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A Conceptual User-Centric Model for Mental Health Information Systems

Santo Fernandi Wijaya, Jansen Wiratama, Rudi Sutomo

Universitas Multimedia Nusantara
jansen.wiratama@umn.ac.id

Abstract. This study aimed to develop a user-centric model for structuring mental health information systems with a focus on user experience. The PRISMA methodology was utilized to review existing literature and identify key factors for such systems based on user needs. A questionnaire was administered to 80 university students aged 18-25 years to evaluate the proposed conceptual model using entropy analysis. The results indicated that lifestyle elements were most critical in the model, followed by use of IoT and professional psychological support. However, the small sample size limits generalizability of the findings. While this study provides initial insights into a user-centric approach for MHIS models, further research is needed through more rigorous empirical evaluation methods and larger samples.

Keywords: Information Systems, Mental Health, User-Centric Model, User Experience.

1. Introduction

This digital era requires people to adjust activities with technological support. People must complete tasks independently with dense parallel activities. These activities make most people experience high activity, and people often ignore health factors, causing conditions such as tired eyes, muscle tension, difficulty resting (insomnia), disturbed appetite, difficulty adjusting, loss of mood, irritability, emotions, fear, and worry. These activities make people experience stress levels and tend to experience mental health disorders. For this reason, people need technology-based mental health services, such as collaborative psychological services using information and communication technology, which aims to solve mental health problems—ways to improve mental health care include intensive communication, obtaining information through applications, and education (Pekas et al., 2022).

User-centric design for a Mental Health Information System (MHIS) involves understanding and empathizing with users' diverse needs and challenges, ensuring inclusivity and accessibility. The design process incorporates continuous user involvement, clear communication, and personalization features to create an engaging and supportive experience. In parallel, UX evaluation for the MHIS focuses on usability, appropriateness of content, feedback mechanisms, emotional impact, and performance monitoring. Usability testing assesses navigation and responsiveness while evaluating content for clarity and non-stigmatizing language. Feedback mechanisms allow continuous user satisfaction assessment, and monitoring emotional impact ensures the system aligns with intended emotional responses. Additionally, ongoing performance evaluation and adherence to ethical standards regarding user privacy and consent contribute to the overall success of the MHIS in meeting the unique needs of users in the mental health domain.

Although previous research has examined the building of mental health architecture, further research is still needed, which is reviewed from other perspectives to understand the needs and preferences of users regarding the Mental Health Information System (MHIS) model by developing relevant content according to user needs. The Research question to be answered in this research is: what critical factors are needed to Create a User-Centric Model for Structuring MHIS with a Focus on User Experience?

2. Study Literature

2.1. User-centric Approach

The term user-centric is an approach that focuses on end-user systems where users are placed as resources in designing, developing, and managing information systems to ensure the use of information systems can meet the needs and preferences of users. For this reason, it is necessary to analyze and understand the needs and goals of system users. It is essential to communicate actively with users to identify user needs for information systems (Bahja et al., 2020). In addition, it is necessary to design information system interfaces and functionality with a User Experience approach to determine navigation, information presentation, and relevant features according to user needs (Aritonang et al., 2022). It is then done by user testing to evaluate the effectiveness and user satisfaction with the information system, followed by allowing users to customize information system functionality according to preferences. After that, it can carry out further development to collect feedback from users to make continuous improvements, enhancements, and adjustments to produce an information system that is relevant and useful for users.

2.2. Information Architecture Model

Information Architecture is a structural design and organization of information by facilitating the system's navigation, understanding, and retrieval of information. The Information Architecture Model is a conceptual framework that describes the arrangements, relationships, and components of information in a

specific context to be accessible to support user needs and business objectives. For this reason, it is necessary to pay attention to critical components in designing the Information Architecture Model, such as defining Hierarchy and Organization, determining navigation and wayfinding that users use in navigating through information and other navigational elements, determining labels to help users identify and understand relevant content, determining search. And retrieval to assist users in finding information according to their needs, assess user flow and interaction to assist users in interacting with data, determine content types and templates to identify different types of content and provide templates to format content consistently, and determine accessibility and usability for ensure that information can be used and accessed by users, determine scalability and flexibility for users to adapt to changes related to user needs, Stakeholder support to align with business goals, user needs, and technological constraints encountered, and determine visual representation to illustrate the structure and organization of information visually by using diagrams, drawings, design artifacts (Harahap et al., 2021).

2.3. Mental Health Information System (MHIS) Architecture Model

The MHIS architecture model aims to keep track of user needs, preferences, and feedback to provide a user experience that supports the use of MHIS. Developing an MHIS model with a User Experience (UX) approach aims to ensure that the information available can meet user needs and provide a good experience (García-Gómez et al., 2014). The MHIS model with the UX approach can also recognize symptoms of mental illness and ways to deal with mental problems and identify user groups and characteristics, such as mental health knowledge, education level of technology, and communication preferences (Mochammad Aldi Kushendriawan et al., 2021).

2.4. Mental Function

The function of the MHIS is to facilitate data collection, processing, analysis, distribution, and sharing of MHIS services. MHIS aims to increase the effectiveness and quality of mental health services (Baghini, M.S, Rabiei & Aasdi, F, Moghaddasi, H, 2020). Thus, the MHIS can function as a planning and service tool to improve mental health services quality. For this reason, it is necessary to pay attention to critical factors to ensure that the use of mental health applications functions effectively, safely, and is beneficial for users, such as applications that have credible resources and content with scientific research and practical support in the field of mental health, protection of personal information. And sensitive data from users, Apps have benefits for users' mental health, content, and app features that are relevant to mental health issues based on User experience (UX), Simple navigation and layout that helps users find information or features quickly, Apps can customize according to the user's preferences and needs, the application can encourage the active involvement of the user through relevant features, the application provides a guide for using the application to make it easier for users, the application offers consultation facilities with mental health professionals, such as psychologists or counselors to provide solutions to user complaints, the application has reporting features in the form of an information dashboard updating users' mental health, the application has technical support, and periodic maintenance by the IT team, and the application has been tested and evaluated by experts to ensure the effectiveness of the application. The following are the mapping results from the authors' previous research. The mapping results can be seen in Table 1.

Table 1. Result Mapping from Previous Research

No	Indicators	Definitions	References
1	Education Benefit	Health application use training functions to ensure users understand using the application.	(Collen & Hammond, 2015; Musen et al., 2014)

No	Indicators	Definitions	References
2	Education Health Literacy	Mental health literacy increases the ease of seeking help.	(Amira et al., 2023; Harahap et al., 2021)
3	Education Mental Health	Mental health Literacy provides an understanding of mental disorders and how to overcome them.	(Chao et al., 2020; Chelsea, 2020; Fadhilah & Stefanus, 2018; Pongtambing, 2020; Sampetoding et al., 2022; O. K. Sari et al., 2020; Zaza et al., 2023)
4	Education Process	The online learning process in understanding lessons needs adaptation.	(Putri et al., 2018)
5	Lifestyle	Effect of lecture learning assignments on stress levels.	(Curley & Polites, 2020; Esmaeilzadeh, 2021; Lai et al., 2021; Pekas et al., 2022; Sampetoding et al., 2022; O. K. Sari et al., 2020)
6	Stress with activity	Effect of lecture learning assignments on stress levels.	(Fauziyyah et al., 2021; M. K. Sari & Susmiatin, 2023)
7	Stress with people	The role of friends can relieve stress.	(Curley & Polites, 2020; Esmaeilzadeh, 2021; Lai et al., 2021; Noviyana, Trilestari, 2020; Pekas et al., 2022; Putri et al., 2018; O. K. Sari et al., 2020)
8	Innovative Work Behavior	Collaborative function in the application to collaborate information for users.	(Collen & Hammond, 2015; Johnson et al., 2023; Musen et al., 2014; Zaza et al., 2023)
9	Professional psychology role	The process of face-to-face counseling as a medium of communication in mental health applications.	(Curley & Polites, 2020; Esmaeilzadeh, 2021; Lai et al., 2021; Noviyana, Trilestari, 2020; Pekas et al., 2022; Putri et al., 2018; O. K. Sari et al., 2020)
10	Professional psychology online	Online counseling process as a communication medium in mental health applications.	(Ansyah et al., 2023; Ryan et al., 2023)
11	Professional psychology with people	The professional role of psychologists in helping students reduces stress.	(Ryan et al., 2023; Shidara et al., 2022)
12	Professional psychology with solution	The professional role of psychologists in dealing with the mental health of students.	(Ryan et al., 2023)
13	IoTs in learning	The role of the internet in learning activities.	(Bickmore & Paasche-Orlow, 2012; Lin et al., 2021; Sampetoding et al., 2022; Yu Bogaevskaya et al., 2021)
14	IoTs of condition	The influence of products from IoT can adjust activities based on one's condition.	(Bickmore & Paasche-Orlow, 2012; Lin et al., 2021; Sampetoding et al., 2022; Yu Bogaevskaya et al., 2021)
15	IoTs of technology innovative	Innovative use of technology to keep up with technology trends in mobile-based applications.	(Johnson et al., 2023; Zaza et al., 2023)
16	Medical Records	Track-ability function in the System to track integrated information for users	(Collen & Hammond, 2015; Harahap et al., 2021; Musen et al., 2014)
17	Self-Health Monitoring System interactive	The role of friends can interact through the Mental Health Information System application.	(Collen & Hammond, 2015; Curley & Polites, 2020; Esmaeilzadeh, 2021; Harahap et al., 2021; Lai et al., 2021; Musen et al., 2014; Noviyana,

No	Indicators	Definitions	References
			Trilestari, 2020; Pekas et al., 2022; Putri et al., 2018; O. K. Sari et al., 2020)
18	Self-health Monitoring System reduces stress.	Mental health applications as a medium for providing mental health services to reduce stress levels.	(Collen & Hammond, 2015; Musen et al., 2014)
19	Mental Health Service Providers	IoT facilities in improving the quality of intelligent mental health service providers.	(Chao et al., 2020; Chelsea, 2020; Fadhilah & Stefanus, 2018; Pongtambing, 2020; Sampetoding et al., 2022; O. K. Sari et al., 2020; Zaza et al., 2023)
20	Mental Health Service Health condition	The influence of products from IoT can detect a person's mental health condition.	(Lin et al., 2021; Ryan et al., 2023; Sampetoding et al., 2022; Yu Bogaevskaya et al., 2021)
21	Mental Health Service Monitoring	Mental health Literacy in providing information on how to maintain good mental health.	(Chao et al., 2020; Chelsea, 2020; Fadhilah & Stefanus, 2018; Pongtambing, 2020; Sampetoding et al., 2022; O. K. Sari et al., 2020; Zaza et al., 2023)
22	Mental Health Service Stigma	Mental health literacy in reducing stigma against mental disorders.	(Chao et al., 2020; Chelsea, 2020; Fadhilah & Stefanus, 2018; Pongtambing, 2020; Reavley & Jorm, 2012; Sampetoding et al., 2022; O. K. Sari et al., 2020; Wei et al., 2015; Zaza et al., 2023)
23	Mental Health Service Information	Interactive function to display information to do interactive.	(Collen & Hammond, 2015; Musen et al., 2014)
24	Mental Health Service Flexibility	Function flexibility in the application to perform an analysis of the available reports.	(Ryan et al., 2023; van Gool et al., 2022)

The mapping from previous research shows that digital Medical Records are useful for storing, managing, and sharing patient health information, including medical history, diagnosis, treatment, prescriptions, and other health data. Medical records are data privacy, ethical, and sensitive information security, so it is necessary to maintain patient data confidentiality. Self-health Monitoring System is a system function to identify and manage changes in mental health conditions that are carried out alone. However, a mental health professional's consultation is essential for effective diagnosis and treatment. Mental health education helps raise awareness for individuals about mental health issues, stress management, emotional support, and ways to promote mental well-being in general. A healthy lifestyle can contribute to preventing mental disorders, managing stress, and improving the overall quality of life, which can impact mood, ability to deal with stress, and overall quality of life. The Internet of Things (IoTs) can be used to develop innovative solutions for monitoring, diagnosing, and managing individuals who need to maintain mental well-being. IoT-based Mental Health applications can manage stress, anxiety, or depression for individuals. Mental Health apps can train to breathe, meditate, or send alerts to rest when sensors detect high-stress levels (Fadhilah & Stefanus, 2018; Sampetoding et al., 2022). The Mental Health Service aims to diagnose, treat, prevent, and manage mental disorders, with mental health professionals formulating treatment plans according to individual needs. Stress can have the negative effect of increasing anxiety and depression. Critical stress management in mental health to develop healthy stress management skills. Innovative Work Behavior to provide different solutions to improve performance by creating added value. Work environment innovation develops more efficient processes. Professional psychologists have expertise in assessing, diagnosing, and treating mental health problems. Professional psychologists play a

role in providing counseling to individuals with mental disorders.

3. Methodology

3.1. Methodology Research

This research uses the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) Literature Review method to map from previous research to synthesize and find critical factors that influence the development of a mental health architecture information model (Liberati et al., 2009). On the basis of these critical factors, this study develops an entropy-based method for determining the ranking of indicators. The formulation results from previous research, and this research is Creating a User-Centric Model for Structuring MHIS with a Focus on User Experience.

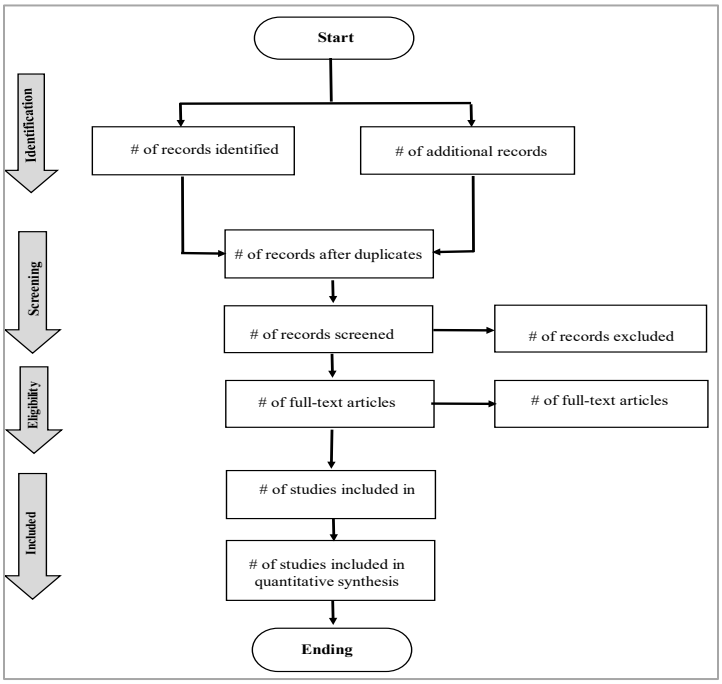

Fig. 1: The flow of information of a systematic review using the PRISMA method (Liberati et al., 2009)

Based on the background of this research, authors searched for articles in the form of proceedings or journals using the Google Scholar search database using the keywords "mental health information, user experience" for the 2020-2022 period. After reading the title, abstract, and introduction, the results of filtering articles were that the researcher chose 28 papers by identifying 24 indicators as the basis for answering this research question. Then, the authors conducted a mapping and comparison, which became a critical indicator of the mental health information model. From these factors, the researcher defines and creates questionnaire questions. In addition, this research also involves mental health experts as professional psychologists willing to provide opinions regarding the design and development of the MHIS architecture model that aims to ensure that the information provided is accurate and meets users' needs. The characteristics of the respondents used as a test for this research were 80 active students aged 18 - 25 years.

The data collection method in this research uses a questionnaire. Respondent data considers criteria such as age, level of knowledge, technology proficiency, and mental health problems. This research uses the entropy method to determine the ranking of each indicator, which forms the basis of the probability distribution of respondents' answers to the questionnaire questions. The entropy method is one of the

MCDM methods that can be used in determining indicator rankings (Asl et al., 2012). The assessment was calculated with the weight of each indicator using the following formula:

1. Each number was subtracted with the ideal value. *Xij* expresses the result of this subtraction.
2. *Xij* value was obtained from the *Pij* matrix as:

$$\boldsymbol{P}_{ij} - \frac{X_{ij}}{\sum_{i=1}^{m} X_{ij}}, \forall i, j \quad (1)$$

where m denotes the number of respondents.

3. Entropy values for each criterion were calculated using:

$$Ej = -k \sum_{i=1}^{m} Pij \ln Pij, \forall j, \quad (2)$$

$$\text{Where } \boldsymbol{K} = \frac{1}{lnm} \quad (3)$$

4. The dispersion of each criterion was calculated using:

$$dj = 1 - Ej, \forall j \quad (4)$$

5. Assume that the total weight = 1, so to get the weight ofeach criterion, the dispersion value was normalizedusing (4), where *n* is the number of criteria.

$$Wj = \frac{di}{\sum_{j=1}^{n} dj \, \forall i} \quad (5)$$

The questionnaire design for this research is meticulously crafted to align with the objectives of developing a user-centric model for mental health information systems. The design is anchored in key indicators encompassing user experiences, preferences, and needs regarding mental health information platforms. Questions are formulated to gather insights into user expectations, usability requirements, and content preferences. Topics include ease of navigation, information accuracy, confidentiality concerns, and the perceived effectiveness of mental health resources. The questionnaire is structured to ensure clarity, coherence, and relevance to the study's goals. The sampling strategy targets active students on a private campus, reflecting a specific demographic group likely to engage with mental health information systems. A purposive sampling approach is employed to ensure representation across different academic disciplines, genders, and age groups. The research focuses on obtaining a diverse range of perspectives to enhance the generalizability of the findings. Data collection involves distributing the questionnaire to selected participants through online platforms or in-person surveys, depending on logistical considerations. Consent is obtained, and participants are assured of the confidentiality of their responses.

The analysis of the collected data follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method, a systematic approach commonly used for evidence synthesis in health-related research. In this context, PRISMA is adapted for qualitative data analysis. The process involves:

a) Data Screening: Initial screening of responses to ensure completeness and reliability of the dataset.

b) Data Extraction: Systematic extraction of relevant information from the questionnaires, focusing on key themes related to user perceptions and preferences in mental health information systems.

c) Thematic Analysis: Coding and categorization of responses into themes, considering factors such as usability, content preferences, and perceived effectiveness.

d) Synthesis: Integrating the extracted themes to understand perspectives on mental health information systems comprehensively.

e) Quality Assessment: Ensuring the rigor of the analysis by assessing the findings' edibility, dependability, and transferability. Reporting: Presenting the results clearly and structured, highlighting key insights and providing a basis for developing the conceptual user-centric model.

3.2. Research Model

Based on the analysis results from previous research, authors mapped users' needs, preferences, and needs, such as relevant mental health content and resources (psychologists, psychiatrists) for consulting rooms. The function of mental health professionals in the MHIS development process is to ensure that the information available is accurate, up-to-date, and practically aligned with user needs. After that, the authors designed an intuitive navigation system so users can find and access information as needed. Then, make a Wireframing and Prototyping Design (user interface prototype) based on the information architecture. Conduct wireframe or prototype usability testing with users to identify problems and solutions, Design the visual elements of the model (color scheme, typography, icons, and images), And develop actual content for each part of the mental health information architecture model.

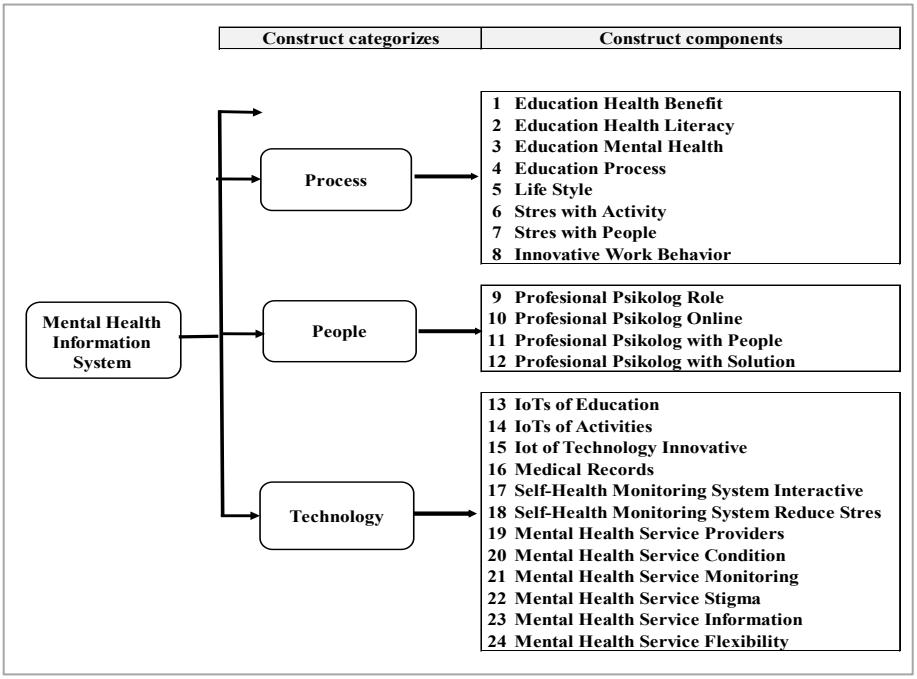

Fig. 2: Research Model

4. Result and Discussion

Based on the results of data processing in this research, shows that Lifestyle is a critical factor that is needed to Create a User-Centric Model for Structuring MHIS. This answers the first research question of this research which is a critical factor in developing MHIS. Detailed indicators that affect mental health information can be seen in Table 2.

Table 2. Indicators Rank for a Mental Health Information Systems

No	Indicators	Entropy index
1	Lifestyle	0.9546
2	IoTs in education	0.9423
3	Online Professional psychology	0.8375
4	IoTs activities	0.8307
5	Mental Health Service Flexibility	0.8258
6	Education Benefit	0.8223
7	Stress with activity	0.8024
8	Stress with people	0.8024
9	Mental Health Service Stigma	0.7784
10	Self-Health Monitoring System interactive	0.7670
11	Mental Health Service Monitoring	0.7657
12	Mental Health Service Providers	0.7655
13	Self-health Monitoring System reduce stress	0.7597
14	Professional psychology	0.7502
15	IoTs technology innovation	0.7321
16	Professional psychology with solution	0.7300
17	Mental Health Service Information	0.7259
18	Professional psychology role	0.7200
19	Education Mental Health	0.7176
20	Mental Health Service Health condition	0.7141
21	Mental Health Service Health condition	0.7121
22	Medical Records	0.7053
23	Education Process	0.7043
24	Innovative Work Behavior	0.6589

The data processing results in this research show that lifestyle is a critical factor needed to Create a User-Centric Model for Structuring MHIS. These results answer the first research question essential to developing MHIS. Detailed indicators that affect mental health information can be seen in Table 2. Based on the results of the data processing, it shows that the Lifestyle indicator has a significant influence on a person's mental health. For this reason, paying attention to habits, behavior, and mindset dramatically affects a person's mental health, for example, how a person does physical activities, maintains a balanced nutritional diet, gets enough sleep, intelligently manages stress, and interacts socially. Besides that, it is crucial to avoid excessive alcohol consumption, be wise in managing time, balance work time with personal time, and involve yourself in fun activities. This lifestyle can reduce stress and ultimately maintain one's mental health.

5. Result and Discussion

In conclusion, this study makes a preliminary attempt at developing a conceptual user-centric model for structuring MHIS to improve user experience. The entropy method was utilized to prioritize model components based on a survey of 80 students. While lifestyle factors were identified as most critical, the study is limited by its reliance on a small sample of youth only. Significant further research with more diverse samples is required to empirically evaluate and refine the proposed MHIS model through prototyping and user testing. Additionally, comparative assessments against existing MHIS models would provide more insights. This study can serve as an early conceptual step toward developing user-centric MHIS, but substantial empirical research remains to be done to realize practical systems.

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References

Amira, I., Hendrawati, H., Sukmawati, S., Maulana, I., & Rosidin, U. (2023). Penyuluhan Menjaga Kesehatan Mental pada Era Adaptasi Kebiasaan Baru. *JPKMI (Jurnal Pengabdian Kepada Masyarakat Indonesia)*, *4*(1), 63–74. https://doi.org/10.36596/jpkmi.v4i1.599

Ansyah, E. H., Paryontri, R. A., & Affandi, G. R. (2023). effectiveness of counseling based on Al-Fatihah psychology to reduce academic stress in students during the covid-19 pandemic. *Jurnal Ilmiah Psikologi Terapan*, *11*(1), 19–24. https://doi.org/10.22219/jipt.v11i1.20941

Aritonang, P. A., Johan, M. E., & Prasetiawan, I. (2022). Aspect-Based Sentiment Analysis on Application Review using CNN (Case Study : Peduli Lindungi Application). *Ultima Infosys : Jurnal Ilmu Sistem Informasi*, *13*(1), 54–61.

Asl, M. B., Khalilzadeh, A., Youshanlouei, H. R., & Mood, M. M. (2012). Identifying and ranking the effective factors on selecting Enterprise Resource Planning (ERP) system using the combined Delphi and Shannon Entropy approach. *Procedia - Social and Behavioral Sciences*, *41*, 513–520. https://doi.org/10.1016/j.sbspro.2012.04.063

Baghini, M.S, Rabiei, R., & Aasdi, F, Moghaddasi, H, S. A. (2020). National mental health information system: a review of data architecture in selected countries. *J Adv Pharm Edu Res*, ;*10(S2)*, :130-138.

Bahja, M., Hammad, R., & Butt, G. (2020). *A User-Centric Framework for Educational Chatbots Design and Development BT - HCI International 2020 - Late Breaking Papers: Multimodality and Intelligence* (C. Stephanidis, M. Kurosu, H. Degen, & L. Reinerman-Jones (eds.); pp. 32–43). Springer International Publishing.

Bickmore, T. W., & Paasche-Orlow, M. K. (2012). The role of information technology in health literacy research. *Journal of Health Communication*, *17 Suppl 3*, 23–29. https://doi.org/10.1080/10810730.2012.712626

Chao, H.-J., Lien, Y.-J., Kao, Y.-C., Tasi, I.-C., Lin, H.-S., & Lien, Y.-Y. (2020). Mental Health Literacy in Healthcare Students: An Expansion of the Mental Health Literacy Scale. In *International Journal of Environmental Research and Public Health* (Vol. 17, Issue 3). https://doi.org/10.3390/ijerph17030948

Chelsea, M. (2020). Mengenal Pentingnya Menjaga Kesehatan Mental. *TarFomedia*, 54–58. http://www.jurnal.stiks-tarakanita.ac.id/index.php/forum/article/viewFile/534/317

Collen, M. F., & Hammond, W. E. (2015). *Development of Medical Information Systems (MISs) BT - The History of Medical Informatics in the United States* (M. F. Collen & M. J. Ball (eds.); pp. 123–206). Springer London. https://doi.org/10.1007/978-1-4471-6732-7_3

Curley, E., & Polites, G. (2020). The optimal experience: Social identity and IT identity as antecedents of group flow in social media use. *Proceedings of the Annual Hawaii International Conference on System*

Sciences, *2020-Janua*, 664–673. https://doi.org/10.24251/hicss.2020.082

Esmaeilzadeh, P. (2021). How does IT identity affect individuals' use behaviors associated with personal health devices (PHDs)? An empirical study. *Information & Management*, *58*(1), 103313. https://doi.org/https://doi.org/10.1016/j.im.2020.103313

Fadhilah, K., & Stefanus, A. (2018). Perangkat Pemantau Kesehatan Mental Berbasis IOT. *Prosiding Industrial Research Workshop and National Seminar*, *9*, 840–847. https://jurnal.polban.ac.id/ojs-3.1.2/proceeding/article/view/1158

Fauziyyah, R., Awinda, R. C., & Besral, B. (2021). Dampak Pembelajaran Jarak Jauh terhadap Tingkat Stres dan Kecemasan Mahasiswa selama Pandemi COVID-19. *Jurnal Biostatistik, Kependudukan, Dan Informatika Kesehatan*, *1*(2), 113. https://doi.org/10.51181/bikfokes.v1i2.4656

García-Gómez, J. M., de la Torre-Díez, I., Vicente, J., Robles, M., López-Coronado, M., & Rodrigues, J. J. (2014). Analysis of mobile health applications for a broad spectrum of consumers: a user experience approach. *Health Informatics Journal*, *20*(1), 74–84. https://doi.org/10.1177/1460458213479598

Harahap, N. C., Handayani, P. W., & Hidayanto, A. N. (2021). Functionalities and Issues in the Implementation of Personal Health Records: Systematic Review. *J Med Internet Res*, *23*(7), e26236. https://doi.org/10.2196/26236

Johnson, K., Collins, D., & Wandersman, A. (2023). Developing a sustainability readiness strategy for health systems: Toolkit, interactive tools, and virtual support system. *Evaluation and Program Planning*, *97*, 102241. https://doi.org/https://doi.org/10.1016/j.evalprogplan.2023.102241

Lai, C.-S., Au, K.-M., & Low, C.-S. (2021). Beyond Conventional Classroom Learning: Linking Emotions and Self-Efficacy to Academic Achievement and Satisfaction with Online Learning during the COVID-19 Pandemic. *Journal of Education and E-Learning Research*, *8*(4), 367–374. https://doi.org/10.20448/journal.509.2021.84.367.374

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ*, *339*. https://doi.org/10.1136/bmj.b2700

Lin, A. L., Chen, W. C., & Hong, J. C. (2021). *Chapter 8 - Electronic health record data mining for artificial intelligence healthcare* (L. Xing, M. L. Giger, & J. K. B. T.-A. I. in M. Min (eds.); pp. 133–150). Academic Press. https://doi.org/https://doi.org/10.1016/B978-0-12-821259-2.00008-9

Mochammad Aldi Kushendriawan, Harry Budi Santoso, Panca O. Hadi Putra, & Martin Schrepp. (2021). Evaluating User Experience of a Mobile Health Application 'Halodoc' using User Experience Questionnaire and Usability Testing. *Jurnal Sistem Informasi*, *17*(1), 58–71. https://doi.org/10.21609/jsi.v17i1.1063

Musen, M. A., Middleton, B., & Greenes, R. A. (2014). *Clinical Decision-Support Systems BT - Biomedical Informatics: Computer Applications in Health Care and Biomedicine* (E. H. Shortliffe & J. J. Cimino (eds.); pp. 643–674). Springer London. https://doi.org/10.1007/978-1-4471-4474-8_22

Noviyana, Trilestari, S. (2020). UPAYA PENGELOLAAN STRES di ERA ADAPTASI KEBIASAAN BARU. *UPAYA PENGELOLAAN STRES Di ERA ADAPTASI KEBIASAAN BARU STRESS*, 68–72.

Pekas, M. G., Santos, F. S., Recede, R. A. A., & Rosa, M. A. Dela. (2022). Filipino Teachers' Mental Health Amidst the Covid-19 Pandemic. *International Journal of Multidisciplinary: Applied Business and*

Education Research, *3*(6), 1017–1027. https://doi.org/10.11594/ijmaber.03.06.07

Pongtambing, Y. S. (2020). Konsistensi Internal dan Validasi Kriteria pada Alat Ukur Kesehatan Mental Mahasiswa Universitas Hasanuddin. *Gadjah Mada Journal of Psychology (GamaJoP)*, *6*(2), 210–220. https://doi.org/10.22146/gamajop.55702

Putri, L. A., Anward, H. H., & Zwagery, R. V. (2018). Perbedaan Kualitas Persahabatan Ditinjau Dari Gaya Kelekatan Pada Mahasiswa Psikologi Fakultas Kedokteran ULM. *Jurnal Kognisia*, *1*(1), 1–16.

Reavley, N. J., & Jorm, A. F. (2012). Stigmatising attitudes towards people with mental disorders: Changes in Australia over 8years. *Psychiatry Research*, *197*(3), 302–306. https://doi.org/https://doi.org/10.1016/j.psychres.2012.01.011

Ryan, M., Abujaber, N., Travers, D. Á., McBride, K. A., Tingsted Blum, P., Engels, M., Alshibi, A., Greene, H., Githaiga, S., Didenko, A., & Vallières, F. (2023). The acceptability, appropriateness, and feasibility of implementing supportive supervision within humanitarian contexts: A qualitative study. *SSM - Mental Health*, *3*, 100202. https://doi.org/https://doi.org/10.1016/j.ssmmh.2023.100202

Sampetoding, E. A. M., Chuvita, L., & ... (2022). Studi Litelatur Penerapan Internet of Things pada Kesehatan Mental: A Literature Review: The Application of IoT in Mental Health. *Journal Dynamic …*, *7*(1), 13–18. http://journals.ukitoraja.ac.id/index.php/dynamicsaint/article/view/1458

Sari, M. K., & Susmiatin, E. A. (2023). Deteksi Dini Kesehatan Mental Emosional pada Mahasiswa. *Jurnal Ilmiah STIKES Yarsi Mataram*, *13*(1), 10–17. https://doi.org/10.57267/jisym.v13i1.226

Sari, O. K., Ramdhani, N., & Subandi, S. (2020). Kesehatan Mental di Era Digital: Peluang Pengembangan Layanan Profesional Psikolog. *Media Penelitian Dan Pengembangan Kesehatan*, *30*(4), 337–348. https://doi.org/10.22435/mpk.v30i4.3311

Shidara, K., Tanaka, H., Asada, R., Higashiyama, K., Adachi, H., Kanayama, D., Sakagami, Y., Kudo, T., & Nakamura, S. (2022). Linguistic Features of Clients and Counselors for Early Detection of Mental Health Issues in Online Text-based Counseling. *2022 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*, 2668–2671. https://doi.org/10.1109/EMBC48229.2022.9871408

van Gool, F., Bongers, I., Bierbooms, J., & Janssen, R. (2022). Whether and how top management create flexibility in mental healthcare organizations: COVID-19 as a test case. *Journal of Health Organization and Management*, *36*(5), 604–616. https://doi.org/10.1108/JHOM-07-2021-0258

Wei, Y., McGrath, P. J., Hayden, J., & Kutcher, S. (2015). Mental health literacy measures evaluating knowledge, attitudes and help-seeking: a scoping review. *BMC Psychiatry*, *15*(1), 291. https://doi.org/10.1186/s12888-015-0681-9

Yu Bogaevskaya, O., Yumashev, A. V, Zolkin, A. L., Smirnova, O. A., & Chistyakov, M. S. (2021). Application of progressive information technologies in medicine: computer diagnostics and 3D technologies. *Journal of Physics: Conference Series*, *1889*(5), 52001. https://doi.org/10.1088/1742-6596/1889/5/052001

Zaza, S., Bartelt, V. L., Erskine, M. A., & Armstrong, D. J. (2023). Mental Health and Information Technology Catalysts as Determinants of Innovative Work Behavior. *Communications of the Association for Information Systems*, *52*, 103–131. https://doi.org/10.17705/1CAIS.05205