EKSIS: A WEBSITE-BASED FOR MENTAL HEALTH PROMOTION PLATFORM TO ENHANCE ADOLESCENTS' RESILIENCE

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Abstract

Adolescent mental health poses a significant challenge worldwide. According to WHO data from 2019, the global prevalence of mental health conditions before the pandemic was 13%, or approximately 970 million people living with mental health issues, with 52.4% being female and 47.6% male. According to the Indonesia-National Mental Health Survey (I-NAMHS) in 2022, the prevalence of mental health problems among adolescents aged 10-17 years in 34 provinces in Indonesia was 34.9%. Approximately 11 million adolescents in Indonesia experience mental disorders, placing the country in the category of a mental health emergency for adolescents. This alarming prevalence places Indonesia in a mental health emergency for its youth. Among these adolescents, 52.58% are aged 10–13 years, and 47.42% are aged 14–17 years, with no significant gender differences in risk levels. Resilience is a part of mental health that refers to successful adaptation to stress. Adolescents with high resilience tend to have lower risk of having mental health problems. This study aims to develop the EKSIS Program, a community-based health promotion initiative designed to enhance adolescent resilience in stress management through a website-based platform. The program enables adolescents to access mental health resources, receive psychological support, and engage in tailored activities to build resilience. Grounded in the theory of internal self-resiliency, the study adopts a participatory action research design with a multi-method sequential exploratory approach, comprising three cycles. Cycle 1 involves investigating mental health problems in youth using intervention mapping and phenomenological methods with 18 informants. Cycle 2 focuses on developing instruments, content modules, the EKSIS Program, and digital media using intervention mapping and design thinking approaches. Cycle 3 evaluates website usability acceptance in adolescents. The study involved 60 adolescents aged 15–18 years from SMA Sooko Mojokerto, East Java, Indonesia. This research provides a foundation for developing adolescent mental health programs tailored to their specific needs. The proposed program aims to effectively and sustainably enhance resilience and stress management among adolescents in Mojokerto. This article focuses on the development of the EKSIS website which is used in the program.

Keywords: Mental health, adolescents, resilience, health promotion, website-based media.

1. Introduction

According to WHO (1948), mental health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Ruiz-Ranz & Asín-Izquierdo, 2024). Several factors of a person can be defined as mentally healthy are capable of showing emotion, having resilience, and ability to adapt so that person is able to face obstacles and address problems with the best knowledge. In this research, mental health is scoped only focus on resilience in youth. Resilience itself is defined as the ability of someone recover from the trauma, impactful life changes, or serious illness (Kalisch & Kampa, 2021). This article, which is part of the research, aims to explain a website development as a

part of bigger research project, EKSIS. Our research protocol has explained the motivation, research stages, and relevant literature used in this research (Rachmayanti et al., 2024).

There are web-based applications that relates to young people, related to mental health in general, and more specific in resilience. A result in qualitative design research shows that three main components in these kind of website are (1) basic information about mental health services and how-to manuals, (2) knowledge about misconceptions and stigma in mental health and how to counter those correctly, (3) stories in digital platform will likely to be chosen as a form of giving those information (Adeane & Gibson, 2023). However, user requirement for EKSIS focus on deploying useful materials and put them into one place. So that young people can find validated and relevant information related to what they need. Our previous research findings (Rachmayanti et al., 2024) shows that there is *sequence* and *relatedness* in the knowledge about mental health for teenagers. For example, someone need to understand his own feelings first, therefore they need information about how to express feelings. Thereafter, he may try to need information on how to communicate the feeling to other person, such as to guardians or parents. This *sequence* is exist and must be assisted so the teenager can understand the mental health related information with the same view. Besides that, to increase the *relatedness*, records about what kind of materials they already read and understand should be easily accessed by parents or by professionals. By having the records, parents or professionals can review and implement the materials in the real life. A news-like information is useful to attract website users without any requirement to sign-in and submit further personal information. This information is also preferable to adolescents who are reluctant to share their identity during sign-up process.

Another web-based project focused on female adolescents combating depression. The research used a randomized controlled trial to 128 female students with mild to moderate depressive symptoms (Moeini et al., 2019). This website offer more types of information media rather than text only (Adeane & Gibson, 2023), this website consists of short videos, animations, and Power-Point slides. In our previous interview results, Indonesian teenagers are attracted to animation and visual approach rather than text. So, this website is close enough to user requirement for EKSIS. However, besides the preference of *visual* media that can boost their motivation to read, our need-finding interview results show that teenagers need a place to *express* their feelings with least negative judgements. A feature that allows teenagers to express their ideas, current situation, and feelings is not exist yet in both websites. Both websites are mainly providing information to be read by the users (one-way).

A program that utilizes a website is also developed specially for cancer survivors (Mizrach et al., 2022). The website supports adolescents and youth after receiving cancer treatments in order to improve physical health that is closely connected to healthy mind. The resiliency program, Bounce Back, is delivered through video conferences, and relaxation training as a website feature. In the context of cancer survivors, there is an important need to have face-to-face consultation rather than written media. However, in general, young adults and adolescents likes to *remain anonymous* so they have no burden to express their mood or showing their authenticity (Ellison et al., 2016). This anonymity is one main important characteristics of adolescents, therefore, EKSIS is expected to facilitate anonymous interactions. But Bounce Back have a structured training program that have *sequence* and make sure that the participants follow and pass the designed program. This feature is suitable with the need of the potential EKSIS users.

To sum up, in order to increase resilience in young adults and adolescents, EKSIS have several values that need to be put as website contents and features. Those values are remain anonymous, have sequence, have relatedness, freedom to express, minimum negative judgments, and visually-appealing media.

2. Methods

System Development Life Cycle (SDLC) approach is commonly used to develop computer-based applications. Knowing that this research will involve several people in different (study) backgrounds, thus, a life cycle approach that allows potential end-users to assess and review the prototype back and forth is required. Therefore, Rapid Application Development (RAD) is chosen in this research implementation. RAD is widely used in developing computer programs in biomedical, health, medicine (Glez-Peña et al., 2010).

Figure 1. Rapid Application Development.
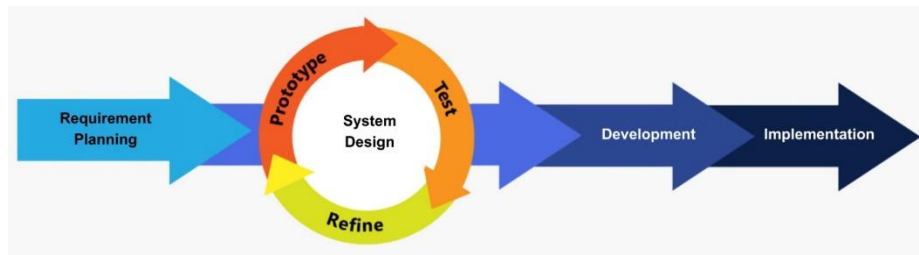
The website development process starts with cycle 1 interviews with potential users (i.e., need finding). There are three types of potential users: users that need to know basic information about mental health issues in youth and follow the sequence of modules (e.g. teenagers), users that give directions to teenagers on a daily basis, either at school or at home (e.g. teachers, counselors, parents, homeroom class), professional users that advise both teenagers and parents (e.g. psychiatrist, psychologist, academic counselors). The interviews aim to seek out common mental health problems in youth and their expectations on the web. There are 18 informants that cover all three potential users: 8 subjects are teenagers aged 16-18 years old, 8 subjects are their parents, and 2 professionals in psychology subject. Interviews were conducted in their houses in order to make them relaxed and open to sharing their stories.

After getting their requirements, the next step in RAD is to make a **prototype**. The first prototype contains several *basic requirements*. Then, this first prototype is delivered to high school students to gain feedback (i.e., **test phase**). Their feedback, *extended requirements*, is used to improve the EKSIS website and deploy a second prototype (i.e., **refine phase**). After refining the EKSIS website three times and getting the *final requirements*, the website is **deployed** using WordPress platform and **implemented** during several months to measure the resilience of the youth. The resiliency score is measured before and after using EKSIS website as explained in this research protocol (Rachmayanti et al., 2024). The results of the youth resiliency will be written in a separate research article.

3. Results

As explained in the previous section, there are three types of requirements. Each requirement type is obtained from two **system design** loops. *Basic requirements* are learning modules for both parents and teenagers (see Figure 2), and quizzes (see Figure 4) related to the modules, a place to express happiness for teenagers, general information about mental health that no sign-in requirement to read it (see Figure 3). Thus, everyone that visits the EKSIS website can get knowledge about mental health in youth, especially resiliency. The first and second prototypes are delivered to the 18 students and their parents that participate in this research. Whereas the second prototype is shown to two psychologists who are focused on youth study. The inclusion of two experts here are to seek out advice from professional views and create access for teenagers to visit them when in need without any hesitation.

During this session, several feedbacks were obtained. Three students shared their opinion about the modules: they need motivation to stay enrolled in the modules. They are already overwhelmed with homework and school activities; hence, they requested a reward scheme to make them finish their modules. Another feedback was given, there is a need for positive gestures from viewers about happiness posts. By having support from unknown visitors, the user becomes less reluctant to share their happiness. The support should be limited, but it has to have positive impacts. Last, a voice from parents that requires articles for them to understand teenagers more. They argued that they live in different eras compared to these generations. Their parents, teenagers' grandparents, have a very different approach to educating them. So, the ones that need to learn about mental health are not only the students, but also their parents (see Figure 5). Thereafter, feedback obtained in this first system design loop is the *extended requirements*.

After tailoring both basic and extended requirements, another test is delivered. This test is not only given to the 18 students and two psychologists. Views from students and parents are positive, and they lightly suggest to have some entertainment besides the learning modules. The entertainment here could be an interactive game, or a chatbot. So, the users can balance between learning and playing on the EKSIS website. Meanwhile, psychologists have a view about summary that can give information about module sequence and trace each user's learning progress (e.g., gradebook). Besides that, psychologists suggest that there is a special menu for parents. This menu contains tips for coping with teenagers' daily problems (see Figure 5). Feedback gathered from this second system design loop is the *final requirements*.
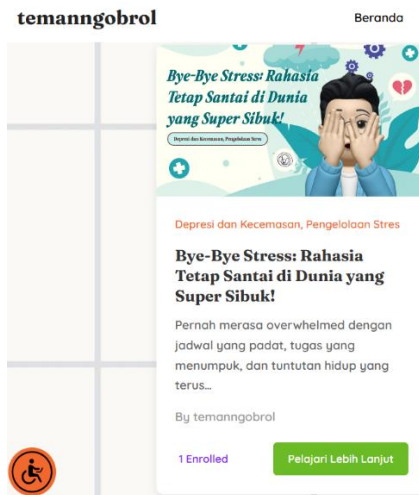
Figure 2. Basic Requirement: Learning Modules.

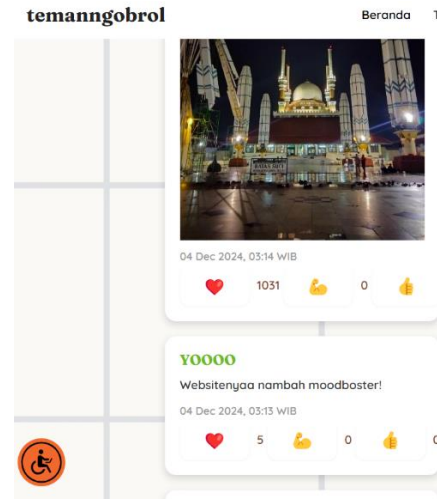*Figure 3. Basic Requirement: Happiness Corner.*
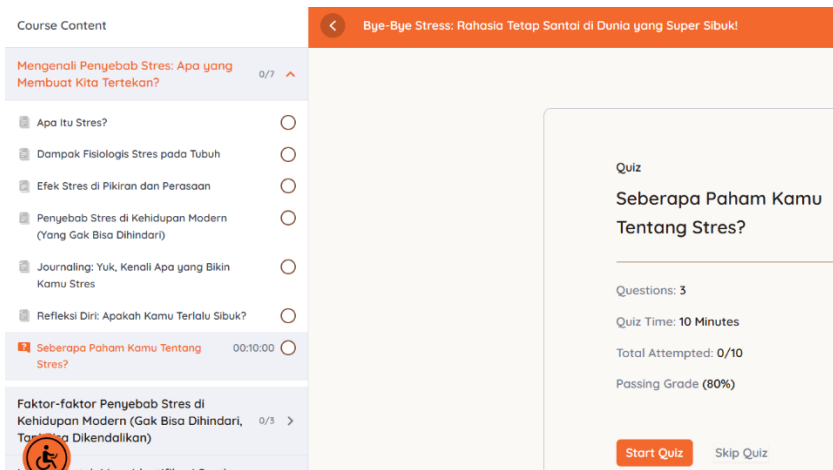

Figure 4. Basic Requirement: Quizzes.

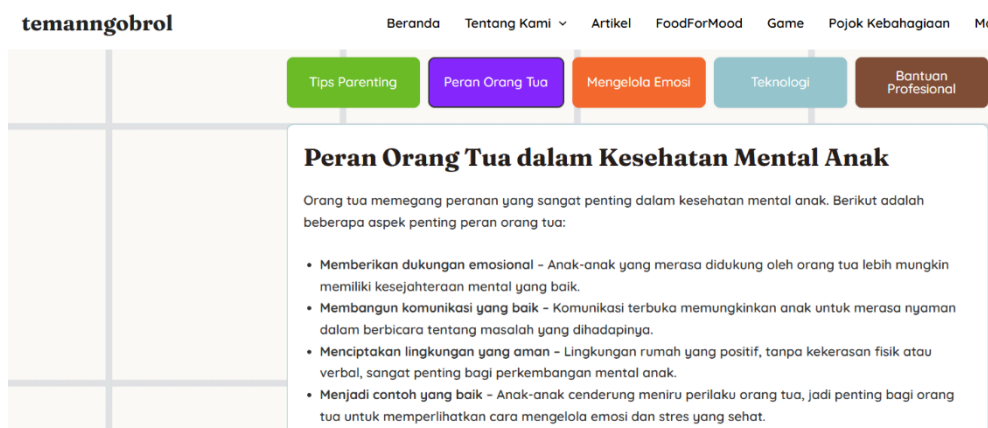

Figure 5. Extended Requirement: Information for Parents.

Figure 6. Final Requirement: Rewards and Activity Log in a Gradebook.

Lastly, EKSIS is deployed in WordPress platform (https://temanngobrol.org/) and performed user acceptance testing to 60 high school students. While disseminating this website, a 5-scale System Usability Scale (SUS) questionnaire is also distributed to the subjects. The SUS questionnaire aims to measure the system in accessibility, usability, content, user interaction, and the overall aspects of the EKSIS website. The SUS results show that the overall website is satisfying (81,6%). The highest and the lowest score in the EKSIS is the content (91,02%) and usability aspect (78.17%). Two questions that receive the lowest score: the motivation to learn many new things on the website (63.39%), and the motivation to visit the website regularly (67.8%). The complete questionnaire and score result can be found in https://its.id/SUSq.

4. Conclusions

This article aims to create a tool that is used in a community-based program to increase resiliency in youth. The tool is developed using Rapid Application Development and results in a website application, EKSIS. The website is built through three system design loops in which each loop yields a set of requirements. These requirements are suggested by three typers of users: teenagers (18 subjects), parents of teenagers (18 subjects), and psychologists (2 subjects). At the end of the loop, the website is deployed in WordPress platforms and a System Usability Scale questionnaire is displayed to measure the usability of the website final version in a user acceptance test. This acceptance test involved 60 high school students who are in different subjects with the ones who participated in requirement planning and design phase. During the acceptance test, EKSIS website received an overall score of 81% which means the website usability is satisfying. However, there are two aspects that need to be improved: the users' motivation to learn new things through the website; and their willingness to visit the website regularly.

References

Adeane, E., & Gibson, K. (2023). Using Web-Based Content to Connect Young People With Real-life Mental Health Support: Qualitative Interview Study. *JMIR Formative Research*, *7*, e38296. https://doi.org/10.2196/38296

Ellison, N. B., Blackwell, L., Lampe, C., & Trieu, P. (2016). "The Question Exists, but You Don't Exist With It": Strategic Anonymity in the Social Lives of Adolescents. *Social Media + Society*, *2*(4). https://doi.org/10.1177/2056305116670673

Glez-Peña, D., Reboiro-Jato, M., Maia, P., Rocha, M., Díaz, F., & Fdez-Riverola, F. (2010). AIBench: A rapid application development framework for translational research in biomedicine. *Computer Methods and Programs in Biomedicine*, *98*(2), 191-203. https://doi.org/10.1016/j.cmpb.2009.12.003

Kalisch, R., & Kampa, M. (2021). Stressor Appraisal as an Explanation for the Influence of Extra-Individual Factors on Psychological Resilience. In *Multisystemic Resilience* (pp. 135-152). New York: Oxford University Press. https://doi.org/10.1093/oso/9780190095888.003.0008

Mizrach, H., Goshe, B., Park, E. R., Recklitis, C., Greer, J. A., Chang, Y., Frederick, N., Abrams, A., Tower, M. D., Walsh, E. A., Huang, M., Kenney, L., Homans, A., Miller, K., Denninger, J., Usmani, G. N., Peppercorn, J., & Perez, G. K. (2022). Randomized Waitlist-Control Trial of a Web-Based Stress-Management and Resiliency Program for Adolescent and Young Adult Cancer Survivors: Protocol for the Bounce Back Study. *JMIR Research Protocols*, *11*(1), e34033. https://doi.org/10.2196/34033

Moeini, B., Bashirian, S., Soltanian, A. R., Ghaleiha, A., & Taheri, M. (2019). Examining the Effectiveness of a Web-Based Intervention for Depressive Symptoms in Female Adolescents: Applying Social Cognitive Theory. *Journal of Research in Health Sciences*, *19*(3), e00454. http://www.ncbi.nlm.nih.gov/pubmed/31586376

Rachmayanti, R. D., Dewi, F. S. T., Setiyawati, D., Megatsari, H., Diana, R., & Vinarti, R. (2024). Using Digital Media to Improve Adolescent Resilience and Prevent Mental Health Problems: Protocol for a Scoping Review. *JMIR Research Protocols*, *13*, e58681. https://doi.org/10.2196/58681

Ruiz-Ranz, E., & Asín-Izquierdo, I. (2024). Physical activity, exercise, and mental health of healthy adolescents: A review of the last 5 years. *Sports Medicine and Health Science*. https://doi.org/10.1016/j.smhs.2024.10.003