

# Self-directed e-learning-based mental health interventions to improve post-covid-19 pandemic health worker resilience and well-being

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## ABSTRACT

The purpose of this study is to assess the efficacy of self-directed e-learning-based mental health interventions in improving the resilience and well-being of health workers after the COVID-19 pandemic at the Madapangga Health Center in Bima Regency. The sampling technique used is nonprobability convenience sampling, where samples are selected based on the availability and willingness of health workers who take part in training and complete pre- and post-training evaluations. The course is divided into five modules covering the following topics: introduction to mental health and resilience, stress management, psychological resilience, self-care and implementation. A total of 128 people completed the program, with 91 people taking part in pre and post-training assessments. Data were collected using questionnaires with Likert scales to test knowledge and measure positive behaviors and well-being. To detect significant changes before and after the intervention, the data were analyzed using STATA 16 software and paired t-tests. Post-intervention results showed significant improvements in self-care behavior, stress management, and overall well-being. An increase in resilience scores was positively correlated with better job performance and psychological health ( $p < 0.000$ ). This study shows that self-directed e-learning is effective in improving resilience and well-being of healthcare workers, especially in stress management and self-care. The program is flexible and easily accessible, especially for healthcare workers in areas with limited access to mental health services. Further research is recommended to include a larger sample sizes, long-term follow-up, and exploration of intervention components.

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## INTRODUCTION

The Coronavirus disease 2019 (COVID-19) pandemic is one of the most serious health crises of the century, which has a far-reaching impact not only on health systems but also on the mental health of healthcare workers around the world. Healthcare workers on the front lines of the pandemic response face enormous constraints, such as drastically increased workloads, significant risk of viral infections, and high psychological stress when caring for critically ill patients (Oktay Arslan et al., 2021), (Sagaltici et al., 2022), (Firew et al., 2020). In these circumstances, healthcare workers have to endure significant stress, both physically and mentally, which can result in a variety of mental health problems. They have to work in extremely difficult conditions, including long working hours, lack of relaxation, and constant fear of contracting the virus and transmitting it to their families (Purtle et al., 2020), (Jones et al., 2021), (Riedel et al., 2021).

During the pandemic, healthcare staff had to work in extremely difficult conditions, such as long working hours, lack of rest, and stressful work situations (Hossain et al., 2020). Furthermore, the fear of contracting COVID-19 and transmitting the virus to their families also causes them mental stress (Lindert et al., 2021). Many healthcare professionals, for example, experience anxiety when they come home from long shifts, for fear of contracting and endangering their loved ones. This fear often leads to feelings of social isolation, as they have to distance themselves from family and friends to avoid transmission (Pandey et al., 2021), (Ayenigbara, 2022), (Jafri et al., 2022).

In addition to physical and mental hurdles, healthcare staff must make a life-or-death choice. When resources are limited, they often have to determine who is receiving critical care or a ventilator, and this assessment has far-reaching moral and ethical implications (Lee et al., 2021), (Jafri et al., 2022). This enormous burden of obligation can lead to moral exhaustion, which is characterized by feelings of guilt, humiliation, and despair. If not treated effectively, moral exhaustion can have long-term harmful effects on the mental health of healthcare personnel (Min et al., 2021), (Delanerolle et al., 2021), (Blakely et al., 2022).

Burnout and other mental health disorders have a significant influence not only on affected individuals, but also on patients and the organizations they work for. Fatigue among healthcare workers is associated with poor patient interaction, which can lower patient satisfaction and reduce therapy outcomes. Furthermore, burnout can lead to increased absenteeism and turnover among healthcare professionals, which burdens the healthcare system with higher recruitment and training costs (Embriaco et al., 2007), (Khansa & Janis, 2019). Although the adverse impact of the pandemic on the mental health of healthcare workers has been well documented, effective solutions to address this problem are lacking. Many current approaches are reactive, addressing mental health issues as they arise rather than proactively avoiding them. Furthermore, existing therapies are often inaccessible to all healthcare providers, especially those working in remote locations or environments with limited resources (Nooijen et al., 2019), (Fazel & Kohrt, 2019), (Uphoff et al., 2020).

To overcome this problem, more innovative and accessible alternatives are needed. One possible strategy is to use self-paced e-learning to provide mental health therapy. E-learning provides greater flexibility and accessibility than traditional techniques, allowing healthcare workers to access training resources aimed at improving their resilience and well-being at any time and from any location. E-learning initiatives can also be tailored to specific requirements, allowing healthcare workers to master the skills and methods most relevant to their circumstances (Ghadam et al., 2023), (Lötsch & Ultsch, 2016).

Self-directed e-learning-based mental health therapy provides a variety of benefits. First, e-learning allows healthcare professionals to learn at their own pace, giving them the freedom to incorporate learning into their hectic work schedules. Second, these therapies can be accessed from anywhere, which is especially useful for healthcare personnel who work in rural areas or in situations with limited access to mental health services. Third, e-learning can cover a variety of

topics, including stress management and resilience, as well as relaxation and mindfulness practices, all of which can help healthcare professionals manage stress and improve their overall well-being (Jaoua et al., 2022), (Naciri et al., 2021), (Fitzgerald et al., 2022).

E-learning was chosen as a mental health intervention method over other methods, such as face-to-face therapy sessions or group training, because it has several significant advantages. First, e-learning offers flexibility of time and place, allowing individuals to access material at any time and from anywhere. This is especially beneficial for those who have limited time or access to mental health services, such as in remote areas or those with busy schedules. Second, e-learning can reach a wider audience efficiently and at a lower cost. In the context of mental health, this means that more people can receive support without being limited to the physical capacity of a therapist or group space, thus increasing the scope of services. Third, e-learning platforms allow for personalized learning according to individual needs, which means that the material can be accessed and learned at their own pace. It provides a more self-sustaining experience of the intervention and can help individuals feel more empowered in managing their mental health. In addition, e-learning can also reduce the stigma often associated with seeking mental health help. By accessing the material online, individuals can feel more comfortable and anonymous, which encourages more people to seek the help they need without any embarrassment or worry about social outlook (Al-Khani et al., 2019), (Tavares et al., 2021), (Chidiebere Okechukwu et al., 2020), (Rutkowska et al., 2022).

The purpose of this study is to assess the efficacy of self-directed e-learning-based mental health interventions in improving the resilience and professional well-being of health workers during the pandemic. This study will assess the effects of the intervention on many elements of mental health, such as fatigue, stress, anxiety, and general well-being. Furthermore, the study will look at the association between increased resilience and well-being and higher quality care provided by healthcare professionals.

## RESEARCH METHOD

This study was carried out at the Madapangga Community Health Center (Puskesmas), Bima Regency, West Nusa Tenggara, for a period of one month, with the aim of evaluating the effectiveness of self-directed e-learning-based mental health interventions in improving the resilience and welfare of health workers after the COVID-19 pandemic.

### Course and content design

This training aims to help healthcare workers understand the different types of stress they face in the workplace, especially the increased stress due to the COVID-19 pandemic. The main objective of this course is to provide the necessary information and skills for healthcare practitioners to manage stress, trauma, and pressure through the use of effective and practical solutions. The course consists of 5 modules. Each session addresses important themes related to the mental health of healthcare professionals, from a simple introduction to stress to improving psychological resilience.

The content is methodically structured to ensure that participants understand and apply what they learn in a practical way that is relevant to their daily work situation. Course materials are offered through a self-directed e-learning platform, which allows healthcare workers to learn whenever and wherever they have time (Ricotta et al., 2022). The main content of the course consists of audio-narrated presentations that provide an in-depth explanation of each topic. Participants are also provided with access to a variety of additional resources, such as journal articles, related websites, and demonstration videos, all of which are intended to help them better understand the topics covered.

The course uses an asynchronous learning format, which means that healthcare workers can access and complete the course modules at their own leisure. There is no time limit to complete each module separately, but the full course must be completed within one month i.e. July 9 – August 9, 2024. It is intended to provide maximum flexibility for healthcare professionals with hectic work schedules while still allowing them to complete courses in a considerable amount of time.

### Sample

This evaluation was carried out using nonprobability convenience sampling (Mazhar et al., 2023). The sample includes all health workers at the Madapangga Health Center who have participated in training and completed pre and post-training evaluations in July - August 2024. At the time of the analysis, there were 153 health workers enrolled in the training, with 128 successfully completing all modules. A total of 91 health workers who had completed pre- and post-training evaluations were included in the next study.

### Data collection

This assessment approach uses the first three layers of Kirkpatrick's model to measure how effective the training is: (1) participants' reactions to the training, (2) learning outcomes, and (3) changes in participants' behavior (Huang et al., 2022). The assessment aims to assess participant satisfaction, improvement in knowledge and attitudes, and behavioral changes related to resilience and well-being after participating in self-directed e-learning courses. Knowledge scores before and after training were measured using multiple-choice questionnaires (total score of 10), while confidence was assessed by a scale related to learning outcomes (total score of 12). Because behaviors could not be directly measured, healthcare workers self-reported the frequency of their involvement in five resilience-building behaviors (total score of 25), which included the use of coping mechanisms, awareness and relaxation activities, self-care, and social interaction, and Resilience was measured using 10 validated Connor-Davidson Resilience Scale items (10 CD-RISC items).

In this study, resilience measurement uses the Connor-Davidson Resilience Scale (CD-RISC), although this instrument has not been validated specifically for health workers in Indonesia, cultural adaptation measures have been taken to ensure external relevance and validity. This process includes translating the CD-RISC into Indonesian, followed by trials on a small sample of different populations to assess clarity and comprehension. In addition, validity and reliability analyses are carried out to ensure internal consistency, so that the measurement of resilience in this context becomes more accurate and relevant, with the Cronbach's Alpha value of the CD-RISC instrument being 0.97. Each statement on the RISC-25 CD has five response options: 1) strongly disagree, 2) disagree, 3) somewhat agree, 4) agree, 5) strongly agree. The answers obtained will be scored 0–4 with a minimum total score of zero and a maximum of 100.

### Data analysis

The data was analyzed using STATA 16 statistical software. First, paired t-tests were conducted to compare resilience and well-being ratings before and after the intervention to see if there was a significant difference. Furthermore, a correlation analysis was conducted to determine the relationship between increased resilience and well-being and lower stress levels, which provided a complete picture of the success of the intervention.

## RESULTS AND DISCUSSIONS

Of the 128 health workers who have completed the course in July-August 2024, as many as 91 people who have completed pre- and post-training assessments were included in the analysis. The

majority of participants were women (85.6%) with the largest proportion coming from midwives (46.7%) who work in Maternal and Child Health (KIA) services (37.8%). The course was attended by a wide range of professions, with the top three professions completing the course being midwives (46.7%), nurses (28.9%), and other health workers such as public health experts, nutritionists, and others (5.6%) (See Table 1).

**Table 1.** Respondent Characteristics (n=91)

| Characteristic               | Frequencies (%) |
|------------------------------|-----------------|
| Gender                       |                 |
| Man                          | 14(15,4%)       |
| Woman                        | 77 (84,6%)      |
| Work                         |                 |
| Doctor                       | 1 (1,1%)        |
| Nurse                        | 26 (28,6%)      |
| Midwife                      | 42 (46,2)       |
| Pharmacy                     | 4 (4,4%)        |
| Nutritionist                 | 4 (4,4%)        |
| Public Health Expert         | 6 (6,6%)        |
| Environmental Health Expert  | 1 (1,1%)        |
| Administrative Personnel     | 4 (4,4%)        |
| Laboratory Expert            | 2 (2,2%)        |
| Other Health Workers         | 5 (5,5%)        |
| Function                     |                 |
| General Examination          | 8 (8,8%)        |
| KIA Services                 | 34 (37,4%)      |
| Immunization                 | 3 (3,3%)        |
| Dental and Oral Services     | 3 (3,3%)        |
| Health Promotion             | 5 (5,5%)        |
| Surveillance                 | 0 (0%)          |
| Disease Control              | 3 (3,3%)        |
| Sanitation                   | 1 (1,1%)        |
| Mental Health Services       | 1 (1,1%)        |
| Nutrition Services           | 4 (4,4%)        |
| Elderly Health Services      | 2 (2,2%)        |
| Laboratory                   | 2 (2,2%)        |
| Occupational Health Services | 0 (0%)          |
| Emergency Installation (IGD) | 2 (2,2%)        |
| Other Services               | 23 (25,3%)      |
| Length of Work               |                 |
| <1 Year                      | 11 (12,1%)      |
| 1-5 years                    | 22 (24,2%)      |
| 6-10 Years                   | 20 (22%)        |
| >10 Years                    | 38 (41,8%)      |

### Reaction to training

Healthcare workers who took the course showed a very high level of satisfaction with their experience, giving the e-learning course an average overall satisfaction score of 4.2 out of 5 (on a Likert scale from 1: very poor to 5: very good).

### Learning outcomes

In the pre-training questionnaire, the majority of participants have demonstrated an adequate level of readiness and knowledge in the aspects measured. However, the post-training findings showed a significant increase in participants' knowledge and confidence. Based on the available data, the average increase in knowledge and confidence scores from pre to post intervention was significant (for example, the average increase in the variable PreCS\_WB to PostCS\_WB was 32.73 with a value of  $p < 0.000$ ). This confirms that the training provided has been

effective in increasing the knowledge and confidence of health workers, which is very important to support their performance in the field (Table 2).

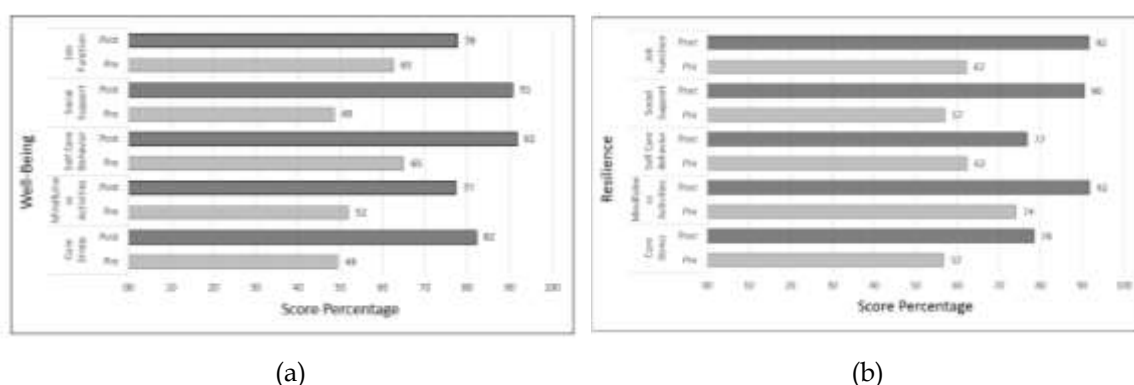
### Behaviour change and health outcomes

Statistical analysis of the average scores before and after training revealed significant improvements in various aspects of behaviour and well-being. For example, there was a significant increase in self care behavior (SCB) which was reflected in an average increase of 26.74 points with a value of  $p < 0.000$ . Similar increases were also seen in Social Support (SS) with an average increase of 42.17 points, and Job Function (JF) with an increase of 15.08 points, both with a value of  $p < 0.000$ .

After controlling for other relevant factors, the increase in scores in behavior change and resilience showed a substantial and positive effect on the improvement of the respondents' well-being. The results of statistical analysis revealed that certain behavioral adjustments were positively correlated with an increase in well-being scores. For example, an increase in the use of stress management methods (Cure Stress) was associated with an increase in average well-being of 32.73 points after the intervention ( $p < 0.000$  value). In addition, the improvement of self care behavior also contributed to the improvement of welfare with an average increase of 26.74 points ( $p < 0.000$  value). This shows that the improvement in self-care and stress management behaviors adopted by post-training participants has a direct impact on their well-being.

Furthermore, the analysis showed that higher resilience scores had a positive impact on well-being. For example, the increase in social support experienced by participants contributed significantly to the improvement of their well-being, with an average increase of 42.17 points ( $p < 0.000$  value).

After considering other factors that may be interfering, the increase in well-being scores was also shown to have a positive effect on participants' resilience. This is reflected in the increase in the Job Function score which recorded an increase of 15.08 points ( $p < 0.000$  value), indicating that better welfare increased the ability of participants to carry out their job functions more effectively and efficiently. Overall, these results confirm that behavioral changes and increased resilience that occur after training play an important role in improving the welfare of health workers. Interventions focused on improving positive behaviours and resilience can be expected to provide significant benefits in improving quality of life and overall well-being.



**Figure 1.** Graph of the increase in respondents' pretest and posttest answers on the variables (a) well-being and (b) resilience

**Table 2.** Results of pre and post test analysis on well-being and resilience variables (n=91)

| Variable               | Different |            | t     | Pr(T,t) |
|------------------------|-----------|------------|-------|---------|
|                        | Mean      | Std. Error |       |         |
| Pre-CS_WB - Post-CS_WB | 32.73     | 1.43       | 22.86 | 0.000   |
| Pre-MA_WB - Post-MA_WB | 25.38     | 1.41       | 17.99 | 0.000   |

|                          |       |      |       |       |
|--------------------------|-------|------|-------|-------|
| Pre-SCB_WB – Post-SCB_WB | 26.74 | 0.72 | 37.01 | 0.000 |
| Pre-SS_WB – Post-SS_WB   | 42.17 | 1.11 | 37.95 | 0.000 |
| Pre-JF_WB – Post-JF_WB   | 15.08 | 1.37 | 10.97 | 0.000 |
| Pre-CS_R – Post-CS_R     | 21.67 | 1.35 | 16.02 | 0.000 |
| Pre-MA_R – Post-MA_R     | 17.69 | 0.69 | 25.71 | 0.000 |
| Pre-SCB_R – Post-SCB_R   | 14.35 | 1.33 | 10.78 | 0.000 |
| Pre-SS_R – Post-SS_R     | 33.4  | 0.89 | 37.37 | 0.000 |
| Pre-JF_R – Post-JF_R     | 29.31 | 0.93 | 31.62 | 0.000 |

Information:

CS = Cure stress; MA = Mindfulness activities; SCB = Self care behaviour; SS = Social support; JF = Job function; WB = Well-being; R = Resilience

The study used a nonprobability convenience sampling approach involving two groups of participants, where the results were compared before and after the intervention. The intervention carried out was in the form of an e-learning course designed to improve the resilience and well-being of health workers during the COVID-19 pandemic. The results of the evaluation showed that after attending the course, there was a significant improvement in resilience-building behavior, as well as an increase in well-being and resilience scores between the two groups. These scores were analyzed using paired t-tests and linear regression models, which showed that changes in positive behavior were closely related to improved participants' well-being and resilience ( $p < 0.000$ ).

The study supports the findings Alkhaldi et al., (2024) and Manou et al., (2022) which states that taking an e-learning course on resilience and wellbeing results in a significant improvement in resilience-building behaviors and an increase in well-being and resilience scores. These findings also support the findings of previous studies that education-based care, such as those conducted by Fago-Olsen et al. (2020), can drastically improve participants' positive skills and behaviors related to stress management and mental health (Fagö-Olsen et al., 2020). Subha et al., (2023) It also found that improved positive behaviours after the intervention were also associated with lower symptoms or greater well-being, suggesting the efficacy of learning-based intervention techniques in improving health outcomes.

These findings may explain the fact that, first and foremost, mental health and well-being issues have a significant impact on health workers, especially during crisis situations such as the COVID-19 pandemic. Stress and fatigue are common problems among healthcare workers, especially those who work on the front lines during the epidemic. E-learning programs designed to improve resilience and mental health are an excellent way to address these challenges (Yeng et al., 2022), (Abovarda et al., 2023), (Gachanja et al., 2021), (Baggieri et al., 2019). The program includes a variety of activities to improve resilience and psychological well-being, such as mindfulness training, relaxation methods, and creating a self-care plan. These exercises aim to improve people's ability to manage stress and maintain their mental health. As recommended by the World Health Organization (WHO), maintaining mental and physical health through scheduled and meaningful activities is essential to improve quality of life and productivity, especially in stressful conditions (Hofmann & Gómez, 2017), (Zhang et al., 2021), (Purtle et al., 2020), (Fortin et al., 2021).

Second, during the one-month follow-up, participants in the e-learning program had significantly higher levels of resilience and well-being building behaviors, although the limitations in the study did not compare with the control group or the group that did not complete the course. These findings are consistent with the findings Klassen & Klassen, (2018) about social learning that states that people's views of their skills (self-efficacy) have a great impact on their behavior in achieving goals. When people are confident in their own abilities, they tend to participate in the activities needed to achieve their goals.

This e-learning program uses a three-step method to increase user self-efficacy. 1) self-observation; Participants were asked to track changes in stress and well-being before and after training. They can then observe how skills such as mindfulness and self-care, which they learn during the course, help them reduce stress. 2) assessment process; Participants compare their

performance with the goals they set beforehand. Participants were more motivated to apply the strategies they had learned when they saw improvements in their well-being. 3) self-reaction; Participants were encouraged to discuss their experiences and acknowledge their own achievements in stress management and overall well-being. Social support from peers or online communities also plays an important role in maintaining this positive behavior.

These findings are comparable to those Lattie et al., (2019) which suggests that treatments that address mental health and the development of coping skills can significantly improve individual well-being. In this study, increased use of coping techniques to deal with stress was associated with almost the same changes in psychological well-being and resilience. Interestingly, however, increased self-care behaviour was shown to have a greater influence on well-being than resilience.

## CONCLUSION

This study states that self-directed e-learning interventions have succeeded in improving the resilience and well-being of health workers. The results of the study support this conclusion, where there was a significant improvement in positive habits such as stress management and self-care after following the intervention. Based on data analysis, Cronbach's Alpha value of 0.97 indicates that the instrument used has excellent internal consistency. This increase directly affects the psychological well-being and self-efficacy of health workers. For example, the results of statistical tests showed that stress management behaviors, such as the use of relaxation and mindfulness techniques, correlated with increased well-being scores. This suggests that the intervention helped participants develop skills to better manage stress and challenges at work, thus supporting their overall mental health. With improvements in habits such as stress management and self-care, healthcare workers are not only better able to maintain their psychological well-being, but also more confident in facing the challenges of daily work. This is a strong indication that self-directed e-learning interventions are an effective strategy to improve well-being among health professionals.

Limitations in this study include a relatively small sample size, namely 91 participants who completed pre and post-training evaluations. Although the results are significant, this sample size may not be representative enough to provide a broader generalization about the effectiveness of self-directed e-learning interventions in a larger population of healthcare workers. In addition, the study did not conduct long-term follow-up to evaluate the sustainability of the impact of the intervention. Because improvements in resilience and well-being may be temporary, the lack of long-term data limits understanding of whether the benefits gained remain sustained over time. Suggestions for future research to use control groups, larger sample sizes, long-term follow-up, and exploration of intervention components.

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