, which were then grouped into 15 categories.

The aspects in Table 2 were determined deductively based on the three dimensions of burnout in the MBI as a gold standard of burnout instrument. Still, the in-depth interviews showed that pandemic worry also appeared significantly in all participants during the COVID-19 pandemic. The emergence of the pandemic worry aspect is supported by an expert's definition of pandemic fatigue or COVID-19 burnout.[27] These aspects were then used as the basis for conceptualizing pandemic burnout among health personnel: the syndrome felt by health personnel during the COVID-19 pandemic characterized by emotional exhaustion, depersonalization, low personal achievement, and pandemic worry.

Development of the Pandemic Burnout Inventory

The concept of pandemic burnout was further developed more operationally into indicators that became the main reference for writing instrument items. In

Table 3. Aspects and Indicators of Pandemic Burnout

Aspect	Indicator
Emotional exhaustion	a. Feeling drained of energy to do work
	b. Experiencing mental fatigue
	c. Experiencing cognitive impairment
	d. Feeling more sensitive emotionally
Depersonalization	a. Feeling isolated and trapped in a work routine
	b. Decreased empathy for the patient/patient's family
	c. Feeling overly charged with the problems of the patient/patient's family
	d. Decreased motivation to work
Low personal achievement	a. Feeling less effective at work
	b. Feeling their work is not meaningful to others
	c. Feeling their professionalism was dropping
	d. Withdrawing from work
Pandemic worry	a. Overthinking
	b. Fear of being exposed and spreading the virus from the work environment
	c. Experiencing psychosomatic complaints

Table 4. Final Composition of Pandemic Burnout Inventory

Aspect	Statement item	Factor Loading
Emotional exhaustion	My job is more tiring than before the pandemic.	0.677
	The pandemic situation increased my stress level.	0.711
	I have been feeling sad more often since the pandemic.	0.587
Depersonalization	Patients/patients' families often blame me for their problems.	0.517
	I am not trusted by the patient/patient's family because of the stigma since the pandemic.	0.601
Low personal achievement	I am always excited to come to work.	0.521
	I feel I have worked effectively during the pandemic.	0.514
	I can adapt to changes in workload during the pandemic.	0.629
Psychosomatic complaints	I have experienced stomach pain more often since the pandemic.	0.665
	I have had more headaches since the pandemic.	0.71
	I have been breaking out in cold sweats more since the pandemic.	0.742
Pandemic worry	I am worried that the pandemic won't end soon because people often ignore health protocols.	0.563
	I am afraid of bringing the virus to my family through clothes or things from work.	0.704
	Losing family to exposure to the virus is my greatest fear.	0.61

writing, a reference list of sub-scales and items from the previous burnout instrument (such as the MBI, OBI, SMBM, BAT, BM, and CBI) was used.[14] Notably, these instruments were irrelevant to the context of the health personnel and the specific situation of the COVID-19 pandemic, then the diction was adjusted to the results of the interview content analysis. The description of the indicators of pandemic burnout is further explained in Table 3. These 15 indicators were further developed into 60 statement items to develop a prototype. A 7-point Likert scale was used, with a score of 0–6 (0 representing "never" and 6 representing "every day"), based on the frequency of experience or feeling by the participants.[13]

The Validity and Reliability of the Pandemic Burnout Inventory

a. Content Validity

The evaluation results using the Aiken V formula for the prototype's 60 items ranged from 0.632 to 0.897, with an average of 0.777. The experts were asked to provide feedback with a score on a scale of 1 to 5, which improved the prototype. Of 39 items (65%) met the high validity criteria, and the remainder met the very high validity criteria. As a result, item elimination was not performed at this point, and items were only revised based on expert recommendations.

b. Face validity

The prototype's readability by 30 participants suggested that the instrument could be completed in less than 30 minutes on average. The respondents thought that the statement items were fairly simple to understand. When working on the instrument, they had no questions concerning the statement items' intentions, although the majority gave feedback about the many items that needed to be completed.

c. Evaluation of the Items' Discrimination

Items' discrimination is considered good if the correlation coefficient is $r_{ix} \geq 0.25$.[20] The PBI showed the

lowest coefficient as r_{ix} = 0.136 and the highest coefficient as r_{ix} = 0.506. These results might justify removing items, but the construct validity findings below were considered.

d. Construct Validity

Factor analysis to evaluate the construct validity was carried out with the Jamovi Program (a statistical program) version 2.3.[28] The data used were from field tests on 731 respondents. Exploratory factor analysis (EFA) with the maximum likelihood extraction method and varimax rotation with an eigen value of >1 showed that five factors appeared in the 60 items of the prototype. The initial hypothesis that pandemic burnout consisted of four components was contradicted by this fact. The pandemic worry aspect items were split into two groups; the item on the "psychosomatic symptoms" indicator was distinct from the other items. The factor loading values of the 60 items varied from 0.301-0.742. The loading factor threshold value of >0.5 was applied to eliminate the item.[20]

Further evaluation was carried out by confirmatory factor analysis (CFA) using the goodness of model fit indicator Chi-square (X^2/df)<3; standardized root mean square residual (SRMR)<0.08; robust root mean square error of approximation (RMSEA)<0.06; Tucker–Lewis index (TLI)>0.90; and comparative fit index (CFI) >0.90.[29] Finally, 14 items were selected (Table 4) based on high factor loading, strong content according to qualitative content analysis and the results of expert judgment, and considering the composition of each factor. The goodness of model fit indicator showed the results X^2/df = 3.0149, SRMR = 0.0430, RMSEA = 0.0525, TLI = 0.939, and CFI = 0.955.

e. Concurrent Validity

The results of the correlation between the 14 items of the PBI and MTBI10 showed a sufficient coefficient (r = 0.422, p-value<0.001), as well as the results of the correlation with CAS26 (r = 0.505, p-value<0.001).

f. The Reliability Test

Instrument reliability was represented by the Cronbach alpha coefficient (α), with a value of 0.761.

Discussion

In the context of a pandemic, the COVID-19 Burnout Scale,[30] and the COVID-19 Burnout Frequency Scale,[29] have been developed. The COVID-19 Burnout Scale is an adaptation of the Burnout Measurement—Short Version,[18] with editorial items adapted to the context of the COVID-19 pandemic in Turkey. In contrast, the COVID-19 Burnout Frequency Scale is a burnout instrument specific to the context of the zero-COVID policy in China. What these two instruments have in common is that they both target the general population, including the "non-working" population.

Unlike these instruments, this study introduced a specific definition of pandemic burnout for health personnel. A dialectical approach that combined inductive and deductive approaches to create instruments appropriate to the measurement context without leaving the theoretical foundation,[31] was used in this study. The definition of pandemic burnout is a syndrome conceptualized as a result of chronic stress at work that is not well-managed and is characterized by feelings of emotional exhaustion, depersonalization related to one's job, low self-achievement, pandemic worry, and psychosomatic symptoms. These five aspects of pandemic burnout were developed into a prototype instrument comprising 15 indicators and 60 items. The instrument was created by integrating the findings of a qualitative content analysis of the interview data and an analysis of the dimensions and items on the previous burnout instrument.[31] Nonetheless, due to the unique circumstances surrounding the pandemic, decisions based on interview results carry more weight than those based on a literature study.

The instrument prototype was then validated through an expert judgment mechanism to uphold content and logical validity.[20] This stage involved groups of practitioners and academics in providing comprehensive input from various scientific perspectives and developing theoretical and practical elements.[31] Aiken V content validity was used because this instrument is a scale for measuring non-cognitive attributes.[20] This expert judgment process was also reported in developing the COVID-19 Burnout Frequency Scale instrument,[29] although the scientific publication does not include a quantitative assessment. The item content validity index is essential to maintain legitimacy as the most important determinant of the instrument's measuring function based on its theoretical concept.[20]

A total of 30 potential users were requested to work on the pandemic burnout questionnaire and offer feedback from the user's perspective as part of a face validity study on the prototype instrument. Input from potential users was also considered in developing instruments to make revisions.[32] At the field test stage, data obtained from 731 respondents were analyzed to estimate the item discrimination and test the construct validity and reliability of the PBI. Item discrimination distinguishes individuals who do or do not have the attributes being measured.[20] The PBI's estimation findings for item discrimination indicated that not all items had adequate coefficients (r_{ix}>0.25).

The item discrimination parameter is important for assessing the quality of the instrument, but it should not be regarded as the only standard. The selection of items

must also consider the purpose of using the instrument, the composition of the aspects of the instrument, and the findings by experts who evaluate the instrument's design.[20] Because expert reviews indicated that the 60 items properly represented the measurement objectives, item elimination was not performed. Factor loading is considered another criterion for item quality, which was acquired from construct validity using factor analysis.

The goal of construct validity in this study was to demonstrate a strong association between the measurement results acquired through statement items and the theoretical conceptions that guided the instrument's development. There were five groupings of items, according to the EFA results. These results contradicted the concept that pandemic burnout comprised four aspects developed based on the previous qualitative content analysis. The BAT development experienced a similar situation.[31] Schaufeli, Desart, and De Witte still adopt the findings of factor analysis as a basis for distinguishing the six dimensions of burnout.[17] However, many experts consider BAT components to have very similar definitions.

The prototype EFA results also showed various factor loading values. Because this value is required for gaining construct validity, the factor loading parameter less than 0.5 was employed to reject items from the analysis.[32] This value exceeds the factor loading more than 0.4 parameters in developing the MBI.[12] To assess the applicability of the instrument model, the items were cut down for the first confirmatory factor analysis (CFA-1) from 60 to 31 items based on the EFA results. Only the SRMR values fit the criteria, according to the CFA-1 results (31 items), whereas the others did not.

The reduction from 31 to 14 items was based on high factor loading, strong content according to qualitative content analysis and the results of expert judgment, and considering the composition of each factor, which refers to five aspects. The PBI-14 was decided as the final composition because the second CFA (CFA-2) showed a statistically good fit for the model. Procedures for reducing items are common in instrument development. In developing their instruments, Maslach and Jackson,[13] reduced 47 to 22 items, Schaufelli, *et al.*,[17] reduced 90 to 33 items, and Lau, *et al.*,[29] reduced 11 to five items. A researcher should provide enough high-quality items (around three times the number of items planned) to account for discarding items because of qualitative and empirical evaluation techniques.[20]

The concurrent validity test was carried out by estimating the correlation between the PBI scores and the MTBI and CAS scores, both of which have been tested psychometrically. Based on the field test data, the reliability of the MTBI and CAS showed a coefficient of 0.911 and 0.899, respectively. MTBI is the Indonesian version of the MBI, which is still the gold standard for measuring burnout.[10] CAS,[26] was chosen as the criterion instrument because of the pandemic worry aspect that emerged from the qualitative content analysis. The correlation coefficients of the PBI with the MTBI and CAS were $r = 0.422$ and $r = 0.505$, respectively. Although some experts believe that a decent validity coefficient should be over 0.50, coefficients between 0.30 and 0.50 can be considered a positive contribution.[20] These results were better than the concurrent validity test conducted on the C-BFS with "fear of COVID-19" as the criterion instrument.[29]

The reliability of instrument measurement results was performed by evaluating the internal consistency of 14 PBI items through a single-trial administration. This method was applied because it is more practical and highly efficient.[20] The reliability coefficient was indicated by a Cronbach alpha (α) = 0.761. This value was slightly lower than the acceptable coefficient, which was more than 0.80,[14] but still considered high reliability according to Guilford in Suroso.[32] The preceding MBI instrument similarly has low internal consistency; several dimensions have internal consistency values between 0.77 and 0.74.[12]

Because of numerous sources of error, including those from the measuring instrument, the internal condition factors of the measuring subjects, and the situational factors during the implementation of the measurement, perfect consistency is difficult to achieve for instruments that measure psychological attributes using humans as the subjects. By making changes to the test items, response formats, and field testing, these flaws can be fixed.[20] However, this was not carried out in this study due to the duration and the momentum of the COVID-19 pandemic. This study's limitations can be used as input for future study. Although it is not perfect, overall, the PBI has met the majority of the validity and reliability requirements, making it feasible to use as a measurement tool. This study has produced a specific assessment tool for pandemic burnout for health personnel in Indonesia, which has not been available in previous studies.

Conclusion

The PBI was developed due to theoretical developments, empirical progress, and practical needs. Pandemic burnout is conceptualized as a syndrome felt by health personnel during the COVID-19 pandemic, which is characterized by feelings of emotional exhaustion, depersonalization, low self-performance, psychosomatic symptoms, and pandemic worried. Since the initial draft, the PBI produced 60 items, then was reduced based on a qualitative and quantitative evaluation to 14 items. Although not perfect, the PBI generally meets good criteria according to psychometricians: valid, reliable, objective, standard, and practical. This instrument can be used to evaluate the handling of COVID-19 in terms of the

mental health condition of health personnel. However, developing PBI with item revisions and different response formats to improve the initial version of PBI can be carried out in future study.

Abbreviations

nCOV-19: novel coronavirus 2019; COVID-19: coronavirus disease 2019; MBI: Maslach Burnout Inventory; OLBI: Oldenburg Burnout Inventory; SMBM: Shirom and Melamed Burnout Measurement; BAT: Burnout Assessment Tool; BM: Burnout Measure; CBI: Copenhagen Burnout Inventory; PBI: Pandemic Burnout Inventory; CAS: COVID-19 Anxiety Scale; EFA: Exploratory Factor Analysis; CFA: Confirmatory Factor Analysis; SRMR: Standardized Root Mean Square Residual; RMSEA: Robust Root Mean Square Error of Approximation; CFI: Comparative Fit Index; TLI: Tucker Lewis index.

Ethics Approval and Consent to Participate

Ethical approval was obtained from Hassanuddin University Hospital (No. 412/UN4.6.4.5.31/PP36/2022), Dr. M. Djamil Hospital (No. LB.02.02/5.7/343/2022), and Dr. Harjono Hospital (No. 005421350212115202207070000/VII/KEPK/2022). Each participant or respondent was asked for his consent to participate after being given an explanation about the study.

Competing Interest

The authors declared no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Availability of Data and Materials

The primary data used in this study is limited.

Authors' Contribution

SMP was the lead researcher who designed the research framework and analyzed the data. AD assisted in the conceptualization and validation of the instrument. AHS and SA were the research supervisors and validators.

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