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# Integrating Digital Health Model to Prevent Mental Disorders among Low-Income Citizens: A Roadmap

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### ABSTRACT

Malaysia population faces a variety of health issues, majority of Malaysians' second-most urgent health concern is their mental health. 40% of the 500,000 Malaysians who are depressed come from the low-income category. Numerous studies have shown that persons with the most severe mental health needs frequently encounter considerable obstacles when trying to receive the required services. A sustained intervention paradigm is therefore urgently needed to address these problems. WHO emphasizes the need to ensure that all people, regardless of their socioeconomic or social standing, have better access to high-quality mental health care services. The use of digital mental health services during the COVID-19 pandemic significantly decreased the incidence of psychological distress among the population. Global health authorities are now issuing urgent appeals for individuals to avail themselves of digital mental health care, as it provides a more readily accessible and cost-effective approach. Thus, this study aims to examine influencing factors that encourage low-income groups to engage in digital mental health and recommend the best approach to prevent mental disorders among low-income. This paper presents the roadmap to formulate the Integration of a Digital Health Model to Prevent Mental Disorders Among low-income citizens. The study's targeted sample consists of individuals who are 18 years and above and belong to low-income groups. This study conduct interviews with medical practitioners from public health care, non-governmental organizations, and low-income groups. This research significantly contributes to the Malaysian government in addressing mental health and achieving Malaysia's shared prosperity vision (SPV2030) and 10-10 MySTIE framework to the national plan and SDG goal 3 of good health and well-being for all.

#### Keywords:

Digital health model; mental disorder; low-income citizens

## 1. Introduction

The number of mental health crises worldwide has increased since the coronavirus pandemic. Mental health has become a vital field of study, gaining significant attention from researchers

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globally. Research on "Protection of the Right to Health Care During the COVID-19 Pandemic in Southeast Asia" has made significant contributions to academia, policy development, and practical implementation in various important ways [1]. In Malaysia, the rising incidence of mental health disorders underlines the need for improved access to swift and effective mental healthcare services to reduce this burden. Despite the broad acknowledgment of mental illness, many individuals remain hesitant to pursue mental health services due to the enduring societal stigmas, which are primarily driven by a lack of widespread awareness and understanding [2]. According to the National Health and Morbidity Survey (2020), the incidence of mental health problems among low-income Malaysians was nearly 40%. Ministry of Health Malaysia reports that one in three Malaysians aged 16 and older struggle with mental health issues [3]. In East Malaysia's rural areas, 43% of the population is affected by mental health issues, the highest in the country, with Kuala Lumpur following at 40%. Stress arises when severe socioeconomic challenges like higher unemployment, poverty rates and difficulties accessing necessary healthcare services [4]. Due to the limited access to mental health services, the surge in mental health issues may go untreated or undiagnosed [5].

These factors, along with stronger stigmas, limited access to both general and mental healthcare, and the tendency to seek alternative treatments from religious healers, increase the likelihood and persistence of mental health problems [6]. Those experiencing stress may exhibit behavioural changes that negatively impact personal health. Prolonged stress can harm physical well-being, leading to conditions like hypertension, cardiovascular issues, and a compromised immune system [7]. Numerous studies have shown that individuals with the most acute mental health requirements often encounter significant barriers to accessing necessary services [8]. WHO emphasized that all people should have better access to quality mental health care services, regardless of their income and social status or location [9]. Digital health helped the incidence of psychological distress among citizens during Covid-19 as it improves accessibility, and efficiency, with benefits in both patient outcomes and cost [10].

Private healthcare groups in Malaysia have stepped up their digital mental health service offerings however people from only the middle-income level and above can afford it. Although the Malaysia government provided a national health insurance scheme for the low-income group in 2019, it only covers the top four critical illnesses but does not cover the second biggest health problem which is mental health [11]. To achieve the Sustainable Development Goals (SDG), i.e., to ensure universal access to healthcare services, every citizen, regardless of class or income, should have access to the basic healthcare system. Hence, digital health technologies cannot operate in isolation and need to be integrated into existing public healthcare systems.

Scientific research highly recommended that early detection and affordable digital intervention for mental health hold great promise for improving long-term outcomes [12]. However, the validation for digital mental health interventions in real-world settings is still insufficient [13]. There is still a significant need for additional research to investigate the use of affordable digital mental health tools to prevent mental disorders. Hence researchers such as Torous *et al.*, [14], urgently call for future researchers to investigate it. Given the complexities of human behaviour particularly in the health context, researchers argue that no single theory can fully explain how behaviours change over time [15]. This research explores three prominent theories to produce an integrating model that engages in digital mental health to prevent mental disorders. The first objective of the study is to investigate the factors that motivate low-income populations to participate in digital mental health; the second objective is to recommend the best approach to prevent mental disorders among low-income groups and finally to develop the digital health model to prevent mental disorders among low-income citizens.

## 2. Literature Review

Many young adults today face stress and depression, but because it's talked about so frequently in the media, the community often doesn't take it seriously. This is partly due to a lack of awareness about the seriousness of the issue. As Mazlan Ibrahim and colleagues note, emotions are complex and can lead to problematic behaviour. For mental health researchers, focusing on the key ideas of major behavioural theories can be useful when developing treatments, especially those using modern digital technologies [16]. Researchers studying mental health services may find it helpful to highlight the fundamental ideas of significant behavioural theories while designing and implementing therapies utilising cutting-edge digital technologies. Given the complexities of human behaviour, some argue that no single theory can entirely explain how behaviours change over time [15]. Hence, this research explores three prominent theories:

- i. the health belief model
- ii. the social cognitive theory
- iii. the persuasive system design model.

These three theories are widely cited and used to guide successful interventions targeting behaviours.

- i. Health Belief Model (HBM): It is a social psychological model of health behaviour change that enlightens and forecasts actions connected to health [17]. Following the Health Belief Model (HBM), individuals' beliefs regarding health issues, their perception of the advantages of taking action, the obstacles to taking action, and their self-confidence collectively clarify their involvement (or absence thereof) in behaviours that promote health [18]. The health-promoting conduct must also be activated by a stimulus, often known as a cue to action [5]. In order to guide medication adherence initiatives, this model has been frequently adopted [19].
- ii. Social cognitive theory (SCT): It discusses how personal experiences, other people's actions, and environmental circumstances affect a person's health behaviours. According to this hypothesis, social interactions and social pressures influence the behaviour of those who are mentally ill. This theory also guides that health behaviour is explained based on awareness, self-efficacy, self-evaluation, social modelling, social norms, and social support [20]. The theory also informs strategies to promote engagement and sustained use of digital technology interventions over time by tailoring content for individual users.
- iii. Persuasive system design model (PSD): It is typically described as technology designed to affect the beliefs or behaviours of its users. The concept goes on to explain that information provided by computer technology is more persuasive when it is tailored to the person's needs, preferences, personality, and circumstances. These technologies can be classified into four groups, primary task aid, interactive assistance, credibility improvement, and social reinforcement [21].
- iv. Factors of Adoption of Digital Mental Health Platform: Based on underpinning theories such as the health belief model, social cognitive theory, and persuasive system design model, this study proposes influencing factors that encourage individuals to engage in digital mental health. These factors will be further explored and edited during the

- interview to ensure the most relevant factors are included in the study in the context of B40 groups in Malaysia.
- v. Engage in digital mental health: Digital health is a broad area that includes, among other things, telemedicine, electronic health, and mobile health. In addition to helping to map disease outbreaks and integrating digital tools that make health care more responsive and effective, it offers solutions that can help to enhance health systems. While the integration of technology poses significant challenges, it remains crucial to introduce digital tools to the younger generation as soon as feasible. Embracing information technology and internet-driven automation opens up abundant avenues for the exchange of data between humans and machines, fostering an unprecedented level of communication between these entities [22]. These include bringing digital health services directly to people's homes and to underserved communities. When a digital intervention service grants an individual user access, it diminishes obstacles to receiving care, including challenges related to stigma and those faced by patients with mobility and accessibility issues [23].
  - vi. Availability of Mental Health Insurance: The affordability of mental health services has consistently posed a significant hindrance to accessing care for individuals dealing with mental health problems. Abdulmalik *et al.*, [24] stated that patients and their families are compelled to shoulder substantial financial burdens and face challenges in terms of psychosocial support due to insufficient funding and limited access to mental healthcare.
  - vii. Prevent mental disorders: In the current crisis, using digital health to give mental health care is the best option. There are limited studies of digital technology for mental health information and prevention of mental disorders, conducted in countries such as China as stated by Zhang *et al.*, [25] and India [26]. Studies revealed that those who effectively participated in online mental health courses and activities frequently reaped benefits, such as a decrease in depressive and anxious symptoms and an improvement in quality of life [27]. Likewise, Rahayu *et al.*, [28] reached a similar conclusion in their research, stating that the intervention of technology promotes healthy lifestyle behaviours and has proven to be effective in encouraging behaviours conducive to better health.

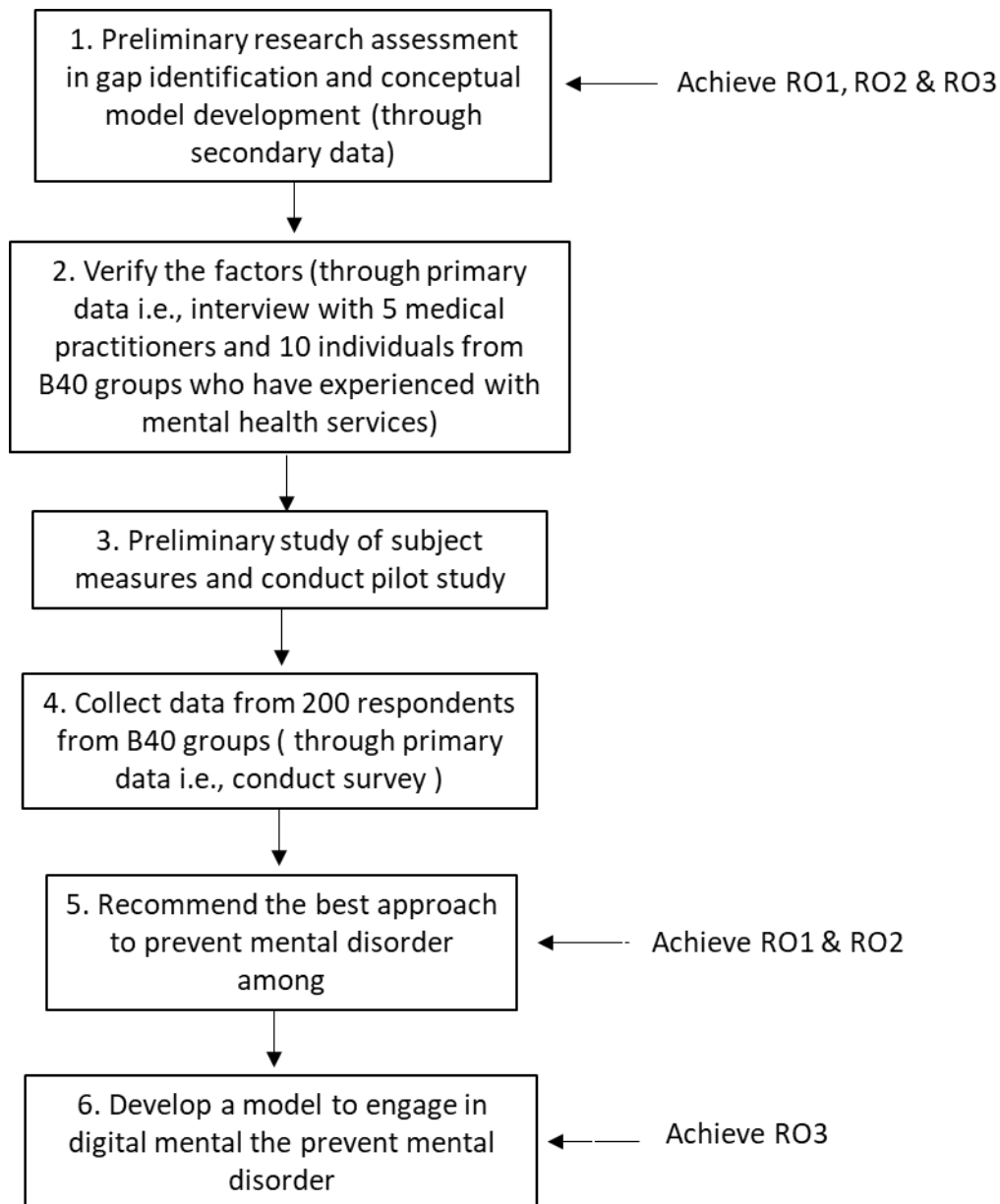
### 3. Methodology

The formulation of Integrating a Digital Health Model to Prevent Mental Disorders Among Low-income Citizens is basically the initial idea of our research. Our main objective is to share the complete roadmap in order to receive feedback on our model formulation. Figure 1 illustrates the entire steps of the model formulation. This research adopts an inductive approach, a common method in health and social sciences research. This approach includes conducting thorough examinations of the data to guide the analysis, rather than being influenced by preconceived hypotheses. This method is suitable for this study as this study aims to explore the practical factors that motivate low-income populations to engage in digital mental health. The study's targeted sample consists of individuals who are 18 years and above and belong to low-income groups, living in Klang Valley, Malaysia. Respondents will be selected by convenience sampling.

This research first used qualitative method which aims to explore factors that influence low-income groups to engage in digital mental health. The interview method was employed for data collection, as it offers the potential for interactive discussions that can yield valuable insights from various viewpoints. Online meetings via Google Meet were scheduled when in-person discussions were not possible due to the conflicting schedules of participants. The first stage of the interview was

carried out with the medical practitioners from public health care. Semi-structured questionnaires were used as a guide to ensure that the discussion was focused on research objectives. The second stage of the interview was carried out with low-income groups consisting of 10 participants who have experienced early stages of anxiety and have used mental health services. This study excluded those individuals under the age of 18, as they are legally categorized as a protected group and may not possess the capacity to make informed decisions in their own best interests. Additionally, young people in this age range may be particularly vulnerable to undue influence.

From the outcome of interviews with people from diverse perspectives, influencing factors in engaging digital mental health were discovered, and also to study the relationship between engaging digital mental health and preventing mental disorders. In the next step, the quantitative method was used to generalize the results to a wider population of low-income groups. Prior to the field study, a preliminary study was conducted. The subject measures for each variable were evaluated during the preliminary investigation using Likert five-point interval scales. The survey questionnaire's validity and reliability were confirmed by pilot research with 20 participants. A sample of 200 young adults from a low-income group received the final, revised structured questionnaires during the second phase of data collecting. Administering and completing of questionnaire are based on the low-income group perception. From analysing the data collected, this study recommends a final confirmed integrated health behaviour model to engage in affordable digital mental health to prevent mental disorders among low-income groups. Figure 1 describes the details process of developing an integrated digital health model for preventing mental disorders among low-income citizens. This research focuses on the initial phase of preliminary research assessment in identifying gaps, specifically examining the influencing and intervening factors involved in digital mental health and conceptual development.



**Fig. 1.** Formulation process of integrating a digital health model to prevent mental disorders

#### 4. Initial Results

At present, our research is in its initial phase, illustrated in Figure 1, which involves the collection of data through a secondary data source – specifically, a Systematic Review process. The primary goal of this phase is to investigate the factors that motivate low-income populations to engage in digital mental health. Our research has unveiled that the motivating factors for engagement among low-income groups in digital mental health can be categorized into Accessibility, Affordability, Communication, and Cultural Sensitivity, as outlined in Table 1 below.

**Table 1**

Influencing factors that encourage low-income groups to engage in digital mental health

Review study ID	Author, year	Low-middle- & below-income group	Mental disorder	Influencing factor
1	Sultana and Pagán [29]	US low-income population	Depressive Disorder Anxiety	Accessibility- Easy access Communication- Bilingual
2	Koly <i>et al.</i> , [15]	Bangladesh	Mental Health	Accessibility Affordability
3	Naslund <i>et al.</i> , [30]	India South Africa	Depression schizophrenia	Accessibility- flexibility
4	Lee <i>et al.</i> , [31]	Urbana	Stress, mental illness	Cultural & Sensitivity

- i. **Accessibility:** Individuals are inclined to utilize digital mental health interventions and assets when they have the means to reach them. Digital mental health encompasses a wide array of online resources, programs, and platforms aimed at fostering and improving mental well-being. In this context, ensuring accessibility implies that these materials are available and usable for all individuals, including those facing impediments or obstacles hindering their access. Accessible digital mental health platforms can facilitate the creation of peer networks and supportive communities with greater ease. Prioritizing accessibility ensures that individuals facing similar challenges and experiences can connect and engage more readily. Efforts aimed at enhancing accessibility often incorporate educational components. These components can promote the utilization of digital resources, raise awareness about the significance of mental health, and provide guidance on their effective utilization. Moreover, features that enhance accessibility, like mobile applications, simplify the process of reaching digital mental health resources from the convenience of one's home or while on the move. This added convenience can serve as a motivation for individuals to engage more regularly.
- ii. **Affordability:** If individuals can comfortably afford them, they are more inclined to utilize digital mental health services and assets. Typically, online mental health resources tend to be more budget-friendly compared to traditional face-to-face mental health services. Many applications and digital solutions offer no-cost or budget-friendly versions with basic functionalities, ensuring accessibility for a broader user base, regardless of their financial circumstances. The perception that digital mental health services are economically viable encourages individuals to seek treatment or adopt preventive mental health practices since they can avoid concerns related to the high costs associated with conventional therapy. This affordability can be achieved through pay-what-you-can models, subscription-based services, and options that do not impose insurance constraints. When digital mental health tools are both accessible and economically feasible, people are more likely to engage in preventive mental health practices.
- iii. **Communication:** The ability to effectively communicate is essential for motivating people to use digital mental health treatments and resources. People can better grasp what is offered, how it functions, and how it can help them if there is clear and simple communication about digital mental health services and resources. Communication initiatives can increase public awareness of the value of mental health and the accessibility of online resources. Platforms like social media, educational programs, and

public health campaigns can enlighten individuals about the advantages of seeking support on the internet, thereby reducing stigma and nurturing mental well-being. Ensuring open communication regarding privacy and confidentiality policies within digital mental health services is of utmost importance. When individuals are assured that their information will be treated with utmost privacy, they are more likely to place trust in and utilize these services. Sharing personal stories and endorsements from people who have benefited from online mental health services can be an effective communication tool. Such positive reviews and success stories have the potential to inspire others to explore these tools. In summary, effective communication plays a pivotal role in motivating individuals to engage with digital mental health services. Clear, customized, and encouraging communication methods can help individuals gain a better understanding of the utility of these tools, alleviate their concerns, and foster a sense of comfort when seeking online assistance for their mental well-being.

- iv. Culture sensitivity: Cultural sensitivity is a critical factor in encouraging individuals from diverse backgrounds to engage in digital mental health services and resources. In many cultures, there is a significant stigma associated with mental health issues. Culturally sensitive digital mental health resources can address cultural beliefs and perceptions about mental health, helping to reduce stigma. When individuals feel that their cultural perspective is considered, they are more likely to seek help. Cultural sensitivity efforts can also include educational initiatives that raise awareness about mental health within specific cultural contexts. This can help normalize discussions about mental health and encourage engagement.

Cultural sensitivity respects traditional healing practices and beliefs. It does not impose Western approaches to mental health but rather integrates and complements them. This approach encourages individuals to feel comfortable seeking help in a way that aligns with their cultural values. Cultural sensitivity includes offering resources in multiple languages to cater to individuals who may not be fluent in the dominant language of the digital platform. This ensures that language is not a barrier to accessing mental health support.

Cultural sensitivity is essential in making digital mental health resources inclusive and accessible to individuals from diverse cultural backgrounds. When individuals see that their culture is respected, their beliefs are considered, and their unique needs are addressed, they are more likely to engage with and benefit from these resources, ultimately promoting better mental well-being within culturally diverse communities.

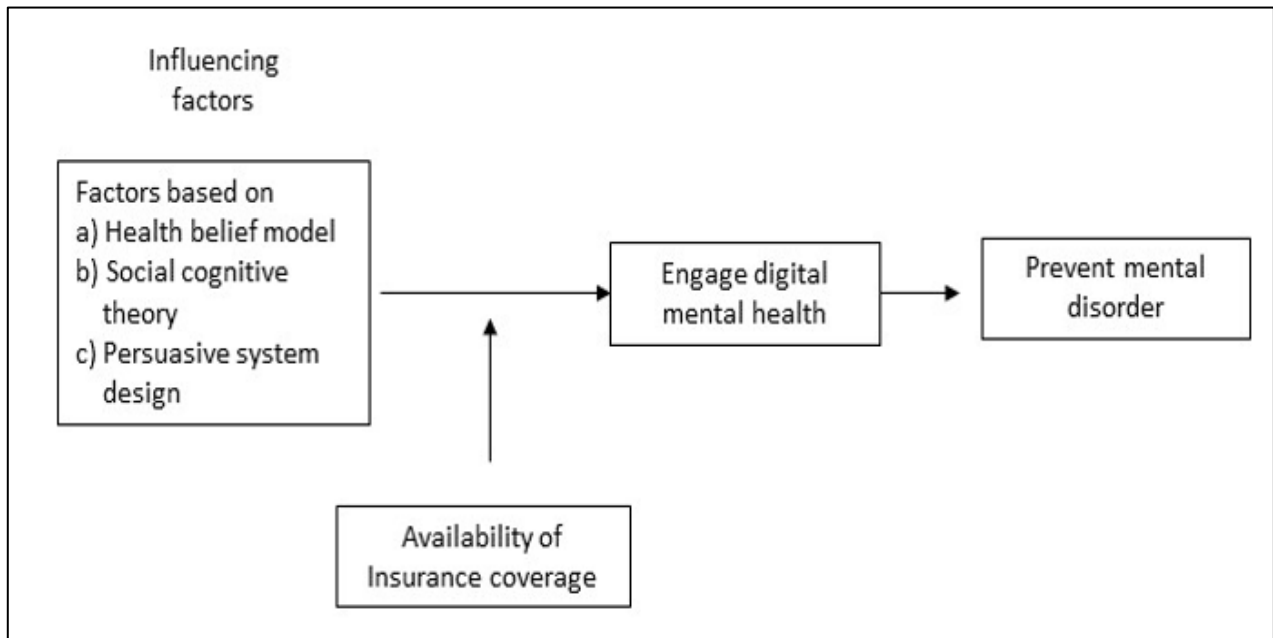
The second objective is to recommend the best approach to prevent mental disorders among low-income groups. A study published in *The Lancet* in 2018 estimated that mental health care services impose a financial burden of over RM14 billion annually on the Malaysian economy. Approximately ten million Malaysians dealing with mental health issues seek treatment from both public and private healthcare systems. While public healthcare facilities are affordable, the shortage of mental health professionals' results in extended waiting periods and suboptimal care. Consequently, some individuals resort to seeking mental health services in the private sector, despite the high costs associated with private care. Adding to the issue is the fact that most medical insurance plans in Malaysia exclude coverage for mental health disorders [32].

Low-income individuals typically have limited disposable income, which means they may not have the financial flexibility to invest in digital mental health services, even if they understand the potential benefits. Without insurance coverage, low-income individuals may miss out on the opportunity to address mental health concerns before they escalate into more serious conditions, potentially



leading to greater costs for the healthcare system in the long run [33]. Hence, this study recommends inclusiveness of mental health in the current insurance policy for the low-income group.

Third objective is to develop the digital health model to prevent mental disorders among low-income citizens. Drawing from the analysis of foundational theories and the evaluation of prior literature, this study presents the following framework. All these are shown in Figure 2 below.



**Fig. 2.** Integrated model to engage in digital mental health to prevent mental disorders

## 5. Conclusion

The research sets out to accomplish three primary research objectives. First, it seeks to explore the factors that drive low-income populations to engage with digital mental health. Second, it seeks to evaluate the importance of incorporating mental health coverage into existing insurance policies for this demographic. Lastly, the research strives to formulate a 'Digital Health Model for Preventing Mental Disorders Among Low-income Citizens. The analysis of secondary data uncovered that accessibility, affordability, communication, and cultural sensitivity are key influencing factors that drive engagement in digital mental health among individuals from low-income backgrounds. Additionally, news reports highlighted the critical role of insurance coverage in enabling individuals to access mental health services. This study illustrates the systematic process of model development, including the activities undertaken, along with our initial findings from the Systematic Review process.

## 6. Contribution and Future Work

This study produces an integrating health behaviour model that engages in digital mental health to prevent mental disorders among the low-income group", based on three prominent theories:

- i. health belief model
- ii. social cognitive theory
- iii. persuasive system design model.

The research findings particularly serve as an advantage, with a focus on improving access to digital mental health services for low-income populations through the inclusion of mental health coverage in the existing insurance policies designed for this income group. The results of this research will provide valuable insights for both private and public healthcare facilities in Malaysia. These insights can help in the integration of digital mental health platforms into existing and upcoming IT systems, thereby enhancing their capabilities, especially during times of crisis. The adoption of digital mental health solutions will address several inefficiencies, including the need for physical visits to hospitals or GP clinics, long waiting times, and the associated higher costs of medications.

Subsequent research endeavours should explore the proposed integrated digital mental health model's effectiveness in preventing mental disorders among diverse income groups and across various countries. Additionally, future studies should investigate the extent to which this model can contribute to reducing the prevalence of mental disorders in the populations under examination.

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