The Effect of Mental Health Apps in Reducing Mental Health Stigma

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Dissertation written under the supervision of

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ABSTRACT

Title: "The effect of mental health apps in reducing mental health stigma"

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The arising of stigma associated with mental disorders constitutes a threat to society these days, as patients struggle daily to overcome their condition and sometimes avoid seeking for help, thus perpetuating their suffering. Moreover, society is bearing the costs of these people not getting properly treated, which comprises not only social costs, but also economic burdens.

This research attempts to address whether a mental health app could reduce the mental stigma and provide a wide and amplified solution to mentally ill people. To do so, a survey was conducted in which respondents were given several questions and scenarios where they report the existence of stigma and how they react to the emergence of a mental health app, specially how they perceive their effects and how much are they willing to use and pay for an app.

The results obtained suggest that stigma is indeed present in our society and that people seem receptive to this alternative method. Finally, effectiveness and whether the app is scientifically approved or not emerge as main predictors of the willingness to use a mental app while stigma seems to have no impact on it. Therefore, mental health apps could thus be a promising toot to mitigate the mental health stigma.

Keywords:
Stigma, Mental health, Mental health app, Willingness to use

RESUMO

Título: "O impacto das aplicações de saúde mental na redução do estigma"

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O surgimento de estigma associado a doenças mentais constitui uma ameaça à sociedade atual, uma vez que os pacientes travam uma luta diária contra a sua condição e, por vezes, evitam procurar ajuda, perpetuando o seu sofrimento. Adicionalmente, a sociedade suporta custos elevados por não tratar adequadamente estes doentes, sendo esses custos não só de cariz social, mas também económico.

Esta investigação procura determinar se uma aplicação de saúde mental pode atenuar o estigma associado à doença mental e fornecer uma solução ampla e massificada para pessoas com doenças mentais. Para isso, foi realizado um questionário no qual os inquiridos foram expostos a diversas perguntas e cenários em que suportam a existência do estigma e reagem ao surgimento de uma aplicação móvel de saúde mental, percebem os seus efeitos e quanto estão dispostos a usá-la e a pagar por ela.

Os resultados obtidos sugerem que o estigma é uma evidência na nossa sociedade e que as pessoas parecem recetivas a esse método alternativo. Finalmente, a eficácia da aplicação e o facto de ser cientificamente comprovado surgem como principais preditores da disposição para usar um aplicativo mental enquanto o estigma parece não ter impacto, o que atesta que o uso de uma aplicação pode ser realmente um meio de diminuir o estigma.

Palavras-chave:

Estigma, Saúde mental, Aplicações de Saúde Mental, Propensão a usar

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The delivery of this work marks the end of my academic path.
I leave Católica Lisbon School of Business and Economics a greater student and person than when I walked in this institution for the very first time.

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TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

TABLE OF APPENDICES

CHAPTER 1: INTRODUCTION

1.1 Background

The importance of mental health from a personal, social and economic point of view has grown considerably since the 50's of the 20thcentury. Considering the high prevalence of mental disorders in Europe, the striking evidence produced by The Global Burden of Disease (Murray and Lopez, 1996) report showing that neuropsychiatric conditions account for up to a quarter of all disability-adjusted life-years (with variations between countries according to income level), and the overall financial costs of mental disorders (estimated to be more than Euro 450 billion per year just in the EU), several initiatives at national and International level have highlighted the need to place mental health among the first priorities of the public health agenda (eg. World Health Organization's comprehensive mental health action plan 2013-2020; EU Framework for Action on Mental Health and Wellbeing, to mention a few). From a positive side, it is recognized that good mental health and psychological wellbeing has a positive impact on individuals and societies, resulting in improved social cohesion, and economic progress.

However, and despite the fact that a great body of scientific knowledge produced in the last decades has provided us with cost-effective interventions to promote mental health and prevent mental illness, "only about half of people with a severe mental disorder, and far less with a mild-to- moderate mental disorder, in the EU, receive adequate treatment, while there is far less coverage of interventions to prevent mental disorders" (European Framework for Action on Mental Health and Wellbeing). In Portugal, for example, to have access to psychological support can take up to 4 years (in Expresso).

This treatment availability gap can be understood by the stigma that still prevails regarding mental health. Structural stigma results in inadequate investment in mental health services, compromising access and quality of services; social stigma places a great pressure on those affected by mental health problems, and self-stigma results in people experiencing mental health problems being reluctant to seek help.

It is in this context that mental health apps may represent an opportunity to expand the availability of mental health treatment, and help people overcome their resistance to access the help they need to deal with a mental health problem.

1.2 Problem Setup and Research Questions

Mentally ill people often deal with two reality dimensions: they cannot get a successful healing treatment and face social stigma associated with their disease. Concerning social stigma, there are several published studies and works that present this concept, its origin and impacts on daily lives of patients (see subsequent section). As a matter of fact, many patients report they struggle against social stigma and that this makes their lives (and treatments) harder. This was also the target of researchers (developed later in this work). With the spread of new technologies, the massive use of devices and the freelancer behaviour adopted by new start-up enterprises, people control most of their lives with a touch of a button (arrange meetings, control their bank account, pay their bills or simply interact with each other). In this context, a new set of applications, easily obtained through any device, affordable and practical could help patients out without having to leave their houses or causing constraints to their lives. The main apps in the market are summarized in the subsequent section.

The research question that will guide the work onwards and to which an answer is meant to be found is the following:

RQ: Can mental health apps reduce the social stigma associated with mental disorders?

Following the main research question, we will also perform work on whether there is any stigma associated with mental health disorders, because if no stigma arises there is no need for mental health apps to overcome it. Research will also be conducted to determine whether there is any stigma associated with mental health disorders. Prior to evaluating the research question, I will test whether people are more receptive to mental apps than physical apps. These two pre-requirements will help in the time of estimating my research question.

CHAPTER 2: LITERATURE REVIEW

2.1 Differences between Physical and Mental Disorders

The World Health Organization (hereafter WHO) defined health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" back in 1948. It is part of WHO's constitution ever since and broke free the awareness of including mental and social wellbeing as crucial for healthy people. Mankind has been dealing with physical diseases despite we have only been naming them very late, so physical disability is quite known worldwide. WHO defined physical health according to 3 criteria: impairments (body malware of dysfunction), activity limitations (obstacles in dealing with daily ordinary tasks), and participation restrictions (a specific problem an individual has concerning a specific event of her or his life). WHO also states that a physical disability is not only a health problem, but also a complex phenomenon that directly implies the role individuals play within the physical environment and society (both raise barriers that make it hard for patients to overcome difficulties arising from her or his condition). As there can be seen through this work, the environment and society are of extreme importance when it comes to dealing with health diseases or enduring stigma.

The definition of mental disease is not that simple. Mental health could be defined as the absence of psychopathologies, but that would not be wide enough when it comes to conclude about a person's mental condition. There are three components of mental health (Werterhof et. al 2010): happiness concerning general life; individual well-being in terms of self-realization; and awareness of social value, which means that people that are not happy or are unsuccessful struggling to be individually or collectively worth it, are not healthy, despite the lack of symptoms or any diagnosable disease. Therefore, mental health is a positive condition that complies much more than just the absence of diagnosis. Mental disorders have been one of the main focuses of WHO in recent years, which did produce a programme to reduce their harmful effects, the Comprehensive mental health action plan 2013–2020. The programme relies highly on fighting the stigma associated with mental diseases while allocating resources in wider areas in order to increase the medical services supply. The reason for launching it was to increase the awareness of mental health issues and what and how it impacts human daily lives (as there can be seen in the next section, stigma concerning mental ill people is still present in the great majority of societies, especially because people have little knowledge about mental diseases, whom they affect and how).

There is a relation between mental and physical health. In fact, mental disorders increase the risk for other diseases (Prince et al, 2007), partially because of comorbidity in seeking help (as stigma arises) and partially because of behaviour change (or unpredictability, something that is associated with mental disease). Actually, there are two US studies that concluded positively on the relation between depression (a typical mental disorder) and type 2 diabetes. Other physical diseases might also arise following the diagnosis of a mental illness, for instance, general heart diseases (Tully, 2013). In fact, general anxiety disorder is empirically tested for causing blood pressure and hypertension.

The opposite also occurs, i.e., mental diseases arise as a consequence of a physical limitation or expression of any physical restriction (example: post-traumatic stress or depression upon a physical disease, mainly subsequent to an accident).

The causes of mental disorders are still up to date as there is no consensus in determining them (Anh, Kim & Lebowitzs, 2019).

One main difference between mental and physical disease is that one cannot separate symptoms from the disease in the former scenario while in the latter, disease and symptoms might coexist or exist separately (Anh, Kim & Lebowitzs, 2019). To illustrate this, consider a brain tumour. Some symptoms (such as headaches) might either arise as a consequence or not. But whatever the case, the brain tumour still exists and thus, the patient is ill, whether the illness causes her or him to suffer with symptoms. Now, consider a severe case of major depression. There cannot be a case in which symptoms do not exist over and above the disease itself. While a sad and uninterested person experiences symptoms of depression (even if there is no depression at all), depressed people always express them. In the case of mental disorders, symptoms are necessary to determine the diagnosis. There is no such thing as an asymptomatic mental disorder.
The distinction between mental and physical diseases often leads to the assumption that mental disorders are disorders of the mind and physical disorders are disorders of the body (Kendell, 2001). According to the author, this assumption is inaccurate: neither mind nor body develop illness. They are both entities of one person and is that person that develops the illness which might affect the mind, the body or both. To support his theory, the author states that pain (which is often attributable to physical diseases) is purely a physiological phenomenon, or that asthma is generally triggered by emotions such as fear and/or nervousness. As a conclusion, diseases

should not be categorized as mental or physical, but according to the way they will be treated (for example, the "so called" mental illness should be referred to as psychiatric illness).

2.2 From Mental Health Unawareness to its Negative Misperception: Origins of the Stigma

Mental health had not been the object of scientific studies nor the concern of researchers until very recent years. Many reasons lie behind this, more commonly the fact that it consists of a phenomenon that has only been studied very recently and the stigma associated with mental disorders (Mannarini & Rossi 2019). In fact, several people struggle daily to deal with mental illness, just to avoid seeking help, thus they do not receive appropriate therapeutic and social support (Picco et al. 2016).

But why did stigma arise in the first place? The first reason relies on the perception that mental illness has something to do with biology (for instance, it has genetic causes), and because of that, people with positive diagnosis face social distance (Angermeyer and Matschinger 2005). In fact, evidence showed a positive correlation between mental illness, biological causes and social rejection. In the specific case of schizophrenia, this social distance improved at the turn of the century, meaning schizophrenia patients faced in the beginning of the 21st century more rejection than a decade backwards. The simple perception that mental illness has a genetic origin (and not environmental or context origin) makes people believe that person would never be healed, which increases social distance. This corroborates earlier studies on the field (Dietrich et al. 2004) which also found a positive correlation between biological causes and social distance towards people carrying depression or schizophrenia diseases, which can be associated with "lack of will power/immoral lifestyle". Negative attitudes are often set against mental patients, as they appear to be perceived as dangerous, antisocial and unpredictable, with unpredictability being the strongest attitude. The second reason has to do with the culture and context in which the diagnosis occurs. Many patients report they face discrimination behaviours towards them (Whal, 1999) which causes serious damage to patients' lives, including treatment interruption and eventual drop out (Hinshaw, 2007). According to Hinshaw, the western culture developed itself into a point where there is very little acceptance of the difference, mainly that we cannot explain nor have knowledge from. Apart from the belief that mental disorders have genetic origins and the fact that what is different from what is considered "common" or "normal", it is the awareness of the diagnosis that is, again, associated with the lack of knowledge of the disorder among the general public (Magliano et al. (2004). Stigma is indeed

a consequence of society's misperception of what mental diseases really are (Corrigan & Watson 2002). Patients, when given the diagnosis, tend to develop pessimistic beliefs regarding social interactions following the diagnosis. This would lead to social hindering behaviour and eventually death of the person as a social individual. In conclusion, stigma arises mainly due to these reasons: the belief of biological causes, the little acceptance of the difference and lack of knowledge concerning the issue.

There are two types of stigma: public stigma and self-stigma (Rusch, Angermeyer & Corrigan 2005). Public stigma arises in the presence of relevant human differences. Generally, people do not care about the great majority of our differences in the western world. Normally, it does not matter whether a person dresses yellow or blue or whatever car he or she drives. However, personal characteristics, such as skin-colour, income or sexual orientation are relevant for the society to label people into groups. Rusch, Angermeyer & Corrigan stated that relevant human differences often lead to stereotyping (the unconscious act of arranging people in groups) and eventual prejudice and discrimination. According to the authors, It is curious that, most of the time, people tend to stereotype even when they do not agree with what they are stereotyping - they just do it because society forces them to, so that they avoid being stereotyped as well. For public stigma to arise, three social phenomena have to occur: stereotypes, prejudice and discrimination.

An interesting feature regarding public stigma is that it is only endorsed to people with the power to discriminate. In the above mentioned article an example is given in which mental ill people form stereotypes against staff in the medical facilities. A stigma would never arise in such circumstances as mental ill people are not empowered enough to perform it, just the same as a black-skinned group of people could never discriminate against white-skinned people in the western world. The power to discriminate is exclusive - only the people in good economic, social and political conditions are able to discriminate.

Self-stigma refers to the stigma that arises within the group of people that is being stigmatized (Rusch, Angermeyer & Corrigan, 2005). Public stigma is responsible for labelling mental ill people as incompetent at work. This often leads to mental ill people actually believe they are incompetent independently from whether they truly are. Self-stigma has a negative impact on day by day lives of these people as they find it hard to pursue responsibilities, work or any kind that approaches a normal life. There are, however, times where self-stigma does not occur as people are aware of stereotypes but disagree with them.

2.3 Why is stigma associated with mental disorders more prominent than that associated with physical disorders?

Are mental ill people more susceptible to get stigmatized than physically ill people? Rusch, Angermeyer & Corrigan (2005) have identified a curious social behaviour in which one can address this issue. As previously shown the process of social stigma necessarily begins with labelling people into groups, which implies a difference between "us" (i.e., those who are labelling) and "them" (i.e. those being labelled). Whenever it comes to label ill people, mental ill people are often described according to their condition (for instance, a person with autism is often referred to as "the autistic"). This way of speaking clearly distinguishes the person being stereotyped from the others, as the autistic is now one of "them". On the other hand, if the person is afflicted with cancer, he or she is referred to as "the person with cancer" instead of "cancerous". This patient still remains one of "us" and is not stereotyped. This is highly related to the way mental ill people are perceived. Cancer does not change how one is perceived by society, as it is a common and well-known disease (and thus, fails to meet the three criteria for stigma to arise - genetic origin, unacceptance of the difference and lack of knowledge/fear of the unknown). People with cancer do not act oddly or unpredictably, or at least society does not predict people with cancer to behave like that, which does not happen with mental ill people (Rusch, Angermeyer & Corrigan, 2005).

2.4 Action and effort on marginalization associated with lack of mental health: fighting the stigma

Attempts to reduce mental illness stigma should focus on increasing health literacy as well as cultural relevance and competence (Corrigan et al. 2014). Lawmakers and advocates developing programs that aim to reduce mental illness stigma should rely on researchers' complex conclusions on stigma change. Morgan et al. 2018 studied (among others) two intervention categories: contact interventions and educational interventions. Studies were conducted on the short run, meaning that results are only relevant for the period immediately after interventions took place. Contact interventions comprise continuous exposure to people carrying mental disorders. The main goal is to reduce anxiety by increasing empathy, pointed out by some authors to be key when recovering from this kind of disease. However, results showed a small to medium reduction in stigmatising. As for education interventions, they can be either through brief interventions of textual information (which includes information about symptoms) or longer multimedia content delivered to groups. Overall, information

interventions aim to highlight, on the one hand, the negative impact of stigma in patients' daily lives and, on the other hand, actions and skills to help and support not only patients, but also their family members. This kind of approach revealed itself to be, again, a poor weapon against stigmatization. Corrigan et al. 2001 suggested social activism and protest as another relevant approach. Nevertheless, the same authors have lately evaluated this option, finding it ineffective (Corrigan et al. 2012). There have also been some academic approaches suiting to evaluate treatment alternatives that would do better in fighting social stigma than the traditional methods. A way that could maintain people out of sight of society's reproachful eyes could be developing internet interventions (Thomas, N., et al 2015). Several campaigns to address public stigma have already taken place (for example, *Time to Change* in the UK - Gronholm et al, 2017). Action such as this would help reduce the stigma traditional treatment (in the author's opinion) has arisen in the first place as well as reduce the unfair treatment carried out by professionals and others. The *Time to Change* program did indeed cause discrimination levels to drop as reported by family and friends of patients, but no reduction was noticed in professionals' reports which points out that even if people are more willing to seek help, attitudes and behaviours from professionals would still deter people from doing it if no changes are perceived by them.

A general study of how interventions to reduce mental health related stigma are effective was conducted late in 2015 (Thornicroft et al 2015). These evaluated interventions targeted to (among others): the general public; people with mental illness; students and health-care staff. In what concerns the general public, evidence showed a positive outcome in attitude changing, despite no improvements in knowledge. Mental ill people are also the target of stigma reducing interventions. These interventions comprise group-level sessions in which a tutor (usually a former mental patient) runs a meeting with people sharing the same illness (the reader might be familiar with the fellowship of alcoholics anonymous). These therapies often present good results, especially the Cognitive Behavioural Therapies (CBT), a type of therapy that aims to reduce negative thoughts and beliefs regarding the patients' own condition. As for students, studies differ: half of them report positive impacts on attitudes and knowledge in the medium-term while Thornicroft et al's studies also found evidence on the short-term. Finally, medical and health staff are reported by patients to be the source of stigma. Thus, they should be one of the main targets of interventions and actions. Here again, the impact is positive for both knowledge and attitudes. Nevertheless, patients still report negatively when asked whether they believe health care staff stigma has dropped over time.

To conclude the topic, stigma is triggered mainly by lack of knowledge and fear of dealing with mental ill people, which dealt to misperceptions of the diseases and the patients themselves. Options to fight stigma should rely on increasing public literacy on the subject as well as maintaining the ill people focused on recovery.

2.5 The economic burden of mental illness and managerial relevance of a mental health app

Mental ill people can be of substantial cost for society. Costs are divided into two categories: direct costs and indirect costs. Direct costs are the actual amount spent on treating patients. Rice, Miller and Kelman (2006) estimated an overall mental health cost of USD 103 billion in 1985's US gross domestic product, which represents 2,3% of all wealth produced in that year within the US. Indirect costs are the costs society bears for not having these people productive: mental disorders prevent people from producing, consuming and investing as they would have they been healthy. A study was conducted in Canada in 1998 to evaluate the impact of mental problems in society. With respect to the economic burden, direct and indirect costs were identified (Stephens and Joubert, 2001). Among the indirect costs, the authors highlighted the days off work as the main cost and estimated a negative impact of 6.02 billion USD in 1998 Canada's GDP. As Canada's economic performance matches the upper income countries, some of these numbers can be replicated to the western world. As for the rest of the world, due to the lack of labour conditions in middle-lower and lower income countries, higher impact is expected. Similar conclusions were achieved by a group of investigators in their report in 2007 in which they tested the economic burden of personality dysfunctions - the authors used a sample of people with depressive, avoidant, obsessive compulsive and borderline personality disorders (Soetman et al. 2008). Indirect costs (again defined as less workable hours) were also identified. To summarize, preventing mental ill people from proper treatment is not only questionable from a moral and ethical point of view, but also harmful from an exclusively economic perspective.

As mentioned before, there are actually many people struggling daily to deal with mental diseases. This constitutes a risk for society as basic needs and essential care do not have (or are unable to provide) the responsiveness it takes to address this issue. Moreover, patients have to endure the lack of facilities and services available (Chisholm et al, 2013). How and why could this be a problem from an economic point of view (beyond being clearly a social and moral issue to be addressed)? The opportunity cost is there - while investing in other areas we are

jeopardizing the potential of this one. Recently, a study developed by the World Economic Forum reached the number of US$ 16 trillion of negative impact on the next 20 years' US domestic product as a result from not investing in mental health treatment. An estimate of €99.3 billion euros is directly related with productivity losses in the Euro Area, which helped prevent Europe from reaching its economic growth goal for 2020 (McDaid, 2011). Moreover, mental disorders are included in the three most costly classes of medical conditions (Ahn, Kim & Lebowitzs, 2019). A more effective approach on mental illness treatment and healing could transfer effort and wealth to an elsewhere economic sector. Relying on this data, the problem assumes now a greater dimension as patients are not only a social issue but also an economic burden for society.

McDaid's article summarizes the investment of the four different country types (low, lower-middle, upper middle and high income). The first two present less than 2% of Gross Domestic Product spent on mental health. Upper-middle countries spend 2,4% and high income countries, 5,1%. Overall, these stats suggest that there is a large potential to be deepened. In fact, more than 650 million people are believed to match a mental disorder diagnosis (Chisholm et al, 2013) while 1 in 4 euro citizens can expect to experience some type of mental health problem in their lifetime (McDaid, 2011). According to Wordometers, the current world's population exceeds 7,7 billion people which makes people with mental disorders represent 8,4% of the world's total population. These people, remaining sick, can no longer work, produce or consume as expected for a normal person. Apart from that, they are consuming medical and health resources that were proven to be inefficient in solving mental disorders, thus overcrowding the health system.

But how could one turn a potential investment in this area efficient and affordable for the current global entrepreneurship network? No investor (or at least very few) are willing to give their money away because of economic burden or public health. According to Chisholm et al (2013), 3 criteria must be set in order to identify mental health investment priorities: 1 - Cost-effectiveness. This can be measured as the number of extra healthy years a patient has for any investment in his or her treatment costing under the average annual income per capita. 2 - Affordability. This defines a threshold under which an intervention is very affordable (US$ 0.50 per capita) or quite affordable (US$ 1.00 per capita). 3 - Feasibility. Feasibility can be subdivided in 4 categories: reach (ability to attain the target); technical complexity (necessary

technology to implement the business), capital intensity (amount required to start up) and acceptability (the fact that the business does not run over basic rights).

From a political point of view, the attractiveness of the mental health sector is positively impacted. Government goals depend highly on how the national labour force performs at work. This consists not only in reaching economic growth, but also in preventing public benefits (such as social security) from failure or from being eventually dismissed.

Mental apps could help balance the direct and indirect costs as it would provide extensive care for people who, otherwise, could not get proper treatment, for many reasons (money and stigma up front). If the healing success rate improves, then the burden is softened: people would take less days off work, the government would spend less money overcoming these workers absence and eventually would spend less money guaranteeing their survival. This could also release public funds to other areas in need.

But can mental health apps reduce the stigma that is associated with mental health disorders? Thomas et al (2014) studied how the internet could address stigma associated with health problems. Firstly, the internet is capable of keeping people updated and it also increases the awareness for the subject (that is what allowed Time to Change to spread out across the UK). Secondly, the internet protects the identity of patients/app users as well as it consists of a privileged way of obtaining feedback without getting stigmatized. Third, the internet is a massive way of delivering multimedia content to the general public. Finally, the internet allows users in the same condition to discuss with each other and share feelings and emotions. A mental health app could be designed to address these four issues. In fact, some of the existing ones already work in order to protect people from being exposed or stigmatized as well as it increases knowledge regarding the mental condition of mentally unhealthy people.

Considering that stigma is a social process, it is also likely that the social distance implied in the use of Apps will reduce perceived social exposition, and the anticipation of prejudice and stigmatized responses among consumers. Consequently, expressions of mental health stigma in help seeking behaviours for conventional and presencial treatments, could be reduce with the use of treatments that reduce human social interaction such as with mental health apps.

Additionally, Jessica Truschel, a freelancer that currently writes for Psycom (a mental health focused website, article publisher and the third largest in the US industry) states that mental health apps have a great advantage over traditional treatment that is the fact that patients are

anonymous. Dr. Raichback, a psychologist with more than 25 years of experience and one of main interviewed for the article goes even further, claiming that “apps also allow for privacy and confidentiality and can be a safe space for individuals who may be too ashamed to admit their mental health issues in person or who may feel that they will be negatively labelled or stigmatized by others” which totally fits our goal of overcoming the stigma.

This kind of treatment method is not sufficient to fully heal the patient (relying on the opinion of other psychologists that were also interviewed. However, all recognize the importance of maintaining the connection between doctor and patient as well as among patients. Mental health apps could work as a complementary tool for the traditional methods.

A list of examples of mental health apps is provided in appendix 1.

Given that mental health suffers from stronger stigma than physical health in the present study, we hypothesize and test whether:

H1. People show stronger general stigma towards mental health than towards physical health.

H2. Consumers are less receptive towards mental health apps than towards physical health apps.

H3. Consumers perceive mental health apps as less effective than physical health apps.

H4. Consumers perceive mental health apps as less evidence-based than physical health apps.

H5. Treatment programs provided by digital platforms like Apps show less stigma than formal (presential) interventions.

CHAPTER 3: METHODOLOGY

This section presents the methodology applied to this work that consists of collecting and working out quantitative data.

3.1 Research approach

The goal of this work is to understand if mental health apps can reduce the mental health stigma. In the literature review, it is presented a summary of the existing discussions regarding issues such as the stigma associated with mental disorders, reasons for and circumstances where it arises and potential solutions to solve it. Then, some hypotheses were formulated which could address whether a mental health app could overcome the flaws of stigma, using both exploratory and explanatory methods. The exploratory method consists of seeking in the literature the main variables and hypotheses to be tested. The explanatory method comprises the testing of those hypotheses. This was done using a survey (Appendix 2).

3.2 Secondary Data

The main source of secondary data were articles published in prestigious journals. These articles comprise essential information to comprehend how other investigators addressed issues and problems regarding the main subject of this work and thus, retain the major practices and actions to be performed. Variables and relations rely highly on what was found in the existing literature.

3.3 Primary Data

The primary data was obtained through an online survey. Surveys are interviews with a large number of respondents using a predesigned questionnaire, that allow to capture a wide variety of information as well as provide high flexibility of data collection process. On the other hand, despite being lower in cost and higher in speed, a survey has the flaw of limiting the respondents' range of options and preventing them to justify or unravel an option they did not want to take in the first place (for instance, if they choose the least bad option).

Surveys are best practice whenever the researcher wishes to describe human behaviours, mainly when it refers to social and psychological research (Ponto, 2015), as the mental and physical health apps research conducted in this work. Behaviours and preferences can be studied through other ways (for instance, consumer data stored by a warehouse, or number of visitors of a website), however, surveys fit best when it comes to events or realities still to occur or to be

experienced by respondents. In this work, the feasibility of both mental and physical apps is tested, a reality that is expected to be unknown for the majority of the population.

Online questionnaires might give place for survey bias of two sources: sampling (McLafferty, 2003) - explained by the tight survey distribution channel; answer order (Evans, 2005) - arose whenever respondents have access to questions subsequent to the one they are answering.

In order to test whether the survey was effective and understandable, a pilot test of the survey was conducted. Subsequently, some adjustments were made according to the feedback of respondents.

3.4 Online Surveys

3.4.1 Data collection

The data was computed with recourse to a survey as mentioned before, made using the Qualtrics software. Data collection took place in the fourth quarter of 2019, therefore findings and results can be applicable solely to this period. In order to achieve as many people as possible, the questionnaires were spread across social media channels (mainly WhatsApp, Facebook and Instagram). A group of 367 people answered the survey, from which only 125 answers are considered valid due to an error in the data migration. General features of the sample are shown below.

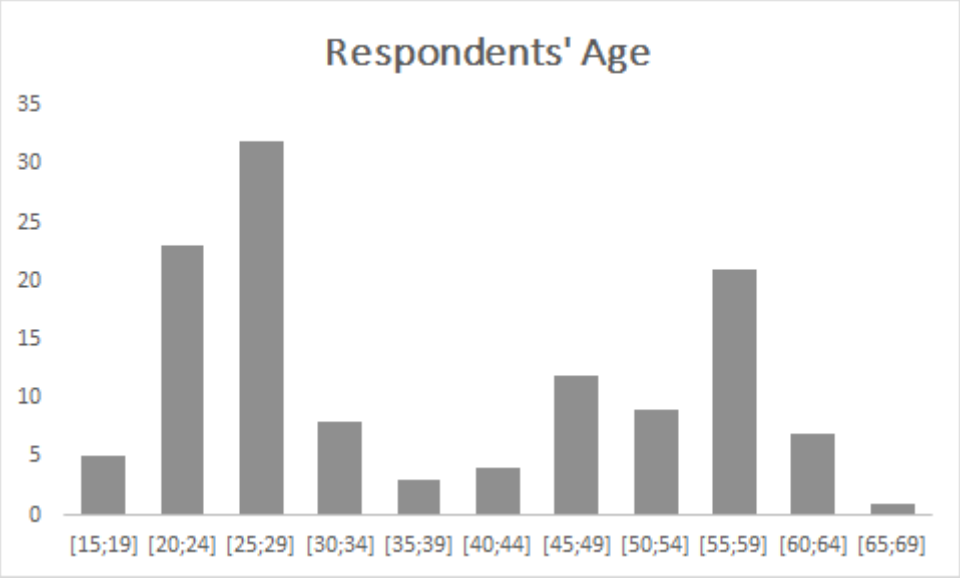

Figure 1: Respondents' Age

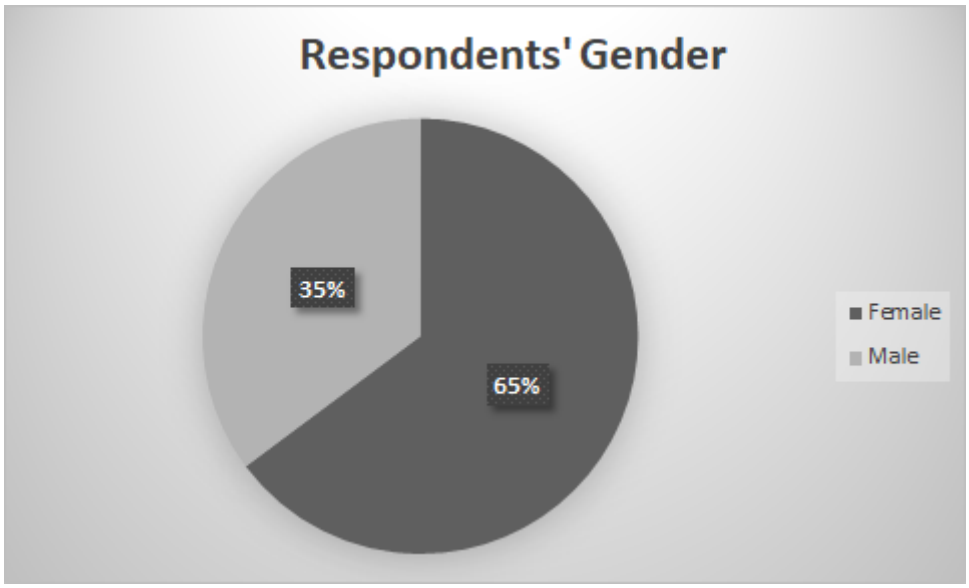

Figure 2: Respondents' Gender

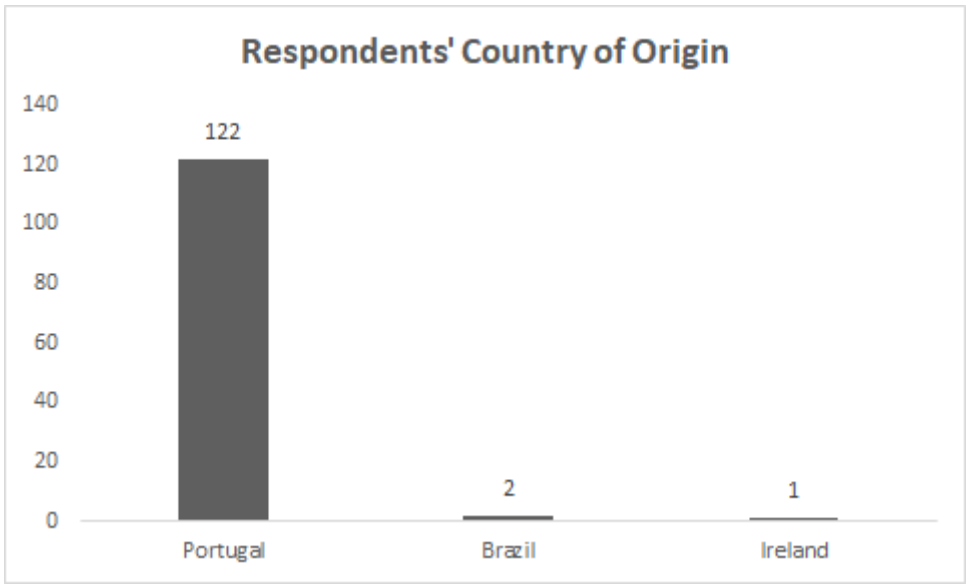

Figure 3: Respondents' Country of Origin

As can be easily seen, the great majority of respondents are aged between 20 and 29 (55 people, which corresponds to 44% of the whole sample, 18% between 20 and 24 and 26% between 25 and 29), followed by the interval [55:59] with 17% and [45:49] with 10%. The least representative interval is [65:69] with solely 1 answer (1%).

Regarding the gender 35% of the sample are men and 65% are women (44 and 81 people respectively). As for the country of origin of respondents, 122 people are Portuguese, 2 are Brazilian and 1 is Irish.

3.5 Research design

The present research uses a within subjects experimental design, given that it involves exposing each respondent to both conditions, which allows each respondent to test all of the conditions. The study uses type of illness (physical or mental) as the independent variable.

3.6 Materials

To test the hypotheses and consequently answer the research question, we measured as dependent variables: Stigma; Receptiveness to the App; App's perceived effectiveness, App's perceived scientific support; and participants willingness to use conventional, App and Alternative treatments in case of experiencing health problems. All these constructs were measured for mental health and for physical health scenarios.

Stigma was measured through the AQ9 (Corrigan et al., 2003) on a 9-point Likert scale. AQ9 the small version of Corrigan's et al., 2003 Attribution Questionnaire (Corrigan et al. 2003) first tested in 2003 to address the presence stigma arising from mental illness. It aims to present respondents with several scenarios of a hypothetical mental ill person named Harry and what/how respondents would feel, think of and react about him. Among the strains developed by the author, I chose to implement the Attribution Questionnaire 9 (AQ9), which is the smaller version of that used by Corrigan in his tests (AQ27) (Corrigan et al. 2003). It consists of 9 questions concerning the condition of Harry who assumes the identity of a mental ill person. This complies with this part of the questionnaire, that is oriented towards stigma and whether it exists or not.

Then, the receptiveness construct, measured by 4 questions: "I'm curious about health apps"; "Health apps are important health providers"; "I believe health apps are helpful"; "I'm willing to use health apps". In this case a 9. Likert agreement scale was used: 1 - "do not agree at all" to 9 - "totally agree".

The effectiveness construct is measured with participants agreeing with 7 items such as "provides good health care to users", "improves wellbeing" on a 9. Likert agreement scale from 1 - “do not agree at all” to 9 - “totally agree”.

The perceived scientific support of the App construct was measured on likelihood ratings of 7 items such as "rely on scientific research", "is evidence based", on a scale from 1 - “not likely at all” - to 9 “extremely likely”.

The Willingness to use treatment construct was measured on participants’ likelihood of using conventional treatments (medical/psychological treatment); App (physical health app/mental health app); and alternative treatments (traditional Chinese medicine, alternative medical treatment, coach program, meditation program) on a scale from 1 - “not likely at all” - to 9 “extremely likely”.

We also measured familiarity with mental/physical health apps; with mental illness, physical illness. Familiarity with apps was measured with participants' rating how familiar they are with mental health/physical apps on a scale from 1 - “not familiar at all” to 9 - “extremely familiar”. Familiarity with illness was measured on participants’ agreeing with 4 items such as “I am familiarized with mental/physical illness” and “I personally know people with mental/physical illness, on a 9. Likert agreement scale from 1 - “do not agree at all” to 9 - “totally agree”.

3.7 Procedure

The survey comprises two questionnaires that have two groups of questions concerning mental and physical health. The order of which these subjects were presented to respondents was random so that bias is avoided. This bias could arise from people always responding to the same group of questions (for instance, mental health) prior to the other (in this case, physical health).

The survey (Appendix 2) is composed by 6 blocks. Block 1, common to all respondents, consists of the general introduction, where it is mentioned that the survey is anonymous and for statistical purposes. Blocks 2 and 3, depending on whether the first subject is mental or physical, present a group of questions about mental/physical health apps and AQ9 about mental/physical health. Block 4 and 5 consist of the same group of questions for physical/mental health. Block 6 includes demographic questions.

Concerning Blocks 2 and 4, respondents had to classify both apps according to these criteria using a 9-point Likert scale - ranging from 1 - “not likely/important/agree/familiar at all” to 9 - “extremely likely/important/familiar / totally agree”, except for the willingness to pay, where they had to select from 0 to 100 an amount they would be willing to pay for each. Prior to the questions a definition of mental/physical health app is presented.

For Blocks 3 and 5, research relied on an existing method first tested in 2003 when a group of researchers conducted a survey in which they addressed whether there was any stigma arising from mental illness or not. The survey method became known as the Attribution Questionnaire (Corrigan et al. 2003). It aims to present respondents with several scenarios of a hypothetical mental ill person named Harry and what/how respondents would feel, think of and react about him. Among the strains developed by the author, the chosen construct was the Attribution Questionnaire 9 (AQ9), which is the smaller version of that used by Corrigan in his tests (AQ27) (Corrigan et al. 2003). It consists of 9 questions concerning the condition of Harry who assumes the identity of a mental ill person. This complies with this part of the questionnaire, that is oriented towards stigma and whether it exists or not.

Block 6 focuses on demographic questions: familiarity with mental/physical illness and people suffering from mental/physical illness, gender, nationality and age.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Estimation results

The following table summarizes the SPSS output for paired sample tests table 1.

Table 1

Variables of mental vs physical health apps (N = 125)

	Mental health app		Physical health app		
Variables	M	SD	M	SD	t
AQ9 (mental) - AQ9 (physical)	34.06	9.03	30.97	8.21	4.50***
Receptiveness (Q18/Q35)	6.44	5.83	1.69	1.92	4.26***
Willingness to pay (mental)-Willingness to pay (physical)	15.54	20.12	12.62	16.85	2.58**
At home (mental) - At home (physical)	5.31	3.31	7.59	1.95	-6.80***
At work (mental) - At work (physical)	6.23	2.74	5.33	3.08	4.13***
At home (mental) - At work (mental)	5.31	3.31	6.23	2.74	-2.14**
Scientific (mental) - Scientific (physical)	5.91	1.98	5.91	2.11	0.03
Effectiveness (mental) - Effectiveness (physical)	4.94	1.71	4.90	2.00	0.31

Note. M = Mean; SD = Standard Deviation.
* p < 0.1 ; ** p < 0.05 ; *** p < 0.01

Table 1: Paired-sample t-tests

First, it was analysed whether participants expressed higher stigma towards mental illness conditions than towards physical illness conditions. Paired sample t-tests on stigma measure AQ9 revealed that participants show higher responses of stigma towards a mental health scenario (depression) (M = 34.06, SD = 9.03) than towards a physical health scenario (obesity) (M = 30.97, SD = 8.21; t (124) = 0.31, p = .756).

Then differences in participants' receptiveness to mental health apps and physical health apps were tested. Paired samples t-test revealed that participants are significantly more receptive to mental health apps (M = 6.44, SD = 1.69) than to physical health apps (M = 5.83, SD = 1.92; t (124) = 4.26; p < .001). Additionally, participants also show higher willingness to pay for mental health apps (M = 15.54, SD = 20.12) than to physical health apps (M = 12.62, SD = 16.85, t (124) = 2.58; p = .011). These results may indicate that people are more interested in getting a treatment from an App for mental health problems than to physical health problems. This may result from a lower response of stigma when considering mental health apps. However, this finding may also be interpreted as manifestation of mental health stigma, whereby people would be more willing to try a mental health app because mental health can be treated with alternative treatments such as Apps whereas physical health problems should only be treated with more traditional and presential methods.

The differences in participants' tendency to use at home mental health apps and physical health apps were also tested. Paired-sample t-test shows that participants are more willing to use physical health apps at home (M = 7.59, SD = 1.95) than mental health apps (M = 5.31, SD = 3.31, t (124) = -6.80, p <.001). Then, a test for the differences in participants' tendency to use at work mental health apps and physical health apps was performed. Paired-sample t-test shows that participants are more willing to use mental health apps at work (M = 6.23, SD = 2.74) than physical health apps (M = 5.33, SD = 3.08, t (124) = 4.13, p <.001). Finally, it was also tested the differences in participants' tendency to use mental apps both at home and at work. Paired-sample t-test shows that participants are more willing to use mental health apps at work (M = 6.23, SD = 2.74) than at home (M = 5.31, SD = 3.31, t (124) = -2.14, p = .034). These results contradict the expectation of people avoiding the use of mental apps in public (due to stigma). Instead they are more receptive to use physical health apps at home and mental apps at work. This suggests, perhaps, that people tend to use mental health apps when they are out of their comfort zone, in stressing situations (at work, for instance) and thus seek to use an app.

To clarify this question, participants' willingness to use different treatments (conventional treatments; Apps and alternative health treatments) were they suffering from a mental health or a physical health problem was explored. A repeated measures ANOVA 2 type of illness (physical/mental) x 3 treatment method (conventional/App/alternative) on participants' willingness to use the different methods was computed. Results indicate a significant main effect of type of illness (F (1, 124) = 12.66, p = .001) whereby participants are more likely to use any kind of treatment for physical health problems (M = 5.60, SD = .14) when compared to mental health problems (M = 5.07, SD = .18).

A significant main effect of treatment method (F (2, 123) = 97.11, p < .001) was found, indicating that conventional methods (M = 6.80, SE = .16) are more likely to be used than Apps (M = 5.03, SE = .210; p < *.001*) or alternative treatments (M = 4.17, SE = .16; p < .001).

Importantly, a significant interaction between type of illness and treatment was also found (F (2, 123) = 12.45, p < .001).

This interaction suggests that while participants are more likely to use conventional treatments for physical health (M = 7.45, SE = .19) than for mental health problems (M = 6.16, SE = .26*;* t (124) = 4.04, p < .001); and more likely to use physical health apps (M = 5.28, SE = .23) than mental health apps (M = 4.78, SE = .23; t (124) = 4.04; t (124) = 2.74, p = .007); this difference

is smaller for apps than for conventional treatments (F (1, 124) = 4.72, p = .037), and is non-significant for alternative treatment methods, with participants showing lower likelihood of using alternative treatment methods for physical health problems (M = 4.06, SE = .21) than for mental health problems (M = 4.28, SE = .19; t (124) = 1.51, p = .133) (Figure 1)

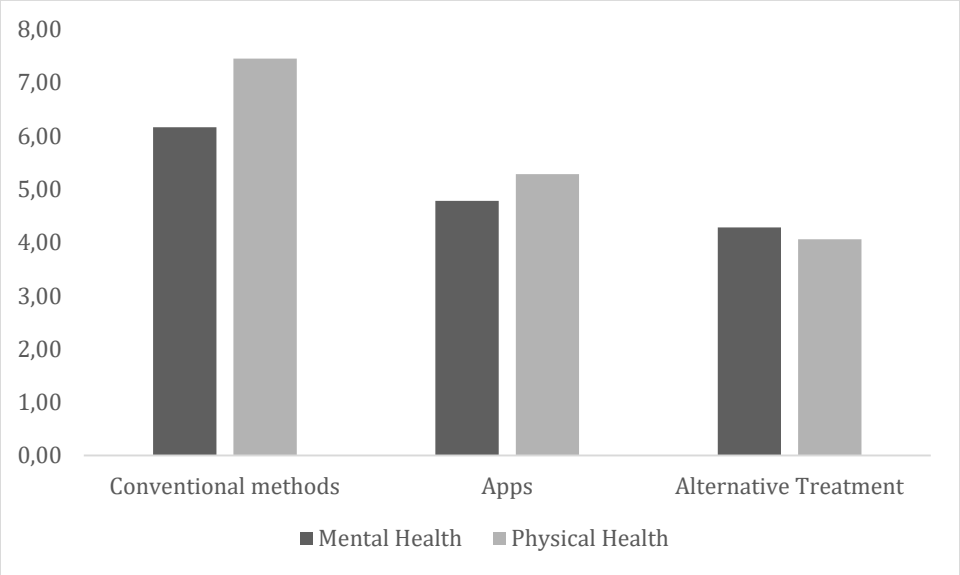

Figure 4: Means of Treatments

This result evidences the existence of stigma, as participants are less likely to seek help for mental health problems than for physical problems. However, this trend is reduced when they consider Apps as a treatment option. Although there is a preference for more conventional treatments, mental health apps seem to imply a lower response of mental health stigma, which should encourage the development of mental health apps. Additionally, the fact that health apps are more likely to be used than alternative treatments for physical health problems (t (124) = 4.86, p < .001) and for mental health problems (t (124) = 2.38, p = .019) may indicate that mental health apps are not judged alternative treatments suggesting they may view it as effective treatment and not as a complementary solution or non-evidence based like some alternative treatments.

Congruent with this analysis, the perceived scientific support of the app, does not show significant differences between mental health apps (M = 5.91, SD = 1.98) and physical health apps (M = 5.91, SE = 2.11; t (124) = 0.03, p = .974). Perceptions of effectiveness of the health apps did not significantly differ across type of illness conditions (Physical: M = 4.90, SE = 2.00; Mental: M = 4.94, SE = 1.71; t < 1; t (124) = 0.31, p = .756). In sum, although participants do not seem to judge mental health apps as less effective or less supported by scientific evidence

than physical health apps, perceived effectiveness and scientific support of health apps is not perceived to be high, as average ratings are situated near the scales mid-point.

Regression analysis explored whether stigma, effectiveness and scientific support predict participants' willingness to use health apps when they are experiencing mental health problems and physical health problems. For the mental health condition, mental health stigma was not a significant predictor while perceived effectiveness and scientific support significantly predicted willingness to use the mental health app (Table 2).

Table 2 **Coefficients (a)**

Model	Unstandardized B	Coefficient Standard Error	Standardized Coefficient Beta	t	Sig.
(constant)	0.82	0.85		0.96	0.34
AQ9 (mental)	-0.24	0.02	-0.86	-1.11	0.27
Effectiveness (mental)	0.66	0.16	0.44	4.12	0.00
Scientific (mental)	0.27	0.13	0.21	1.98	0.05

(a) Dependent Variable: Mental health App

Table 2: Regression 1

For the physical health condition, however, only perceived effectiveness was a significant predictor of participants' willingness to use a physical health app (Table 3).

Table 3 **Coefficients (a)**

Model	Unstandardized B	Coefficient Standard Error	Standardized Coefficient Beta	t	Sig.
(constant)	1.18	0.82		1.44	0.15
AQ9 (physical)	-0.01	0.02	-0.03	-0.50	0.62
Effectiveness (physical)	0.85	0.11	0.66	8.09	0.00
Scientific (physical)	0.04	0.10	0.03	0.41	0.69

(a) Dependent Variable: Physical health App

Table 3: Regression 2

Although the AQ9 stigma scale was not a significant predictor of participants' willingness to use mental health apps, these findings suggest a potential stigmatized perception of mental health apps when compared to physical health apps. Notably, while the effectiveness of a mental

health app is a significant predictor of its use, whether a physical health app is scientifically approved, or evidence based, is not relevant to decide about its use.

4.2 Discussion

Considering the hypotheses formulated earlier in this work, regarding *H1* ("People show stronger general stigma towards mental health than towards physical health") it can be seen from the paired-sample t-tests that stigma is stronger in mental ill people, which definitely accepts *H1*. As for *H2* ("Consumers are less receptive towards mental health apps than towards physical health apps"), this hypothesis is partially rejected. Although participants show more general receptiveness towards mental health apps than towards physical health apps, when they are asked to consider how likely they would be to use these apps, in case of illness, they were more likely to use a health app to treat a physical illness than a mental illness. These seemingly incongruent findings suggest that responses of stigma are more likely to occur in health relevant contexts, and that general attitudes towards health apps, may be a poor predictor of behavioural intentions. *H3* ("Consumers perceive mental health apps as less effective than physical health apps") and *H4* ("Consumers perceive mental health apps as less evidence-based than physical health apps") are rejected as the tests for the difference of means did not produce a significant outcome. That is, although efficacy and scientific support of mental health apps are important predictors of its use, mental health stigma does not seem to affect how consumers perceive health apps efficacy and scientific support.

Finally, *H5* ("Treatment programs provided by digital platforms like Apps show less stigma than formal (presential) interventions"). We can conclude that this hypothesis is accepted. There can be seen that actually, people still prefer conventional treatment to apps. On the other hand, people are much more likely to seek conventional treatment when they suffer from a physical disorder than when they suffer from a mental disorder. This difference decreases significantly when they seek help through an app. The app approaches the means which is a signal of stigma reduction.

Further on, effectiveness works a significant predictor for the use of both mental and physical apps. Scientific support seems to work as a significant predictor solely for the use of physical health apps. Stigma (either associated with mental health or physical health) is not significant in predicting the willingness to use an app. The fact that consumers seem to require mental health apps to have scientific support and to be evidence-based, but that the same requirements

are not taken into account when considering physical health apps is also a manifestation of stigma. Consumers show a double standard when evaluating mental and physical health apps. They are more demanding regarding the scientific support for mental health apps than they are towards physical health apps, which may underlie beliefs of lack of trust, or perceived low credibility of mental health treatments in general, when compared to physical health treatments.

CHAPTER 5: CONCLUSIONS AND LIMITATIONS

5.1 Conclusions

The main purpose of this work was to test whether social stigma could be addressed with the use of a mental health app. The existing literature points out the existence of mental health stigma to be the consequence of the belief that mentally ill people are genetically ill, behave unpredictably and lack a moral lifestyle, which in its turn, is a consequence of the general public's awareness and ignorance concerning the subject. Consequently, patients face social distance and avoid proper treatment, which is a cost difficult to bear for society, apart from the suffer patients struggle with every day.

To address this issue, an experimental study was conducted to find whether stigma effectively arises in the presence of mental illness, when compared to a physical illness and to test how respondents perceive the emergence of an app as alternative treatment. Subsequently, the data was collected and worked out in order to develop statistical tests. These tests addressed the receptiveness of both physical and mental apps, as well as the perception of respondents regarding their scientific background, proper scientific evidence, quality and willingness to use them and pay for them.

Results produced evidence of greater stigma in mental illness, as predicted by the literature. Along with that, people still prefer conventional treatments for both mental and physical illness, despite this preference being significantly higher for physical illness. Nevertheless, when seeking help through an app, this difference is much lower, which suggests the use of apps as a factor to dilute the stigma effect.

Another interesting fact is that the major factors in determining the willingness to use a mental app are the effectiveness and scientific support, while stigma does not seem to impact the willingness significantly, which means one cannot say stigma would deter a mental patient from using an app as a treatment for his conditions. Instead, he or she would care much more about the effectiveness (good health care, positive impact on well-being, effective treatment, control over symptoms, etc.) and scientific support (be evidence based, have medical and experts approval, be developed by experts on the field etc.).

To conclude, stigma associated with mental disorders is indeed an obstacle to people suffering from them. Moreover, it constitutes a burden to society from many points of view. The potential

emergence of a mental health app could be part of the solution to this problem as the willingness to use this method is much closer to the willingness to use a physical health app, when compared to conventional treatments.

5.2 Limitations and Further Research

Despite the evidence obtained regarding the use of mental health apps and how they can reduce the stigma associated with mental illness, some limitations were found. First of all, this experimental study was conducted with limited funds and time constraints.

Then, some data was lost in the migration process which prevent the respondents sample to be more robust and diversified. Therefore, there is a possible flaw concerning the representativeness of the population. Furthermore, the survey method does not allow the investigator to fully explain and clarify the topics.

This work is part of the first steps on the field as it demonstrates that mental health apps are a tool to help reduce stigma. However, whether the general public respond positively to the increase offer of this product is still unknown from a managerial point of view, i.e., how should it be widespread and how should the app fit specific market segments. In other words, how should app developers position in the market. There is also the need for exploring whether advertisement about the apps being less or more evidence based increase the apps usage and whether that effect is bigger for mental than physical, as suggested by the regressions.

Further research on the subject could also rely on how to reconcile conventional treatments and mental health apps, as conventional treatments are still preferred by respondents to other alternatives.

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APPENDICES

Appendix 1: List of top 25 mental health app in 2020

#	App	App Type	Description
1	notOk	Suicide Prevention	it allows close friends and family when one is in need for support through a red button press
2	What's up	General Mental Health	Use of CBT and ACT methods to help one deal with Depression, Anxiety and others
3	Mood Kit	General Mental Health	Practice of self-care through CBT
4	Twenty-Four Hours a Day	Addiction	As the name says, this app helps recover from an eating disorder by providing eating plans and recording meals.
5	Quit That	Addiction	It helps users beat their addictions and habits by tracking their day
6	Mind Shift	Anxiety	It focuses on how one deals with anxiety by changing how he or she thinks about anxiety itself
7	Self-Help for Anxiety Management (SAM)	Anxiety	It helps users build their anxiety toolkit and offers self-help techniques. It allows feelings share among users (confidentiality assured)
8	CBT Thought Record Diary	Anxiety	It consists of tracking negative thinking patterns through its documentation record.
9	IMoodJournal	Bipolar Disorder	It records every step from medication to sleep. It provides summary charts about your stress levels
10	eMoods	Bipolar Disorder	It tracks the whole day of the user from psychotic symptoms to elevated mood.
11	Talkspace Online Therapy	Depression	It connects high skilled professionals to patients for a medical appointment at distance
12	Happify	Depression	It provides a mood training program with games and activity suggestion
13	MoodTools	Depression	Using CBT principles, it presents users with videos to improve the mood and behaviour. It also develops anti-suicidal plans

#	App	App Type	Description
14	Recovery Record	Eating Disorder	As the name says, this app helps recover from an eating disorder by providing eating plans and recording meals.
15	Rise up and Recover	Eating Disorder	It allows users to transcribe the meals track into a PDF
16	Lifesum	Eating Disorder	Users set goals for eating and muscle gain while the app records every step and warns them when to drink water for instance
17	nOCD	Obsessive-Compulsive Disorder	This app provides users with guidance when a crisis occurs as well as put them in touch with ODC professionals
18	Worry Watch	Obsessive-Compulsive Disorder	It works as a worry diary, allowing users to deal with their anxieties
19	GG OCD	Obsessive-Compulsive Disorder	The app consists of short games around a specific theme, helping improve positive thinking
20	PTSD Coach	PTSD	PTSD Coach offers a set of resources from self-assessment for PTSD to anger management. It also provides support from professionals
21	Breathe to Relax	PTSD	This app is a portable stress management app teaching users how to breathe and relax properly
22	UCSF Prime	Schizophrenia	This app is a social network for people that have or had schizophrenia.
23	Headspace	Mindfulness and Meditation	It consists of a meditation app, that helps users sleep and control stress and anxiety
24	Calm	Mindfulness and Meditation	This app was named app of the year by Apple in 2017. It offers guided meditation, sleep stories, breathing techniques and relaxing music
25	Ten Percent Happier	Mindfulness and Meditation	This app also offers meditation programs to deal with stress and anxiety. It updates content every week

Appendix 2: Survey

Block 1: Introduction

Block 2: Mental Health app/ Physical Health app

Q103 / Q102. Rate how familiar you are with mental / physical health apps [Familiarity]
(1- Not familiar at all; 9- Extremely familiar)

Q18 / Q35. Please rate your level of agreement with the following sentences regarding mental health apps / physical health app in general: [Receptiveness]
(1- Do not agree at all; 9- Totally agree)

- **a)** Health apps are important health providers
- **b)** I am curious about health apps
- **c)** I believe health apps are helpful
- **d)** I am willing to try health apps

Q22 / Q36: How much were you willing to pay for a Mental Health App ? [Willingness to Pay]
(0-100 scale)

Q21 / Q37: Please rate your level of agreement with the following sentences regarding the perceived quality and effectiveness of mental health apps / physical health apps: [Benefits of Apps]
(1- Do not agree at all; 9- Totally agree)

- **a)** Provides good health care to users
- **b)** Has a positive impact on users' health
- **c)** Increases wellbeing
- **d)** Increases control over symptoms
- **e)** It is an effective treatment
- **f)** It can replace other interventions or therapies
- **g)** It is as effective as any other intervention
- **h)** Significantly increases mental health
- **i)** Significantly increases physical health

Q24 / Q117: When you think about how mental health apps / physical health apps are developed, how likely are these apps to: [Important Attributes: Further Results]
(1- Not likely at all; 9-Totally likely)

a) Rely on scientific research
b) Be evidence based
c) Have experts' approval
d) Have medical approval
e) Have pharmaceutical approval
f) Been developed by experts in the field
g) Have been empirically tested

Q19 / Q119: Please rate how important are the following features when you think about getting an app to improve your mental health / physical health: [Important Attributes: Further Results]
(1- Not important at all; 9- Extremely important)

a) User friendly
b) Offline availability
c) Level of scientific support
d) Previous empirical testing
e) Safety
f) Price
g) Popularity
h) Celebrity endorsement
i) Certifications from professional associations
j) Personalized options

Q16 / Q120: If you were to use a mental health app / physical health app, how likely would you be to use it: [Consumer Profile: Further Results]
(1- Not likely at all; 9- Extremely likely)

a) At home
b) At work
c) In public transportation

d) In the presence of your friends

e) In your room

f) At the gym

g) In public spaces

Q17 / Q121: If you were using a mental health app / physical health app how likely would you be to: [Consumer Profile: Further Results]
(1- Not likely at all; 9- Extremely likely)

a) Share your progress publicly

b) Share your progress anonymously

c) Share your progress with the app developers

d) Share your progress in your social networks

Q20 /Q122: If you were looking for help to improve your mental health / physical health how likely would you be to use: [Treatment Option]
(1- Not likely at all; 9- Extremely likely)

a) Medical treatment

b) Psychological treatment

c) Traditional Chinese medicine treatment

d) Alternative medicine treatment

e) Physical therapy treatment

f) Personal trainer program

g) Nutritionist program

h) Coaching program

i) Meditative program

j) Mental health app

k) Physical health app

l) Fitness app

m) Self-care app

Block 3: AQ9 - Mental Health/ AQ9 - Physical Health

[Stigma Mental / Obesity]

Q86 /Q130. How dangerous would you feel Harry is?

(1- Not at all; 9- Very much)

Q82 / Q131. I would feel pity for Harry.

(1- Not at all; 9- Very much)

Q92 / Q132. How scared of Harry would you feel?

(1- Not at all; 9- Very much)

Q83 / Q133. I would think that it was Harry's own fault that he is in the present condition.

(1- Not at all; 9- Very much)

Q88 Q134. I think it would be best for Harry's community if he were put away in a psychiatric hospital.

(1- Not at all; 9- Very much)

Q77/Q135. How angry would you feel at Harry?

(1- Not at all; 9- Very much)

Q93/Q136. How likely is it that you would help Harry?

(1- Not at all; 9- Very much)

Q91/Q137. I would try to start away from Harry.

(1- Not at all; 9- Very much)

Q87/Q138. How much do you agree that Harry should be forced into treatment with his doctor even if he does not want to?

(1- Not at all; 9- Very much)

Block 4: Physical Health app/ Mental Health app

Block 5: AQ9 - Physical Health/ AQ9 - Mental Health

Block 6: Demographics

Q105. Please rate your level of agreement with the following sentences:

(1- Do not agree at all; 9- Totally agree)

a) I am familiarized with mental illness.

b) I am familiarized with physical illness.

c) I personally know people with mental illness.

d) I personally know people with physical illness.

Q9. Gender (1- Female; 2- Male)

Q10. Nationality (1- Portuguese; 2- Other. Please specify)

Q11. Age

Appendix 3: Descriptive Statistics

Mental health statistics [A]

Q	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Q103	125	1.000	9.000	2.910	2.252	5.073
Q18 a)	125	1.000	9.000	5.900	2.264	5.126
Q18 b)	125	1.000	9.000	6.830	1.929	3.722
Q18 c)	125	1.000	9.000	6.380	2.117	4.480
Q18 d)	125	1.000	9.000	6.640	1.981	3.926
Q22	125	0.000	100.000	15.536	20.116	404.670
Q21 a)	125	1.000	9.000	5.030	1.984	3.934
Q21 b)	125	1.000	9.000	5.670	1.917	3.674
Q21 c)	125	1.000	9.000	5.850	1.935	3.743
Q21 d)	125	1.000	9.000	5.830	1.954	3.818
Q21 e)	125	1.000	9.000	4.660	2.076	4.308
Q21 f)	125	1.000	9.000	3.920	2.316	5.365
Q21 g)	125	1.000	9.000	3.450	2.092	4.378
Q21 h)	125	1.000	9.000	4.760	2.198	4.829
Q21 i)	125	1.000	9.000	4.660	2.167	4.695
Q24 a)	125	1.000	9.000	6.180	2.223	4.942
Q24 b)	125	1.000	9.000	6.020	2.172	4.717
Q24 c)	125	1.000	9.000	6.010	2.263	5.121
Q24 d)	125	1.000	9.000	5.500	2.539	6.446
Q24 e)	125	1.000	9.000	5.140	2.509	6.296
Q24 f)	125	1.000	9.000	6.420	2.215	4.907
Q24 g)	125	1.000	9.000	6.060	2.190	4.795
Q19 a)	125	1.000	9.000	6.940	2.343	5.489
Q19 b)	125	1.000	9.000	5.590	2.759	7.614
Q19 c)	125	1.000	9.000	5.730	3.088	9.538
Q19 d)	125	1.000	9.000	5.890	2.832	8.020
Q19 e)	125	1.000	9.000	7.100	2.348	5.513
Q19 f)	125	1.000	9.000	6.350	2.553	6.520
Q19 g)	125	1.000	9.000	4.940	2.625	6.892
Q19 h)	125	1.000	9.000	3.770	2.667	7.115
Q19 i)	125	1.000	9.000	6.300	2.665	7.100
Q19 j)	125	1.000	9.000	6.110	2.704	7.310

Mental health statistics [B]

Q	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Q16 a)	125	1.000	9.000	5.310	3.310	10.958
Q16 b)	125	1.000	9.000	6.230	2.739	7.502
Q16 c)	125	1.000	9.000	5.990	2.764	7.637
Q16 d)	125	1.000	9.000	6.030	2.976	8.854
Q16 e)	125	1.000	9.000	7.580	1.863	3.471
Q16 f)	125	1.000	9.000	6.010	3.044	9.266
Q16 g)	125	1.000	9.000	6.260	2.733	7.470
Q17 a)	125	1.000	9.000	4.530	2.764	7.638
Q17 b)	125	1.000	9.000	4.280	2.903	8.429
Q17 c)	125	1.000	9.000	6.570	2.601	6.763
Q17 d)	125	1.000	9.000	4.710	3.172	10.062
Q20 a)	125	1.000	9.000	7.500	2.101	4.413
Q20 b)	125	1.000	9.000	6.160	2.869	8.232
Q20 c)	125	1.000	9.000	3.810	2.542	6.463
Q20 d)	125	1.000	9.000	3.900	2.532	6.410
Q20 e)	125	1.000	9.000	5.130	2.902	8.419
Q20 f)	125	1.000	9.000	5.960	2.483	6.168
Q20 g)	125	1.000	9.000	5.860	2.608	6.802
Q20 h)	125	1.000	9.000	4.750	2.693	7.253
Q20 i)	125	1.000	9.000	4.660	2.751	7.566
Q20 j)	125	1.000	9.000	4.780	2.540	6.449
Q20 k)	125	1.000	9.000	5.170	2.542	6.463
Q20 l)	125	1.000	9.000	4.940	2.729	7.447
Q20 m)	125	1.000	9.000	4.950	2.559	6.546
Q86	125	1.000	9.000	3.570	2.467	6.086
Q82	125	1.000	9.000	6.010	2.191	4.798
Q92	125	1.000	9.000	2.740	2.129	4.535
Q83	125	1.000	9.000	4.100	2.090	4.368
Q88	125	1.000	8.000	2.340	1.801	3.244
Q77	125	1.000	7.000	2.450	1.715	2.943
Q93	125	1.000	9.000	6.260	2.129	4.531
Q91	125	1.000	8.000	2.050	1.596	2.546
Q87	125	1.000	9.000	4.550	2.787	7.765

Physical health statistics [A]

Q	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Q102	125	1.000	9.000	3.180	2.329	5.426
Q35 a)	125	1.000	9.000	5.410	2.342	5.485
Q35 b)	125	1.000	9.000	5.910	2.236	5.000
Q35 c)	125	1.000	9.000	6.000	2.087	4.355
Q35 d)	125	1.000	9.000	6.020	2.218	4.919
Q36	125	0.000	100.000	12.616	16.851	283.948
Q37 a)	125	1.000	9.000	5.260	2.239	5.015
Q37 b)	125	1.000	9.000	5.730	2.219	4.925
Q37 c)	125	1.000	9.000	5.820	2.261	5.114
Q37 d)	125	1.000	9.000	5.580	2.301	5.293
Q37 e)	125	1.000	9.000	4.720	2.351	5.526
Q37 f)	125	1.000	9.000	3.860	2.509	6.296
Q37 g)	125	1.000	9.000	3.500	2.361	5.575
Q37 h)	125	1.000	9.000	4.730	2.259	5.103
Q37 i)	125	1.000	9.000	5.020	2.236	5.000
Q117 a)	125	1.000	9.000	6.060	2.467	6.086
Q117 b)	125	1.000	9.000	6.040	2.374	5.635
Q117 c)	125	1.000	9.000	6.080	2.327	5.413
Q117 d)	125	1.000	9.000	5.780	2.524	6.369
Q117 e)	125	1.000	9.000	5.070	2.591	6.713
Q117 f)	125	1.000	9.000	6.350	2.160	4.665
Q117 g)	125	1.000	9.000	5.990	2.319	5.379
Q119 a)	125	1.000	9.000	6.220	3.034	9.207
Q119 b)	125	1.000	9.000	5.380	3.151	9.930
Q119 c)	125	1.000	9.000	5.780	2.912	8.477
Q119 d)	125	1.000	9.000	6.990	2.183	4.766
Q119 e)	125	1.000	9.000	5.730	3.104	9.635
Q119 f)	125	1.000	9.000	5.590	2.992	8.953
Q119 g)	125	1.000	9.000	4.080	2.770	7.671
Q119 h)	125	1.000	9.000	3.940	2.792	7.795
Q119 i)	125	1.000	9.000	5.980	2.650	7.024
Q119 j)	125	1.000	9.000	4.850	3.389	11.485

Physical health statistics [B]

Q	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Q120 a)	125	1.000	9.000	7.590	1.947	3.792
Q120 b)	125	1.000	9.000	5.330	3.076	9.464
Q120 c)	125	1.000	9.000	5.590	3.168	10.034
Q120 d)	125	1.000	9.000	5.860	2.862	8.189
Q120 e)	125	1.000	9.000	7.450	2.201	4.846
Q120 f)	125	1.000	9.000	6.540	2.638	6.960
Q120 g)	125	1.000	9.000	4.770	2.612	6.825
Q121 a)	125	1.000	9.000	3.700	2.780	7.726
Q121 b)	125	1.000	9.000	6.310	2.821	7.958
Q121 c)	125	1.000	9.000	6.480	2.720	7.397
Q121 d)	125	1.000	9.000	4.790	3.143	9.876
Q122 a)	125	1.000	9.000	7.450	2.172	4.717
Q122 b)	125	1.000	9.000	6.010	2.824	7.976
Q122 c)	125	1.000	9.000	3.520	2.648	7.010
Q122 d)	125	1.000	9.000	3.680	2.726	7.429
Q122 e)	125	1.000	9.000	5.300	2.916	8.500
Q122 f)	125	1.000	9.000	6.010	2.895	8.379
Q122 g)	125	1.000	9.000	5.720	2.909	8.461
Q122 h)	125	1.000	9.000	4.220	2.904	8.433
Q122 i)	125	1.000	9.000	4.820	2.818	7.942
Q122 j)	125	1.000	9.000	4.700	2.525	6.375
Q122 k)	125	1.000	9.000	5.280	2.589	6.703
Q122 l)	125	1.000	9.000	4.650	2.855	8.149
Q122 m)	125	1.000	9.000	4.820	2.607	6.797
Q130	125	1.000	9.000	2.370	1.986	3.944
Q131	125	1.000	9.000	5.620	2.517	6.333
Q132	125	1.000	7.000	2.060	1.564	2.447
Q133	125	1.000	9.000	4.070	2.390	5.713
Q134	125	1.000	9.000	2.280	1.711	2.929
Q135	125	1.000	8.000	2.180	1.677	2.813
Q136	125	1.000	9.000	6.210	2.219	4.924
Q137	125	1.000	7.000	1.790	1.375	1.892
Q138	125	1.000	9.000	4.380	2.732	7.462

Appendix 4: General Health Statistics

Q	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Q105 a)	125	1.000	9.000	6.000	2.495	6.226
Q105 b)	125	1.000	9.000	6.460	2.062	4.251
Q105 c)	125	1.000	9.000	7.000	2.420	5.855
Q105 d)	125	1.000	9.000	7.260	2.236	4.998