

The University of Hong Kong
Department of Computer Science

Final Year Project
Project Plan

**A Mobile Game to Strengthen Youths' Competencies
for Mental Health Self-care**

Yau Herman (3035570054)

Supervisor: Dr. Schnieders Dirk

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1 Background

1.1 Prevalence of Mental Health Problems

Mental health affects the way humans make decisions, feel emotions, and take actions. It has an important role in our well-being, as it helps us to cope with stress, connect with others, and make society contributions. The World Health Organization defines mental health as “an integral component of health and well-being and is more than the absence of mental disorder.” [1]

However, mental health problems are prevalent across the globe. It is estimated that 1 in every 8 people are living with a common mental health condition around the world [2], with anxiety disorders and depressive disorders being the most common, accounting for around 60% of the mental disorder cases (see Figure 1) [3]. Moreover, despite the steady prevalence rate of mental disorders in the recent years, the number of people living with mental disorders is still on the rise due to the global population growth, with an estimated increase of 25% between 2000 and 2019 [3]. In Hong Kong, an increasing trend in mental health problems among youth can be observed. It is found that there is a 50% increase in the number of children and adolescents diagnosed with mental health problems between 2011 to 2016 [4], which outgrows the global number.

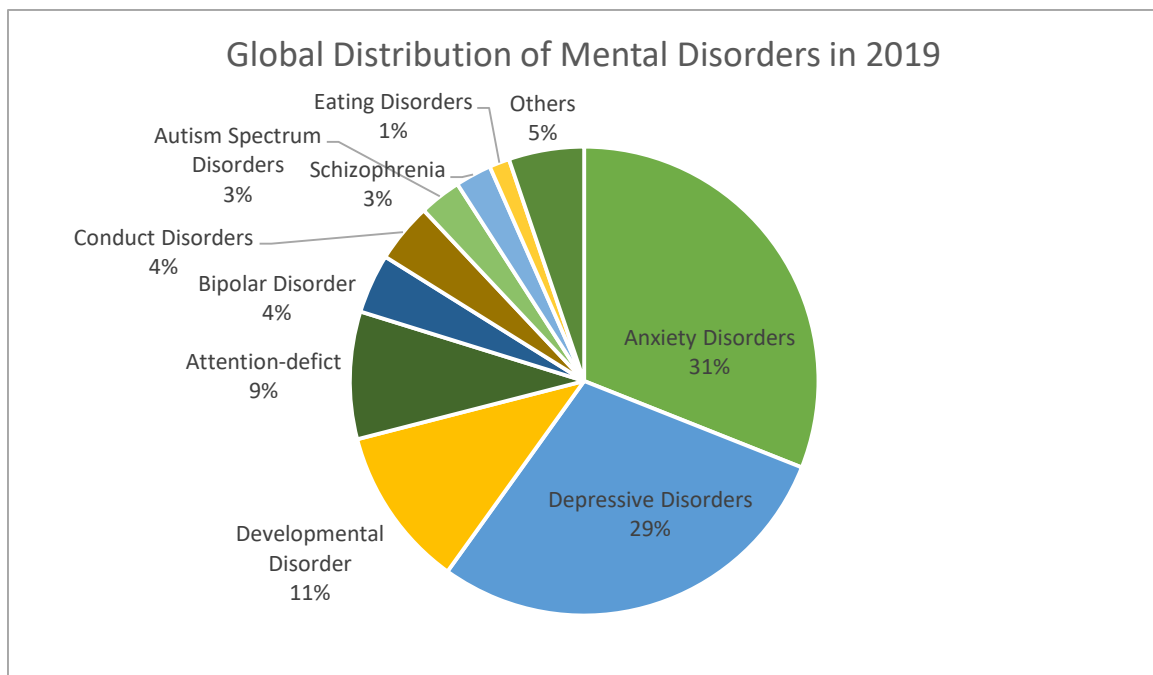


Figure 1: A graph showing the global distribution of mental disorders in 2019 [3].

1.2 Consequences of Poor Mental Health

Poor mental health will lead to premature mortality. It is found that individuals with severe mental health conditions have a higher chance of getting preventable diseases, therefore they have a decreased lifespan of 10 to 20 years [5]. Poor mental health may also lead to suicides, which accounts for more than 1% of the global deaths [6], and 8% of the deaths among the

15-29-year-olds [7]. In Hong Kong, the suicide rate between 2011 and 2022 for people aged between 15 and 24 has increased by 4.7, up to 12.2 per 100,000 people [8]. This is higher than the global suicide rate, which has reduced by 36% since 2000, to 9 per 100,000 people [9]. The increase of the suicide rate of this age group is also higher than other age groups, this is indicated by the converging difference in the suicide rate between these two groups (see Figure 2).

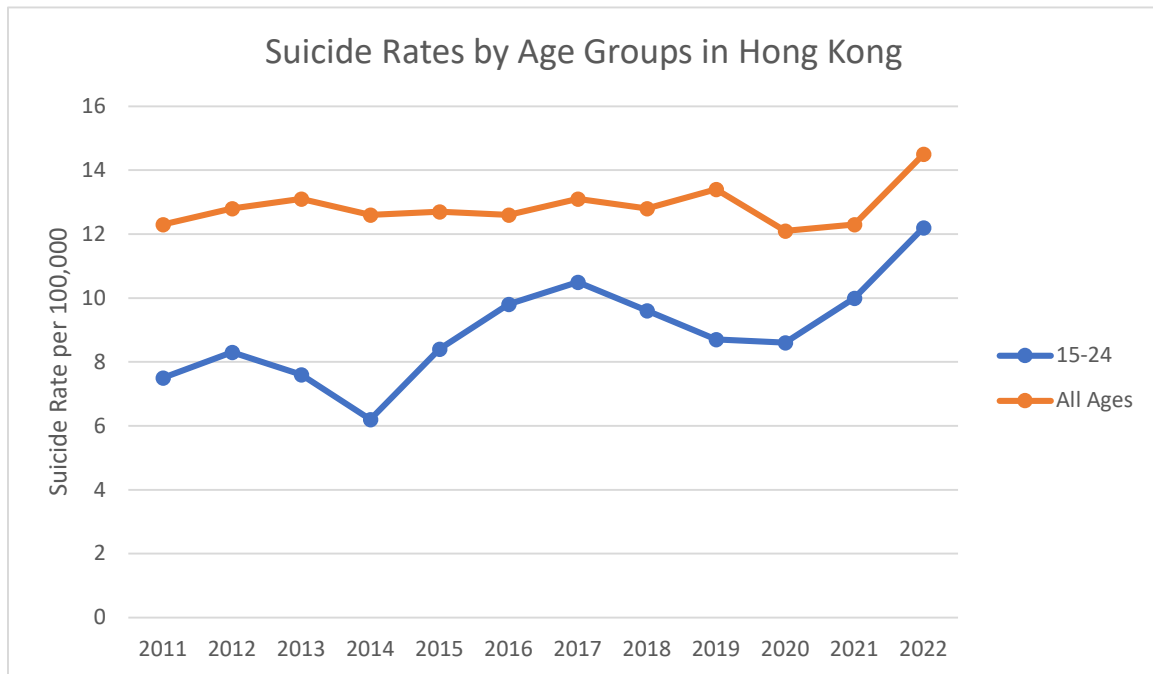


Figure 2: A graph showing the suicide rates by age groups in Hong Kong [8].

Youths with mental health conditions may impact their studies negatively as they struggle to concentrate or focus due to stress or sleep difficulties. It is shown by research that depression is associated with poor academic performance and attendance in school [10], this will impose challenges in their future employment and overall health [11].

Mental health conditions will also have impacts to the society. For instance, economic productivity is decreased due to premature deaths or disability. It is estimated that the societal cost of each treated individual, including the costs of treatment and forgone production value, is between US\$1180 to US\$18313 [12]. It is also projected that the global total cost of mental health conditions will rise from US\$ 2.5 trillion in 2010 to \$ 6 trillion in 2030 [13], which is higher than the costs of other severe diseases combined such as cancer and diabetes, indicating the significance of the cost of mental health problems.

1.3 Challenges of Mental Health Problems

Stigma is one of the biggest hurdles when it comes to mental health care. Mental health is often misunderstood, individuals with mental health conditions are stereotyped to be irresponsible, irrational, or dangerous [14]. As a result, those individuals may refuse to seek support or professional help due to the risk of being discriminated in the society. In Hong

Kong, only 26% of the people diagnosed with mental disorders have consulted professional help in the past year [15].

Another hurdle of mental health care is the service gap. In Hong Kong, there are only 4.39 psychiatrists per 100,000 people [16], which is half the number recommended by the World Health Organisation. The shortage of mental health workers results in long waiting time to see a psychiatrist in the public sector, which can reach up to 95 weeks for some stable mental health cases [17]. Moreover, the cost of private sector psychiatric consultations is unaffordable for some low-income families as their cost can be as much as 10 times more expensive than the public sectors [18]. As the wealth gap in Hong Kong continues to widen, more and more people will be unable to seek mental health support from professionals.

1.4 Self-care as Early Intervention for Mental Health

Early intervention of mental health illness identifies early warning signs and helps prevent symptoms from developing. Patients who have received early intervention had reported improvements in their lifestyle and quality of life [19]. It is estimated that half of all the diagnosed mental disorders start before 14 years old, and three-quarters start before 24 years old [20]. Early intervention during youth years will prevent more severe symptoms from developing in the later years. However, due to the huge demographic size, it would be unrealistic to provide professional care for early intervention of mental health to every individual.

The role of self-care is important when it comes to satisfying the society's demand for mental health. Self-care refers to activities that help individuals to live well and improve both mental and physical health even without the presence of a healthcare provider. A recent survey showed that the most-endorsed ways for improving symptoms of anxiety and depression are self-care activities including spending time outdoors and talking to people close to them [21]. Self-care can also be used clinically guided by specialists, this has been used in interventions for anxiety and depression and has shown to be as effective as face-to-face consultations [22].

1.5 Recent Trends of Video Game Industry

The video game industry is one of the most important sectors of technology nowadays. Report shows that there were 2.6 billion mobile game players in the world [23]. Video games are especially popular among youths, data shows that 99% of the male teens and 94% of the female teens play video games [24]. The convenience of mobile game applications, which can be installed on devices like smartphones and tablets, also contributes to the ever-growing size of the market demographic.

Video games are also becoming more complex. Nowadays video games do more than just provide entertainment, but they also create immersive experiences and become a medium to tell stories and convey ideas. For instance, the story of the game "Omori" revolves around a depressive young boy and explores his inner thoughts, while the game "Ring-Fit Adventure" encourages the users to do physical exercises at home on a routine basis. There are also educational games like "Kahoot!" to increase students' engagement in learning.

2 Objective

2.1 Project Aims

This project aims to contribute to solving mental health problems by helping youths to incorporate mental self-care routine into their daily lives and providing useful information on mental health wellbeing. The proposed mobile game application will use video game industry's appeal to youths as an advantage for early prevention of mental health disorders like depression and anxiety.

The project does not aim to be a replacement for professional help. While self-care can improve individuals' physical and psychological health and is effective in early intervention of mental health problems, self-care itself cannot act as cure for individuals who have already developed severe symptoms of mental health disorders. Recovery of mental health illness requires support from profession health workers and medical substances. Therefore, the application will not give mental health diagnoses to individuals or give medical advice.

2.2 Project Scope

In the proposed mobile game, users will be able to participate in a variety of self-care activities of different categories. For example, social activities encourage users to reach out and spend time with the people they love, physical activities help users to get enough sleep, eat healthy and exercise regularly, while emotional activities allow users to learn coping mechanisms through journaling and self-reflection.

An overview interface will be included in the game where users will also be able to review the past self-care activities that they have participated. This interface will also provide a summary of different metrics like the frequency of self-care activities participation, and the change in mood of the user. The overview will allow users to look for trends and improvements made since they first started using the application.

The game will also analyse metrics collected and suggest user to seek professional help when needed. The data source will come from answers that the user provided when completing certain activities.

The game will incentivize users to participate self-care activities on a routine basics by implementing game mechanics. For example, there will be in-game enemies that the users need to defeat by completing the self-care activities, users will then level up to unlock new in-game items. There will also be a simple story that progresses as the user levels up.

The deliverables of the project shall include an application that is installable on recent mobile devices running Android operating systems, along with a product manual that will include instructions on how to install and use the application.

2.3 Existing Solutions

Existing counselling services can also strength youths' skills of self-care. However, private counselling services are very expensive. In Hong Kong, the shortage of health workers results in a long queue for public counselling services, the effectiveness of such services is reduced as they are not immediate available. Also, counselling is not anonymous, and some individuals might avoid due to stigma and fear of discrimination.

Youths could also look for self-care materials individually by researching online. However, some of the web pages might contain inaccurate or misleading information. On top of that, information on the Internet is very scattered, therefore it could be very time-consuming for the youths to obtain the materials they need. Also, since self-care includes a huge variety of activities, the youths might only focus on the ones that do not suit their needs, and this will hinder the growth of their self-care skills.

There are physical products for self-care activities available from different organizations. For instance, consumers can buy gratitude journals specifically designed as a guide to help them write down their thoughts and feelings. However, physical products are not immediately accessible and are only available in some parts of the globe. Those products also come with price tags and individuals might be willing to invest money to purchase such products.

Self-care mobile applications are also available. However, some of these applications require money investment, and while an alternative free version may be provided, they are very limited in terms on functionality. On top of that, one major downside of using mobile applications is that they do not provide any incentives for users to use them on a regular basis.

2.4 Project Benefits

Users of the game can expect to improvements in health by practicing self-care on a regular basics using the game, which can lower the risk of getting mental health diseases like anxiety and depression through early intervention and prevention. Thus, the stress of the current healthcare system can be relieved as the number of patients with mental health problems is reduced. In the long term, this project may contribute to an increase in the labour productivity of the society due to decreased premature mortality rate and reduced number of individuals with disability.

The project can also help the healthcare workers to detect individuals with high risk of certain mental health problems. The game encourages users with usage data that shows potential risk of mental health problems to seek professional help. These individuals will have a higher chance of recovery due to early treatment, which increases the overall efficiency of mental health treatment.

When compared to other solutions, the proposed game provides a better incentive for users to build a regular self-care routine. First, the game is more convenient on-the-go. Users can use the application whenever and wherever without the need of making appointments required in some other solutions. Second, the game uses the advantage of its anonymity to allow users to play the game with an ease of mind without the feeling of shame or fear of discrimination.

Finally, the game has a low-entry bar for users as it is free of charge and is easily accessible on their mobile devices.

3 Methodology

In the design stage, experts in the clinical psychology field will be consulted for obtaining opinions on the design of the in-game self-care activities and the overall user flow of the application. The prototype of the game shall be completed before consulting these experts so that it can be used for concept demonstration.

Notion will be used for product management. The project progress and milestones will be managed within the software. The software will also store pages of references and useful materials for the development of the project.

The implementation of the project will be done using Unity game engine. Most of the code will be written in C# as it is the language used by the API of Unity. FairyGUI will also be used for implementing the user interface of the game.

During the last phase of the project, a survey will be conducted to evaluate the effectiveness of the game in achieving the goals and improve using the feedback collected. The detailed design of the survey shall be done in the later phases of the project, but the preliminary approach will be to conduct the survey through online forms or in-game.

4 Limitations and Risks

While this project can improve individuals' health, the scale of change that this project can bring to the society is highly dependent on the size of the user base of the application. Due to the limited scope of the project, there is currently no planned measures to ensure a high utility rate of the application by the target audience.

This project faces risks of incorrect estimation of workload due to unforeseen tasks or problems. Game development is a process with a large workload consisting of different types of tasks, including feature development, user flow design, user interface design, game design, visual assets creation, and effects design. Due the limited manpower in this project, an incorrect workload estimation during planning will easily cause delays or even under-delivery of the final product. To tackle this, each milestone shall be divided in different sub-tasks and be given priorities. Tasks with high priorities shall be completed first to ensure the completeness of the final product produced within the limited timeframe.

5 Schedule and Milestones

The project will consist of several milestones, a set of deliverables will be available at the end of each milestone period.

In the first milestone, the project will deliver a prototype equipped with a basic user interface for users to complete some simple self-care activities and defeat in-game enemies. The prototype is set to be completed by 12th November.

The preliminary schedule for the remaining milestones is shown in Figure 3.

Milestone #	Expected Completion Date	Deliverables
-	1 st October 2023	FYP Phase 1 <ul style="list-style-type: none"> • Detailed Project Plan • Project Web Page
1	12 th November 2023	Prototype <ul style="list-style-type: none"> • Basic User Interface • 3-5 Simple Self-care Activities • Simple Game Mechanics
2	Mid-December	Alpha Version <ul style="list-style-type: none"> • 10 Self-care Activities • Story Dialogue System • Game Mechanics System
-	8 th – 12 th January 2024	First Presentation
-	21 st January 2024	FYP Phase 2 <ul style="list-style-type: none"> • Preliminary Implementation • Detailed Interim Report
3	Late-February	Beta Version <ul style="list-style-type: none"> • 20 Self-care Activities • Activity History System • Mood Overview System
4	Mid-March	Final Version <ul style="list-style-type: none"> • 30 Self-care Activities • Finalized Visual and Sound Presentation • Finalized Story Scripts
5	Early-April	Evaluation <ul style="list-style-type: none"> • Survey Results from Users • Implementation of Improvements
-	15 th – 19 th April 2024	Final Presentation
-	23 rd April 2024	FYP Phase 3 <ul style="list-style-type: none"> • Finalized Tested Implementation • Final Report
-	26 th April 2024	Project Exhibition

Figure 3: A table illustrating the preliminary schedule and milestones of the project.

6 Conclusion

Mental health of children and adolescences is one of the major challenges to be solved in the world. It is hoped that this project can contribute to solving the challenge with early intervention and prevention through the promotion of self-care, so that more people can live healthy in a society with a better future.

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