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Factors Affecting Emotional Mental Health (Stress) in Palembang City Hajj Pilgrims

[1]Emma Novita*, [1]Irfannuddin, [1]Iche Andriyani Liberty, [1]Latifah, [1]Rezi Fatrima Surya
Corresponding Author: *emmanovitadanus@gmail.com
[1] Sriwijaya University, Palembang, Indonesia

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ABSTRACT

Hajj is a once-in-a-lifetime obligation for every Muslim who can perform it. Several mental health problems occur during the pilgrimage, including stress, psychosis, insomnia (sleeplessness), and mood disorders. The series of Hajj pilgrimages are known to affect the fitness and endurance of pilgrims, where age factors, comorbidities, degenerative diseases, and physical activity are factors that require pilgrims to be prepared for physical health. This type of research is observational analytic with a cross-sectional design. The population were all pilgrims from the results of health checks and medical records of Siskohatkes Palembang City Hajj in 2023, which amounted to 1112 pilgrims. Participants were selected using a purposive sampling technique. The sample size in this study was calculated using the Slovin formula. A total of 294 participants. The results of this study, there is a significant relationship between gender, and hypertension on mental health stress. There is no significant relationship between age, education level and physical activity on mental health stress.

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Introduction

Based on Law No. 8 of 2019, Hajj is the fifth pillar of Islam that must be performed by Muslims who are capable of completing a prescribed series of worship rituals at the Kaaba,

Masyair, and other designated places during the specified time and under prescribed conditions [1]. Health istithaah constitutes an essential requirement for Hajj, defined as the physical and psychological capability of pilgrims to perform the pilgrimage, as determined through standardized medical assessments and health counseling [2]. The Indonesian Ministry of Health's Data and Information Center reports that the largest proportion of Hajj pilgrims is between 51 and 60 years of age. Furthermore, approximately 60–67% are considered high-risk individuals, with morbidity and mortality rates exhibiting fluctuations across successive years [1].

Older adults are widely considered a vulnerable group due to their increased risk of experiencing mental health problems, such as stress, anxiety, mild depressive symptoms, and sleep disturbances. During the Hajj pilgrimage, elderly pilgrims are exposed to unique environmental and situational challenges that differ substantially from their everyday experiences, including extreme heat, physically strenuous religious rituals, overcrowding, and limited communication with family members. These conditions may increase psychological distress, which, if not properly managed, can adversely affect the performance of Hajj rituals as well as the pilgrims' health, safety, and overall well-being [3].

The Hajj pilgrimage places considerable demands on pilgrims' physical fitness and endurance. Factors such as advanced age, extreme heat, high crowd density (approximately seven people per square meter), geographical and environmental changes, dietary modifications, lifestyle adjustments, separation from family, pre-existing chronic or degenerative diseases, and lower educational attainment may increase the risk of developing mental health problems during the pilgrimage [4]. In Indonesia, the Indonesian Hajj Healthcare Agency (BPHI) in the Makkah working area reported that 13 Indonesian pilgrims experienced mental health disorders during the 2012 Hajj season, primarily presenting with symptoms of severe stress. These conditions were attributed to inadequate psychological preparation, which may impair an individual's ability to adapt to the demands of the pilgrimage and increase the risk of mental health problems, including neurosis, psychosis, frustration, anxiety, conflict, and depression. Furthermore, Tristiadi et al. demonstrated a positive association between psycho-religiosity and mental health, suggesting that stronger psycho-religious well-being is linked to better mental health outcomes [5].

Interviews with Hajj group leaders and healthcare personnel indicated that several elderly pilgrims experienced disorientation and decreased concentration during their stay in Saudi Arabia. These conditions were mainly attributed to difficulties in adapting to an unfamiliar environment and dehydration caused by prolonged exposure to extreme heat. According to Damayanti, the aging process is accompanied by a gradual decline in physical and cognitive functions. Older adults frequently experience reduced functional capacity, including

physical disability, impaired visual acuity, and decreased tolerance for physical activity [6]. Furthermore, the aging process is associated with a gradual decline in cognitive function, particularly memory, as well as a range of psychosocial changes, including retirement, financial difficulties, social isolation, and other challenges commonly encountered in later life.

Preparing for the Hajj pilgrimage involves numerous physical, administrative, and psychological challenges for prospective pilgrims. The completion of administrative requirements, travel arrangements, and mandatory health assessments can be demanding and stressful. Moreover, concerns about performing the Hajj rituals correctly, combined with the anticipation of strenuous physical activities and overcrowded conditions in the Holy Land, may increase anxiety levels, even among pilgrims who appear well prepared and confident.

Anxiety experienced by prospective Hajj pilgrims often extends beyond a temporary emotional reaction and may have a significant impact on their psychological well-being. Therefore, Hajj preparation should address not only physical fitness and administrative requirements but also provide comprehensive psychological and spiritual support. Enhancing emotional resilience and spiritual well-being is crucial to enabling pilgrims to manage the physical and psychological demands of the pilgrimage. Accordingly, Hajj guidance programs should incorporate interventions alongside ritual training (manasik) to reduce anxiety, strengthen psychological resilience, and promote emotional stability before departure [7].

Emotional well-being and social interactions during the Hajj pilgrimage are important determinants of pilgrims' physical and mental health. The gathering of millions of pilgrims from diverse cultural, linguistic, and social backgrounds creates a complex environment that demands substantial adaptability. These circumstances may influence pilgrims' behavior, comfort, and overall well-being throughout the pilgrimage. Furthermore, pilgrims face multiple challenges, including extreme temperatures, strenuous physical activities, overcrowding, inadequate rest, fear of becoming lost, and the need to adjust to unfamiliar cultural settings. Collectively, these stressors can contribute to both physical and psychological strain, increasing the risk of anxiety, depression, and other mental health problems [8].

Previous studies have contributed important evidence regarding the mental health of Hajj pilgrims, with most research emphasizing the factors associated with mental health problems and the development of preventive interventions. Alzeer noted that the Hajj pilgrimage reflects the resilience of the human spirit, the depth of religious devotion, and the strong sense of social solidarity within the Muslim community. By overcoming the psychological and social challenges encountered during this sacred journey, many pilgrims return with enhanced spiritual fulfillment, greater psychological resilience, and stronger interpersonal relationships[8]. Jaelani explained that that spirituality plays a significant role in helping elderly Hajj pilgrims cope with the psychological difficulties encountered during the

pilgrimage. Therefore, integrating spiritual care into Hajj healthcare services is recommended to enhance psychological well-being and facilitate a more meaningful pilgrimage experience for older pilgrims [3].

Sholichah explained that the Hajj pilgrimage is a psychologically and emotionally demanding experience. Therefore, pilgrims should be encouraged to obtain adequate rest, minimize unnecessary sources of stress, and seek sufficient social support to maintain their mental and emotional well-being throughout the Hajj pilgrimage [9]. Gobel et al. reported that educational attainment was not significantly associated with the incidence of stress[17]. The findings of the present study are consistent with those reported by Asep et al., who found a significant association between age and stress, with older adults exhibiting higher levels of stress than younger adults. In contrast, Lusia and Fitriyani F reported that age was not significantly associated with stress. [15], [16]

In contrast, Setiawan reported a significant association between physical activity and stress levels. Variations in stress responses may be explained by several factors, including differences in individual adaptability, coping capacity, and the nature and intensity of the stressors experienced [19], [20]. Figuera et al. reported that participation in physical activity and effective stress management were significantly associated with reduced levels of physical, psychological, and social vulnerability. The authors also found a significant relationship between physical activity and anxiety, stress, as well as quality of life [21].

Previous studies have largely concentrated on the psychological and spiritual dimensions of the Hajj pilgrimage, highlighting the beneficial effects of spirituality, social support, and resilience on pilgrims' mental well-being. Other research has investigated preventive approaches, including stress management and spiritual care, to improve psychological health during Hajj. Nevertheless, findings regarding the determinants of stress among Hajj pilgrims remain inconclusive. While some studies have identified significant associations between age and stress or between physical activity and psychological well-being, others have reported no significant relationships involving educational level, age, or physical activity and stress. Furthermore, most existing studies have examined these determinants independently rather than simultaneously. Consequently, limited evidence is available on the combined effects of demographic characteristics, physical activity, hypertension, and stress among Hajj pilgrims, particularly within the Indonesian setting and among pilgrims from Palembang City.

Material and Methods

This study employed a descriptive observational research design with a cross-sectional approach, in which the researcher observed or measured the study variables only once at a single point in time obtained from the results of health checks of pilgrims and medical records

of Siskohatkes Palembang City in 2023. This research began in February-July 2023. The population in this study consisted of all prospective pilgrims of Palembang City in 2023 are 1112 pilgrims. Participants were selected using a purposive sampling technique. The sample size in this study was calculated using the Slovin formula. A total of 294 participants were included in this study. The inclusion criteria were participants who underwent physical examinations at one of 10 health check centers in Palembang City and were willing to complete the International Physical Activity Questionnaire (IPAQ, No. 68) and the Depression Anxiety Stress Scales-42 (DASS-42). Participants were excluded if they were unwilling to complete the questionnaires or if their data were incomplete.

Table 1 presents the operationalization of the study variables, including their operational definitions, measurement methods, outcome categories, and measurement scales. The table clarifies how each variable was defined and assessed, ensuring consistency in data collection, interpretation, and subsequent statistical analysis across all participants included in the research sample being analyzed.

Table 1. Operationalization of Variables

Variable	Operational Definition	Measurement Method	Measurement Outcome/Category	Scale
Age	The respondent's age, calculated from birth to the time of the study, expressed in years.	Questionnaire	1. <60 years 2. ≥60 years)	Ordinal
Gender	The respondent's biological sex.	Questionnaire	1. Male 2. Female	Ordinal
Educational Level	The highest level of formal education completed by the respondent.	Questionnaire	1. Primary and Secondary Education 2. Higher Education	Ordinal
Physical Activity	The respondent's physical activity performed during the previous seven days, measured using the International Physical Activity Questionnaire (IPAQ).	Completion of the IPAQ questionnaire	1. Light: < 600 2. Heavy: > 600	Ordinal
Blood Pressure (Hypertension Classification)	The respondent's systolic and diastolic blood pressure classified according to the JNC VII criteria based on the guidelines of the Indonesian Ministry of Health.	Blood pressure measurement	1. Normal: SBP ≤120 mmHg and/or DBP ≤80 mmHg; 2. Hypertension**:** SBP ≥140 mmHg and/or DBP ≥80 mmHg	Ordinal
Stress Level (Dependent Variable)	The level of stress experienced by Hajj pilgrims, assessed using the stress subscale of Stress Scale (DASS-42) over the previous week [10].	Self-administered questionnaire using a 4-point Likert scale	1. Normal (No stress): score 0–14 2. Stress: score >14	Ordinal

The data obtained will be analyzed univariately and bivariately using the Chi-Square method. Independent variables and the dependent variable can be said to have a meaningful

relationship if the p-value <0.05. The p value obtained will determine whether H0 is accepted or rejected with a statement if the p value <0.05 then H0 is rejected and if the p value> 0.05 then H0 is accepted. Statistical calculations were carried out with the Statistical Product & Service Solution (SPSS) version 29 program.

Results and Discussions

A. Finding

Based on the results of the study, the frequency distribution of the respondents' characteristics is presented as follows:

Table 2. Frequency Distribution Based on Age, Gender, Education, Physical Activity, and Stress

Variabel	Number (n)	Persentase (%)
Gender		
Men	128	43.5
Woman	166	56.5
Age		
<60 years	179	60.9
≥ 60 years	115	39.1
Education		
Higher Education	73	24.8
Primary and Secondary Education	221	75.2
Physical Activity		
Light	109	37.1
Heavy	185	62.9
Hipertension		
Yes	41	13.9
No	253	86.1
Stress		
Yes	10	3.4
No	284	96.6
Total	**294**	**100**

Based on gender, the majority of respondents were women, accounting for 166 individuals (56.5%), while 128 respondents (43.5%) were men. Regarding age, most respondents were younger than 60 years, comprising 179 individuals (60.9%), whereas 115 respondents (39.1%) were aged 60 years or older. In terms of educational level, the majority of respondents had primary and secondary education, with 221 individuals (75.2%), while 73 respondents (24.8%) had attained higher education. Based on physical activity, 185 respondents (62.9%) engaged in heavy physical activity, whereas 109 respondents (37.1%) reported light physical activity. Regarding hypertension status, the majority of respondents did not have hypertension, accounting for 253 individuals (86.1%). In contrast, 41 respondents (13.9%) were classified as having hypertension. With respect to stress level, most respondents were categorized as not experiencing stress, with 284 individuals (96.6%), while only 10 respondents (3.4%) were

identified as experiencing stress. Overall, the respondents in this study were predominantly women, aged less than 60 years, had primary and secondary education, engaged in heavy physical activity, did not have hypertension, and were not experiencing stress. The results of the bivariate analysis are presented as follows:

Table 3. Relationship between Age,Gender, Education Level, Physical Activity, Hypertension, to Stress

Variable	Emotional Disorder				Total		OR (95% CI)	p-value
	Normal		Stress					
	n	%	N	%	N	%		
Gender								
Men	128	100	0	0	128	100	1.064 (1.024 -1.106)	0.005
Women	156	94	10	6.0	166	100		
Age								
<60 years	174	97.2	5	2.8	179	100	1.582 (0.448-5.590)	0.473
≥ 60 years	110	95.7	5	4.3	115	100		
Education								
Higher Education	73	100	0	0	73	100	1.047 (1.018 – 1.078)	0.064
Low middle education	211	95.5	8	4.5	221	100		
Physical Activity								
Light Weight	105	96.3	4	3.7	109	100	0.880 (0.243 - 3.190)	0.846
Heavy	179	96.8	6	3.2	185	100		
Hypertension								
Hypertension	36	87.8	5	12.2	41	100	6.889 (1.900-24.974)	0.001
Normal	248	98	5	2	253	100		

Based on gender, all male respondents (128; 100%) were classified as not experiencing stress, whereas among female respondents, 156 (94.0%) had normal stress levels and 10 (6.0%) experienced stress. The Chi-square test showed a statistically significant association between gender and stress (p = 0.005). The odds ratio (OR) was 1.064 (95% CI: 1.024–1.106), indicating that female respondents had a higher likelihood of experiencing stress than male respondents.

Regarding age, among respondents aged less than 60 years, 174 (97.2%) had normal stress levels and 5 (2.8%) experienced stress. Among respondents aged 60 years or older, 110 (95.7%) had normal stress levels and 5 (4.3%) experienced stress. However, no statistically significant association was found between age and stress (p = 0.473). The odds ratio was 1.582 (95% CI: 0.448–5.590).

With respect to educational level, all respondents with higher education (73; 100%) were classified as not experiencing stress. Among respondents with primary and secondary education, 211 (95.5%) had normal stress levels, while 10 (4.5%) experienced stress. The association between educational level and stress was not statistically significant (p = 0.064), with an odds ratio of 1.047 (95% CI: 1.018–1.078).

Regarding physical activity, among respondents with light physical activity, 105 (96.3%) had normal stress levels and 4 (3.7%) experienced stress. Among those with heavy physical

activity, 179 (96.8%) had normal stress levels and 6 (3.2%) experienced stress. The Chi-square test showed no statistically significant association between physical activity and stress (p = 0.846). The odds ratio was 0.880 (95% CI: 0.243–3.190), indicating no meaningful difference in the likelihood of experiencing stress between the two physical activity groups.

For hypertension status, among respondents with hypertension, 36 (87.8%) had normal stress levels and 5 (12.2%) experienced stress. In contrast, among respondents with normal blood pressure, 248 (98.0%) had normal stress levels and only 5 (2.0%) experienced stress. The Chi-square test demonstrated a statistically significant association between hypertension and stress (p = 0.001). The odds ratio was 6.889 (95% CI: 1.900–24.974), indicating that respondents with hypertension had approximately 6.9 times higher odds of experiencing stress than those with normal blood pressure.

B. Discussion

The results indicated that, based on gender, stress disorders were more prevalent among female respondents than male respondents. Furthermore, the bivariate analysis demonstrated a significant association between gender and mental health disorders The findings of this study correspond with the results reported by Matud, which reported that women are generally more vulnerable to experiencing stress than men. This gender difference may be attributed to biological factors, particularly differences in the activity of the hypothalamic–pituitary–adrenal (HPA) axis and the sympathetic nervous system. Women tend to exhibit hormonal regulatory mechanisms that result in lower HPA axis activity and reduced cortisol feedback, increasing their sensitivity to psychosocial stressors and making them more prone to stress-related mental health problems [11]. McDonough et al. using Wheaton's Chronic Stress Inventory, women reported distress scores that were approximately 23% higher than those of men, indicating a greater tendency for women to experience chronic psychological stress [17].

The highest prevalence of stress disorders was found among hajj pilgrims with primary and secondary levels of education. However, the bivariate analysis revealed no statistically significant association between educational level and mental health (stress). Although education is widely recognized as an important factor influencing mental health, the findings of this study suggest that educational attainment alone may not be a determining factor in stress among the participants. Previous research has indicated that higher educational attainment, along with mental health education interventions, can improve individuals' understanding of mental health issues and contribute to reducing the long-term risk of depression and anxiety[12], [13], [14]. Gobel et al. found educational level was not significantly associated with the occurrence of stress, suggesting that stress can affect individuals regardless of their level of educational attainment [17].

The prevalence of mental health disorders (stress) was relatively similar among Hajj pilgrims aged <60 years and those aged ≥60 years. Furthermore, the bivariate analysis found no statistically significant association between age and stress. Lusia and Fitriyani F., which also reported that age was not a significant factor influencing stress levels. However, the results differ from those of Asep et al., who found that age was significantly associated with stress, with older adults experiencing higher levels of stress than younger adults. This discrepancy suggests that the influence of age on stress may vary depending on the characteristics of the study population and the context in which the research is conducted [15], [16]

Hajj pilgrims who engaged in heavy physical activity had the highest prevalence of mental health disorders (stress). Nevertheless, the bivariate analysis showed that physical activity was not significantly associated with stress. These findings suggest that the level of physical activity alone may not be a determining factor in the occurrence of stress among the participants. Previous studies have reported that individuals experiencing stress often reduce their participation in physical exercise and prefer less demanding activities because of limited time, low motivation, or difficulties with self-regulation. Instead, they may adopt other maladaptive coping behaviors, such as smoking, overeating, or consuming alcohol, as a way of managing emotional distress [18]. In contrast, the study conducted by Setiawan found a significant relationship between physical activity and stress levels, indicating that individuals with lower levels of physical activity were more likely to experience higher stress. Differences between these findings and the present study may be explained by variations in individual adaptability, coping capacity, and the characteristics of the stressors experienced. These factors can influence how individuals respond to stress, resulting in inconsistent associations between physical activity and stress across different study populations [19], [20]. According to Figuera et al. found that individuals who regularly engaged in physical activity and effectively managed stress experienced significantly lower levels of physical, psychological, and social impairment. Their study also demonstrated that physical activity is significantly related to anxiety, stress, and overall quality of life, suggesting that maintaining an active lifestyle may contribute to better mental well-being and improved quality of life [21].

Stress was present among Hajj pilgrims with both normal blood pressure and hypertension. However, the bivariate analysis demonstrated a statistically significant association between hypertension and stress. This finding is biologically plausible because psychological stress activates the sympathetic-adrenal-medullary system and the hypothalamic–pituitary–adrenal (HPA) axis, resulting in autonomic, endocrine, and hemodynamic changes that can increase heart rate, vascular resistance, and blood pressure [22]–[25]. When stress responses become persistent or recurrent, prolonged exposure to catecholamines and glucocorticoids may contribute to endothelial dysfunction, inflammatory activation, altered lipid metabolism, and

the development and progression of atherosclerosis [26], [27]. These mechanisms provide potential pathways through which chronic psychological stress may contribute to hypertension and other cardiovascular complications. Neuroimaging evidence further indicates that heightened amygdalar activity is associated with increased arterial inflammation and subsequent cardiovascular events, supporting a brain–immune–vascular pathway linking stress with cardiovascular disease [28].

The stress response begins when potentially threatening stimuli are processed by interconnected corticolimbic brain regions, particularly the amygdala and prefrontal cortex. The amygdala contributes to threat detection and the initiation of emotional and physiological responses, whereas the prefrontal cortex participates in the appraisal and regulation of these responses [28]–[30]. These brain regions interact with the hypothalamus and brainstem to regulate both autonomic and neuroendocrine stress systems. Consequently, exposure to a perceived threat can increase sympathetic activity and HPA-axis activation while reducing parasympathetic influence, producing adaptive responses such as heightened alertness, fear, anxiety, and the classic fight-or-flight reaction [24], [29], [30].

Activation of the HPA axis involves the release of corticotropin-releasing hormone (CRH) from the hypothalamus, which stimulates adrenocorticotropic hormone (ACTH) secretion from the pituitary gland and subsequently promotes glucocorticoid, primarily cortisol, secretion from the adrenal cortex [24], [29]. In parallel, activation of the sympathetic nervous system increases catecholamine release, heart rate, vascular tone, and blood pressure, while parasympathetic withdrawal may contribute to reduced heart rate variability [24]. Although these responses are adaptive during acute stress, persistent activation of neuroendocrine and autonomic pathways can promote adverse hemodynamic, metabolic, inflammatory, and endothelial changes [26], [27]. Over time, these alterations may contribute to sustained cardiovascular strain and increase susceptibility to hypertension and atherosclerotic cardiovascular disease.

Conclusion

Based on the results and discussion of the research conducted, several important findings can be concluded. Gender and hypertension were significantly associated with stress among Hajj pilgrims, whereas age, educational level, and physical activity were not significantly associated with stress. Women were more likely to experience stress than men, which may be explained by biological differences in hypothalamic–pituitary–adrenal (HPA) axis activity and hormonal regulation that increase susceptibility to psychosocial stress. Although stress was more prevalent among pilgrims with primary and secondary education and those engaged in heavy physical activity, these factors did not show statistically significant associations with stress. Similarly, stress prevalence was comparable between pilgrims aged

<60 years and those aged ≥60 years, indicating that age was not a significant determinant of stress in this study.

In contrast, hypertension was strongly associated with stress. Chronic stress activates the sympathetic nervous system and the HPA axis, leading to the release of stress hormones that increase vasoconstriction, peripheral vascular resistance, heart rate, and blood pressure. These physiological responses provide a plausible mechanism linking stress to hypertension and support previous evidence that prolonged psychological stress contributes to adverse cardiovascular outcomes.

Based on the study findings, pre-Hajj mental health screening should be implemented to facilitate the early identification of pilgrims at risk of stress. Stress management programs should also be incorporated into pre-departure health preparation to enhance psychological resilience. In addition, regular monitoring of pilgrims with hypertension should be strengthened due to the significant association between hypertension and stress. Integrating mental health services into Hajj healthcare programs and developing policies that include mental health promotion, screening, and monitoring of high-risk pilgrims may contribute to improving the overall health and well-being of Hajj pilgrims.

The findings of this study highlight the importance of integrating mental health into Hajj healthcare services. Pre-Hajj mental health screening, evidence-based stress management programs, and enhanced monitoring of pilgrims with hypertension should be incorporated into routine Hajj health services. These strategies may facilitate early detection of psychological distress, reduce stress-related complications, and support the development of public health policies that improve the health, safety, and well-being of Hajj pilgrims, particularly those at high risk.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] Kementerian Kesehatan Republik Indonesia, Sekretariat Jenderal, Pusat Kesehatan Haji, *Petunjuk Teknis Penatalaksanaan Penyakit Kardiovaskular untuk Dokter*. Jakarta, Indonesia: Kementerian Kesehatan RI, 2017.

[2] Kementerian Kesehatan Republik Indonesia, *Pemeriksaan dan Pembinaan Kesehatan Haji Mencapai Istithaah Kesehatan Jemaah Haji untuk Menuju Keluarga Sehat: Petunjuk Teknis Permenkes Nomor 15 Tahun 2016*. Jakarta, Indonesia: Kementerian Kesehatan RI, 2017.

[3] Kementerian Kesehatan Republik Indonesia, *Profil Kesehatan Indonesia 2021*. Jakarta, Indonesia: Kementerian Kesehatan RI, 2022.

[4] A. Hankir, Z. Chariwala, U. Siddique, F. R. Carrick, and R. Zaman, "Hajj and the mental health of Muslim pilgrims: A review," *Psychiatr. Danub.*, vol. 31, suppl. 3, pp. 290–293, Sep. 2019.

[5] T. A. Ardani, A. Y. Yusuf, and A. R. Irawan, "Psikoreligiusitas dalam peningkatan kesehatan mental calon jamaah haji dan umroh di Kota Malang," in *Proc. Seminar Nasional Psikologi dan Ilmu Humaniora (SENAPIH): Seminar Nasional Psikologi Positif 2020*, Malang, Indonesia, 2020, pp. 279–287.

[6] World Health Organization, "Stress," *World Health Organization*, Mar. 30, 2026. [Online]. Accessed: Sep. 3, 2026.
[7] E. D. Damanik, "Pengujian reliabilitas, validitas, analisis item dan pembuatan norma Depression Anxiety Stress Scale (DASS): Berdasarkan penelitian pada kelompok sampel Yogyakarta dan Bantul yang mengalami gempa bumi dan kelompok sampel Jakarta dan sekitarnya yang tidak mengalami gempa bumi," Master's thesis, Fakultas Psikologi, Universitas Indonesia, Depok, Indonesia, 2006.
[8] W. Widiantini and Z. Tafal, "Aktivitas fisik, stres, dan obesitas pada pegawai negeri sipil," *Kesmas: Jurnal Kesehatan Masyarakat Nasional*, vol. 8, no. 7, pp. 330–336, Feb. 2014, doi: 10.21109/kesmas.v0i0.374.
[9] D. Dharmansyah and D. Budiana, "Indonesian adaptation of the International Physical Activity Questionnaire (IPAQ): Psychometric properties," *Jurnal Pendidikan Keperawatan Indonesia*, vol. 7, no. 2, pp. 159–163, Dec. 2021, doi: 10.17509/jpki.v7i2.39351.
[10] S. H. Lovibond and P. F. Lovibond, *Manual for the Depression Anxiety Stress Scales*, 2nd ed. Sydney, NSW, Australia: Psychology Foundation, 1995.
[11] S. M. Idris and A. Nurwahyuni, "Hubungan hipertensi dan diabetes melitus terhadap mortalitas jemaah haji Provinsi Jawa Barat tahun 2019," *Journals of Ners Community*, vol. 13, no. 2, pp. 139–153, Aug. 2022, doi: 10.55129/jnerscommunity.v13i2.1791.
[12] E. Novita, B. Indawan, M. Mariana, and R. N. Abriyanti, "Asosiasi risiko penyakit degeneratif dengan kebugaran calon jemaah haji Kota Palembang," *Jurnal Biotek Medisiana Indonesia*, vol. 10, no. 2, pp. 97–108, Sep. 2021, doi: 10.22435/jbmi.v10i2.5821.
[13] L. Nasrani and S. Purnawati, "Perbedaan tingkat stres antara laki-laki dan perempuan pada peserta yoga di Kota Denpasar," *E-Jurnal Medika Udayana*, vol. 4, no. 12, 2015.
[14] J. Wang *et al*., "Gender difference in neural response to psychological stress," *Soc. Cogn. Affect. Neurosci.*, vol. 2, no. 3, pp. 227–239, Sep. 2007, doi: 10.1093/scan/nsm018.
[15] F. Fitriyani, M. Jannah, and V. Wardi, "Determinan stres kerja pada perawat instalasi gawat darurat dan unit perawatan intensif di Rumah Sakit Umum Daerah dr. Rasidin Padang," *IKESMA*, vol. 18, no. 2, pp. 91–98, Jun. 2022, doi: 10.19184/ikesma.v18i1.23362.
[16] I. Marijanović *et al*., "Use of the Depression, Anxiety and Stress Scale (DASS-21) questionnaire to assess levels of depression, anxiety, and stress in healthcare and administrative staff in 5 oncology institutions in Bosnia and Herzegovina during the 2020 COVID-19 pandemic," *Med. Sci. Monit.*, vol. 27, Art. no. e930812, Apr. 2021, doi: 10.12659/MSM.930812.
[17] D. Schultchen *et al*., "Bidirectional relationship of stress and affect with physical activity and healthy eating," *Br. J. Health Psychol.*, vol. 24, no. 2, pp. 315–333, May 2019, doi: 10.1111/bjhp.12355.
[18] S. Zhou, L. Li, Y. Zhao, Y. Cao, B. Peng, and L. Zheng, "Physical activity under stress: A perspective of HAPA and individual differences," *Int. J. Environ. Res. Public Health*, vol. 18, no. 22, Art. no. 12144, Nov. 2021, doi: 10.3390/ijerph182212144.
[19] H. Setiawan, M. Munawwarah, and E. Wibowo, "Hubungan aktivitas fisik dengan kebugaran dan tingkat stres pada karyawan back office Rumah Sakit Omni Alam Sutera di masa pandemi COVID-19," *Physiotherapy Health Science (PhysioHS)*, vol. 3, no. 1, pp. 1–10, Jul. 2021, doi: 10.22219/physiohs.v3i1.16935.
[20] H. A. Figueira *et al*., "Impact of physical activity on anxiety, depression, stress and quality of life of the older people in Brazil," *Int. J. Environ. Res. Public Health*, vol. 20, no. 2, Art. no. 1127, Jan. 2023, doi: 10.3390/ijerph20021127.
[21] H. Yaribeygi, Y. Panahi, H. Sahraei, T. P. Johnston, and A. Sahebkar, "The impact of stress on body function: A review," *EXCLI J.*, vol. 16, pp. 1057–1072, 2017, doi: 10.17179/excli2017-480.
[22] M. T. Osborne, L. M. Shin, N. N. Mehta, R. K. Pitman, Z. A. Fayad, and A. Tawakol, "Disentangling the links between psychosocial stress and cardiovascular disease," *Circ. Cardiovasc. Imaging*, vol. 13, no. 8, Art. no. e010931, Aug. 2020, doi: 10.1161/CIRCIMAGING.120.010931.
[23] V. Vaccarino and J. D. Bremner, "Stress and cardiovascular disease: An update," *Nat. Rev. Cardiol.*, vol. 21, no. 9, pp. 603–616, Sep. 2024, doi: 10.1038/s41569-024-01024-y.
[24] L.-M. Walther and P. H. Wirtz, "Physiological reactivity to acute mental stress in essential hypertension—A systematic review," *Front. Cardiovasc. Med.*, vol. 10, Art. no. 1215710, Aug. 2023, doi: 10.3389/fcvm.2023.1215710.
[25] M. Kivimäki and A. Steptoe, "Effects of stress on the development and progression of cardiovascular disease," *Nat. Rev. Cardiol.*, vol. 15, no. 4, pp. 215–229, Apr. 2018, doi: 10.1038/nrcardio.2017.189.

[26] L.-B. Meng, Y.-M. Zhang, Y. Luo, T. Gong, and D.-P. Liu, "Chronic stress a potential suspect zero of atherosclerosis: A systematic review," *Front. Cardiovasc. Med.*, vol. 8, Art. no. 738654, Dec. 2021, doi: 10.3389/fcvm.2021.738654.
[27] L. D. Sher, H. Geddie, L. Olivier, M. Cairns, N. Truter, L. Beselaar, and M. F. Essop, "Chronic stress and endothelial dysfunction: Mechanisms, experimental challenges, and the way ahead," *Am. J. Physiol. Heart Circ. Physiol.*, vol. 319, no. 2, pp. H488–H506, Aug. 2020, doi: 10.1152/ajpheart.00244.2020.
[28] A. Tawakol *et al.*, "Relation between resting amygdalar activity and cardiovascular events: A longitudinal and cohort study," *Lancet*, vol. 389, no. 10071, pp. 834–845, Feb. 2017, doi: 10.1016/S0140-6736(16)31714-7.
[29] Y. M. Ulrich-Lai and J. P. Herman, "Neural regulation of endocrine and autonomic stress responses," *Nat. Rev. Neurosci.*, vol. 10, no. 6, pp. 397–409, Jun. 2009, doi: 10.1038/nrn2647.
[30] M. A. Kredlow, R. J. Fenster, E. S. Laurent, K. J. Ressler, and E. A. Phelps, "Prefrontal cortex, amygdala, and threat processing: Implications for PTSD," *Neuropsychopharmacology*, vol. 47, no. 1, pp. 247–259, Jan. 2022, doi: 10.1038/s41386-021-01155-7.

Authors



Emma Novita holds a doctoral degree in Biomedical Sciences from the Faculty of Medicine at Sriwijaya University. She earned her medical degree in 1989 from Sriwijaya University and a Master's degree in Public Health in 2004 from the School of Public Health at the University of Indonesia. She has approximately 25 years of work experience at community health centers and the Palembang City Health Department. She currently serves as the Head of the Department of Public Health and Community Medicine (IKM-IKK) at the Faculty of Medicine, Sriwijaya University, and she is actively involved in various health-related research projects. (email: emmanovita@fk.unsri.ac.id).



Irfannuddin is a professor at the Faculty of Medicine, Sriwijaya University, and a specialist in sports medicine. He earned his medical degree in 1998 from the Faculty of Medicine, University of Sriwijaya, a Master's degree in Medical Education in 2008, and a Doctorate in Biomedical Sciences in 2015. He served as the First Vice Dean for Academic Affairs at the Faculty of Medicine, University of Sriwijaya, from 2021 to 2025. (email: irfan.md@unsri.ac.id).



Iche Andriyani Liberty earned her bachelor's degree from the Faculty of Public Health at Sriwijaya University in 2011 and her master's degree in Health (Biomedical Studies) from the Graduate School of Sriwijaya University in 2014. He then pursued a Ph.D. in Epidemiology at the University of Indonesia in 2016 and graduated in 2018 with a scholarship from BUDI-DN. He has been a tenured faculty member since 2014 in the Department of Public Health and Community Medicine (IKM-IKK) at the Faculty of Medicine, Sriwijaya University. (email: andriyaniliberty@fk.unsri.ac.id).



Latifah earned her medical degree from the Faculty of Medicine, Universitas Sriwijaya, and completed her residency in Psychiatry at Universitas Padjadjaran, Bandung. She obtained her Master of Health (M.Kes.) degree from Universitas Bina Husada, and is currently pursuing her doctoral degree in Environmental Health at the Postgraduate Program of Universitas Sriwijaya. She is a faculty member in the Department of Psychiatry at the Faculty of Medicine, Universitas Sriwijaya, where she actively teaches in the undergraduate medical program and is engaged in psychiatric and environmental health research. (email: dr.latifah1505@gmail.com).



Rezi Fatrima Surya is a lecturer and researcher in public health. His research focuses on behavioral science and health promotion. He holds a bachelor's and master's degree in public health from Andalas University, and He is currently a lecturer in the Department of Public Health and Community Medicine at the Faculty of Medicine, Sriwijaya University. (email: rezifatrima@unsri.ac.id).