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A framework to influence the behavioural intention of adults to monitor their health using gamification: A case of Discovery Vitality in East London, South Africa

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ABSTRACT

The epidemic of overweight or obesity conditions has become a public health concern in South Africa, and signifies major challenges of chronic diseases affecting the healthcare sector. Recent years have noted the increasing prevalence of gamification and development across all age groups. The rapid adoption and use of gamification as a tool to improve adult motivation and engagement when monitoring their health and wellness is an essential form of health intervention. Gamification allows its users to keep track of their health in real time and encourages an active healthy lifestyle behaviour. Research has found that there are factors that may inhibit the behavioural intention of adults to use gamification for health monitoring in the long term. These factors include cost or membership fees associated with gamification that uses Discovery Vitality and privacy concerns.

The main aim of this research study was to develop a framework to influence the behavioural intention of adults to monitor their health through gamification making use of Discovery Vitality as the case study. The self-determination theory was used as the theoretical framework to ensure continuance usage of gamification for sustained health monitoring.

A qualitative research approach was chosen for this study. The purposive sampling technique was selected to identify 20 adults between the ages of 18-59 years that are members of Discovery Vitality in East London, South Africa. Interviews were conducted with the 20 participants to identify the factors that will influence their behavioural intention to make use of gamification to monitor their health. After data collection, thematic analysis was used to analyse the data and the data provided by the participants was organised and summarised into relevant themes to answer the main research question.

The study developed a framework which incorporated the four constructs of the self-determination theory, namely perceived autonomy, competence, relatedness and satisfaction of basic psychological needs for sustained health monitoring. The study also developed the five factors influencing the behavioural intention of adults to continue using gamification for sustained health monitoring. These factors are known as: broad appeal, applicability and accessibility through mobile technology and pervasive sensors, development and accomplishment, employment of creativity and feedback, and lastly social influence and relatedness. The recognition of weight loss, tracking and monitoring of physical activities and medication adherence was found to positively influence the behavioural intention of adults to continuosly use gamification to monitor their health.

Keywords: gamification, adults, behavioural intention, self determination theory

DECLARATION OF ORIGINALITY

I, LINDA NTSHONA, hereby declare that:

- I am fully aware of the University of Fort Hare's policy on plagiarism and I have taken every precaution to comply with the regulations.
- The work in this dissertation is my own work and where based on other authors' works, all sources used or referred to have been documented and recognised.
- This dissertation has not previously been submitted in full or partial fulfilment of the requirements for an equivalent or higher qualification at any other recognised educational institution.
- I am fully aware of the University of Fort Hare's policy on ethics and I have taken every precaution to comply with the regulations. I have obtained an ethical clearance certificate from the University of Fort Hare's Research Ethics Committee and my reference number is CIL031SNTS01.

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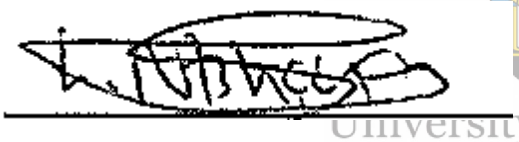

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

The burden of obesity is one of the worldwide leading healthcare problems affecting the healthcare sector. According to the World Health Organization (2016), there are approximately 2.1 billion people worldwide from the age of 15 years and older that are considered obese, with a higher prevalence in urban areas. This number of people has been rising over the past decades and causes major public health concerns in South Africa (SA). Furthermore, the prevalence of obesity is estimated to increase by 60% in adults, especially women, by 2025 (SANCDA, 2017). Hence, Gebreab (2014) argued that around 2.8 million people die worldwide per year due to health problems related to obesity.

The Heart Stroke Foundation South Africa (2017) stated that health monitoring is important in order to take a proactive approach to maintain a healthy lifestyle. Burke, Wang and Sevick, (2011) agrees that health monitoring is one of the methods that can be used to assist individuals to monitor their diets by taking control of their eating and exercise behaviours. Several studies have indicated that attitude concerning food and physical activity is one of the major challenges faced by individuals when monitoring their health (Goedecke, Jennings & Lambert, 2017). In addition, many adults struggle to remember to take their medication on time; this thereby serves as a source of failure in self-monitoring (Rossouw, Grant & Viljoen, 2012).

Hence, technology is seen as the main option that can assist adults to deal with challenges related to health monitoring. One of the technologies that in the recent past has been used for health monitoring purposes is gamification. According to Cugelmn (2013, p. 1), “gamification is defined as the use of game design elements in non-game contexts”. Gamification can be used by adults to manage their health and wellness, offering gaming features that motivate health monitoring (Cugelmn, 2013). Discovery Medical Aid makes use of gamification elements to encourage healthy lifestyle among the members through fitness trackers and health apps in order to motivate individuals to make behavioural changes for health monitoring (Discovery Vitality , 2020). Hence, the main focus of the Discovery Medical Aid is to link devices as well as fitness apps to Discovery Vitality in order to get rewards (Discovery, 2020). The main goal of Discovery Medical Aid is to ensure that people are healthier by improving and securing their lives (Discovery, 2020). This is achieved through awareness programmes which enable people to be aware of their health risk factors, and assist them to oversee and improve their health.

The aim of gamification in the healthcare context is to engage, teach, offer entertainment, measure, and to improve user experience (De Croon, Wildermeerch, Willie, Verbent & Abeele, 2016). Gamification includes various gaming elements that allow adults to monitor their health on a daily basis, for example by keeping track of their heart rate, medicine intake and calories consumed each day (Ngamntwini & Cilliers, 2021).

According to Muangsrinoon and Boonbrahm (2019), behavioural intention (BI) refers to the likelihood that individual will perform a certain behaviour. BI is always different for every individual depending on certain aspects including gender, adult attitude, subjective norm, and perceived behavioural controls (Fakhrudin, Karyanto & Ramli, 2018). Hence, the most persuasive predictor of behaviour is the behavioural intention. According to Yang, Asaad and Dwivedi (2017), gamification is capable of influencing an individual's behaviour and attitudes both positively and negatively. On the other hand, Fakhrudin et al. (2018) argued that gamification has been made available for adults to utilise, but the long-term influence of behavioural intent has not yet been recognised, which raises a challenge in achieving the desired behaviour over a short term. This relates to the procedure in which adults might choose to use gamification as a tool to monitor their health (Fakhrudin et al., 2018).

Although the abundant use of gamification in fitness apps motivates and promotes adults' engagement to monitor a healthly lifestyle and practise active physical activity, the consistent use of technology by adults and lack of commitment remains a huge concern (Chan & Woo, 2010). Additionally, using gamification as a tool to monitor heatlh was found to be the most effective way of keeping track of healthly eating behaviour; however, remaining committed to the use of gamification for a long term remains a problem for adults (Mdunyelwa & Cilliers, 2021). This study proposes a framework to influence the behavioural intention of adults to monitor their health using gamification. Finally, the theoretical premise of the research study is mainly to focus on the problem statement, research questions, objective of the study, significance, literature review and end with the research methodology.

1.2 PROBLEM STATEMENT

Over the last few years, the popularity of gamification in the healthcare context has increased dramatically. According to Miller, Cafazzo and Seto (2016), gamification improves compliance of users as well as their ability to manage their health conditions by adhering to their prescribed medication. However, incorporating gamification onto adults' daily lives

portrays a number of challenges such as reliability, accuracy and lack of knowledge (Chan & Woo, 2010). Preserving an active physical lifestyle and healthy eating behaviour by utilising gamification is critical for adults in order to monitor their health; however, encouraging them to use gamification in the long term remains a huge a challenge (Miller, Cafazzo & Seto, 2016). Furthermore, it was found that when adults utilise gamification elements, their interest tends to decline over time, thereby using it only for a short term (Sardi, Idri & Fernandez-Aleman, 2017).

According to Ahmed and Saravanan (2017), behavioural intention comprises instructions that people give to themeselves to behave in a certain way, which relates to the process in which adults could choose to monitor their health making use of gamification. Recent studies reveal that continuous use of gamification by adults goes further than the adoption and extends to confirming that the device can impact the users' healthly lifestyle in the long term (Muangsrinoon & Boonbrahm, 2019). Athough gamification is widely accessible and plays a critical role in motivating adults to change their health behaviour, this device fails to reveal long-term impact of behavioural intention and habits; thereby making it difficult to predict behavioural intent over a short time (Lau, Smit, Fleming & Riper, 2017). This situation relates to the Discovery Vitality programme.

Similarly, although the vitality programme has been a worldwide accomplishment in South Africa, Discovery Medical Aid was found to have problems related to the members that do not use gamification as intended; thereby showing short-term impact on behavioural intent (Walsh, Auerbach, Castro & Dewan, 2018). Finally, a framework to influence the behavioural intention of adults to monitor their health making use of gamification. The following section discusses the research question and the sub-questions of this study.

1.3 RESEARCH QUESTIONS AND SUB-QUESTIONS

This section addresses the main question for this research study. It also outlines and explains the three sub-questions formulated to aid in answering the main research question.

1.3.1 Main research question

How can the behavioural intention of adults in South Africa be influenced to make use of gamification for health monitoring?

1.3.2 Research sub-questions

i. How can gamification contribute in health monitoring of adults in South Africa?

Gamification improves intrinsic and extrinsic users' motivation and engagement. Recent studies also reveal gamification as a fun activity that endorses healthy behaviour of users (Muangsrinoon & Boonbrahm, 2019). Additionally, gamification was found to be one of the main ways that promotes users' happiness and self-esteem.

ii. What are different types of gamification elements that promote health monitoring?

Different types of gamification elements exist to support health monitoring. According to Muangsrinoon and Boonbrahm (2019), gamification is the use of game elements in applications found in mobile devices. There are many gamification elements found within mobile devices and these range from ranking, rewards, points, feedback, market places and economies to team, self-representation with avatars and competition under rules that are explicit and enforced (Rezvan, 2017). These elements stimulate users' behavioural intention, increase users' satisfaction and promote a healthy lifestyle.

ii. What are the factors that influence behavioural intention of adults to monitor their heatlh making use of gamification in South Africa?

According to Lau, Smit, Fleming amd Riper, (2017), gamification and gamified applications are capable of motivating adults to monitor their health both in developing and developed countries, and of encouraging users through rewards and points to live a healthy lifestyle.

1.4 OBJECTIVE OF THE STUDY

The purpose of this study was to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. Hence, the basis for a favourable outcome for gamification goes beyond the adoption to some degree and instead aims to have a long-term effect on adults' lifestyle (Lau, Smit, Fleming & Riper, 2017). This in turn will help in reducing the stigma involved and the perceptions of adults.

1.5 SIGNIFICANCE

The prevalence of obesity is one of the critical worldwide problems, predominantly in adolescents living with chronic health conditions. However, through the use of game elements including apps and video games, the healthcare status of South Africans can be improved (Schulz, 2017). This leads to the dawn of gamification. Gamification promotes a healthy lifestyle of physical activity for adults and enables them to monitor their health. Thus, the rapid

growth of gamification has the potential to improve healthcare of adults, especially in areas with under-resourced health facilities (Ngamntwini & Cilliers, 2021).

According to Schulz (2017), gamification motivates adults in the form of game elements to learn to live a healthy lifestyle by practising physical activities. In the healthcare sector, gamification in the form of game elements and rewards is used to motivate adults to monitor their health, encourage their behaviour and efforts in difficult situations related to unhealthy activities (Lavy, 2017). From the healthcare perspective, the study sought to provide a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification.

1.6 LITERATURE REVIEW

According to Statistics South Africa (2019), adults in South Africa are all the individuals between the age of 18 and 59 years. Globally, obesity accounts for 2.1 billion people (SANCDA, 2017). According to the Discovery Vitality statistis (2020), about 70% of women and 31% of men in South Africa are considered obese.

Discovery Vitality (2020) states that Discovery Vitality is a worldwide prominent science-based behavioural change programme that inspires individuals to exercise healthly activities and rewards them for it. In addition, Discovery Vitality involves three progammes that inspire and compensate individuals for practising a healthy living lifestyle, good driving ability and good banking (Discovery Vitality, 2020). Although the Vitality programme is known for rewarding its users for living a healthy lifestyle, it also utilises the gamification apps, for example “Nike-run club app”, to provide users with information related to their health and ways to improve it using gamification elements, such as leaderboards, points or badges as a way of motivating them (Discovery Vitality, 2020). This Discovery Vitality programme is known as the biggest medical aid as it has vitality programmes to incentive members that use gamification.

Health monitoring in adults is one of the main critical public health challenges in South Africa and a financial burden to the healthcare system (Cois & Day, 2015). The pervasiveness of health monitoring is related with the issue of chronic diseases such as cancers, hypertension, cardiovascular diseases etc (Barrett, Ortmann & Dawson, 2016 as cited in Schmidt, 2016).This leads to the dawn of the technology known as gamification.

In recent years, the concept of 'gamification' has become popular worldwide, influencing users' behaviour and motivation through experiences. Gamification can be applied in various areas including finance, productivity, healthcare, and in education (Wanick & Bui, 2019). For the purpose of this study, gamification in healthcare was found to be the most suitable in conducting this study. Muangsrinoon and Boonbrahm (2019), as cited in Deterding, Dixon, Khaled & Nacke, (2011, p. 20) defined gamification as "the use of game mechanics in non-game activities to influence people's behaviour". A similar definition has been offered by Rezvan (2017) who stated that gamification is a procedure used in technologies and game elements to cooperate with audiences and recommend solutions to problems.

Sardi et al. (2017), provided a summary of the gamification elements in their systematic review including ranking, rewards, points, feedback, market places and economies, team and self-representation with avatars improve users' motivation and engagement and promote a healthy lifestyle of users. There are various benefits within gamification such as patient involvement; endorsing of healthy behaviour; supporting the users' efforts to change their behaviour; enabling health activities to be amusing, pleasant and understandable; enhancing intrinsic and extrinsic motivation; and the convenience associated with usability (Almarshedi, Wills & Ranchhod, 2015) The main theoretical premise behind gamification is that it positively influences user's healthcare and their wellbeing. Due to this, adults are encouraged to influence their behavioural intention to montitor their health utilising gamification.

According to Chao (2019) behavioural intention is an individual's prospect in accomplishing a certain behaviour, and is usually the significant factor in actual behaviour. In this study, behavioural intention relates to adults' intention to continuously use gamification to monitor their health. A literature review conducted by Johnson, Deterding, Kuhn, Staneva, Stoyanov and Hides, (2016) indicates that gamification provide new opportunities for health monitoring to prevent the issue of unhealthy eating behaviour in adults. Additionally, gamification influences users to live an active lifestyle and stimulates a healthy eating behaviour (Schulz, 2017).

Gamification motivates its users, improves their lifestyle and influences their health behavioural change. Maphumulo and Bhengu (2019) stated that health monitoring is capable of improving the healthcare systems in South Africa. The study done by Vanduhe, Cemal Nat and Al-Delawi (2020) indicates that the user's attitude is based on their behavioural intention to continue to use gamification over the long term for health monitoring. Gamification elements

including user experience, engagement and motivation are the key factors that have a huge impact in health monitoring (Sailer, Hense, Mayr & Mandl, 2017). These gamification elements also known as gamification features are discussed below.

1.6.1 Gamification features

There are many gamification features or elements available worldwide. According to Rezvan (2017), gamification elements are grouped into the following categories including: ranking, feedback, market places and economies, and competition under rules that are explicit and enforced. These are discussed below.

i. Rankings

According to Rezvan (2017), rankings are used to motivate users' behaviour. Ranking is grouped into three categories including badges, achievements and levels. In this study, rankings are used to reveal adults' current state including talents, achievements, and competencies related to a game hierarchy. However, badges are rewards given to a person for achieving a particular goal or a skill, while levels are goals that users score in a gaming hierarchy and are rated based upon other players (Antonaci, Klemke & Specht, 2019). Finally, it is critical for ranking to be very precise, updated and be easily available to all users.

ii. Feedback

Antonaci et al. (2019) defined feedback as the information that is distributed to users related to their advancement, accomplishment issues, or other features of their activities. It is used to track individuals' progress. In addition, feedback information can be conveyed either directly or indirectly depending on the gamifying hierarchy and can take several forms (Antonaci et al., 2019). In this study, feedback is divided into four categories: points, leaderboards, avator, and progress. According to Antonaci et al. (2019), points are known as the statistical illustration of the user's success, while leaderboards are established upon social comparison to allow users to understand their perfomance when compared to other users/players. Antonaci et al. (2019) stated that avatars are known as the fundamental version of the user/player. Finally, progress relates to feedback due to tracking of success and status and is highly appreciated by users.

iii. Market places and economies

Features such as market places and economies relate to rewards. Rewards are badges that are given to users for the accomplishment of a particular task, goal or skill (Marston & Hall, 2016). According to Marston and Hall (2016), rewards exist in various forms such as points, badges

and in monetary incentives. In addition, rewards are considered as an element of gamification due to its popularity in various digital games.

iv. Competition under rules that are explicit and enforced

According to Rezvan (2017), the above-mentioned feature relates to quest or challenges detected in a gamifying hierarchy. Antonaci et al. (2019) stated that challenges are normally in the form of puzzles or problems to be resolved either by a single person or by the group. Additionally, challenges in a gamifying hierarchy require users/players to complete and solve critical engaging problems, thus enabling them to apply their critical thinking skills (Marston & Hall, 2016). In a gamified environment, this enables users/players to have a sense of direction or persistence (Alsawaier, 2017). The next section discusses the theoretical perspective.

1.7 THEORETICAL PERSPECTIVE

This study adopted the self-determination model (SDM) developed by Legault (2017A). The SDM originated from the self-determination theory (SDT) and this SDT informed the theoretical perspective of this study. Ryan and Edward originally proposed this theory in 2000 to analyse individual behaviour based on two categories: intrinsic and extrinsic motivation. According to Deci and Ryan (2000) the SDT is a theory of human motivation that observes an extensive range of occurrences across gender, age, culture and socio economic status. The purpose of the SDT is to clarify human motivation and behaviour based on the individual variances in motivational orientations, effects on motivation as well as interpersonal insights (Legault, 2017A). Ankli (2009) and Suciu, Mortan and Lazar (2013) established and tested the SDM based on Vroom's expectation theory (VET) and the SDT. However, the SDM was found to be most suitable in analysing the user's motivation. Figure 1 below depicts the theoretical perspective for this study.

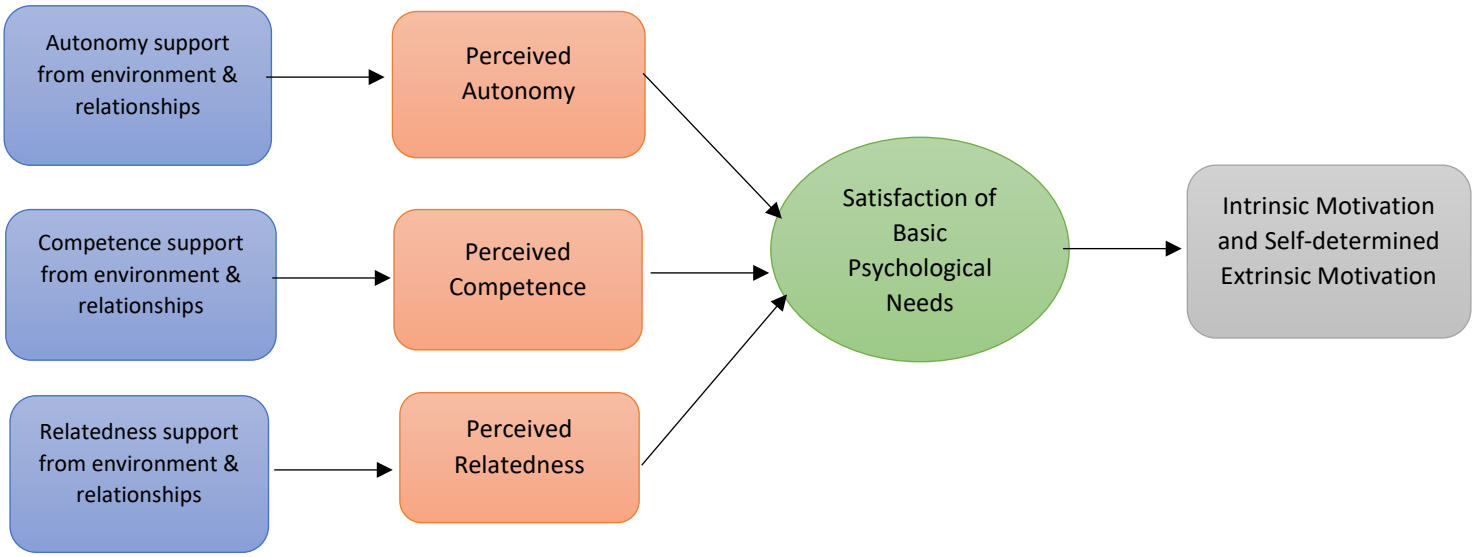

Figure 1: Self-determinaion model (SDM)

Source: Legault, 2017A

The self-determination model is made up of the three categories autonomy, competence and relatedness to achieve psychological growth. According to Ankli (2009, p. 32), autonomy refers to "being the perceived origin or source of onces own behaviour". It is about enabling users to have control of their own behaviours and goals. Hence, the sense of having control and acting/behaving appropriately enables users to change, which in this case refers to changing their unhealthy eating behaviour and this plays a major role in one's health. Additionally, enabling users' autonomy increases intrinsic motivation; however, discouraging users' sensation of autonomy lessens their intrinsic motivation (Arvanitis & Kalliris, 2017).

Ankli (2009, p. 33) stated that competence "relates to the feeling in ones interactions with the social environment and experience opportunities to exercise and express ones capacities". Competence is basically about seeking challenges that are ideal for one's capabilities. It is not related to achieving skills or capabilities, but rather a sense of assurance and efficiency in action (Ankli, 2009). Ryan and Edward (2000) argued that self-assured people with the ability to achieve success are more likely to take actions to achieve their goals.

However, relatedness relates to the sense of belonging with one another and within the community, the sense of caring and being cared for by others (Ankli, 2009). It replicates the intergrative inclination of life, the tendency to be associated with people and be acknowledged by others (Ankli, 2009). Hence, after the analysis of the first three quadrants, it can be said that satisfaction of basic psychological needs can be achieved to ensure that health monitoring is

achieved. Finally, recent studies reveal that in order to influence behavioural intention of users in this regard, motivation must be intrinsic and extrinsic to be successful (Ankli, 2009).

The SDM has been used in various studies including: healthcare, education, finance and business to motivate users' behavioural intention (Chao, 2019). Regarding this study, the perceived autonomy, competence and relatedness of gamification by adults play a major role in monitoring health. Furthermore, the use of SDM provides users with the knowledge and sense of control over the factors that influence their behavioural intention to continue montoring their health making use of gamification. The following section examines the research design and methodology used for this study.

1.8 METHODOLOGY

According to Igwenagu (2017), research methodology is the procedure involved in ascertaining and analysing the research questions of the study on the chosen research topic. It is a fundamental way of speculating how the research will be conducted and the necessary steps needed to achieve the desired outcome of the research project (Pandey & Pandey, 2015). The next section briefly discusses the research paradigm, followed by the research method, design, population and sampling, data collection, data analysis and data trustworthiness – more detail is presented in Chapter 5.

1.8.1 Research paradigm

A paradigm is the predominant perspective of a certain study. It is a theory that guides the way individuals do things (Pham, 2018). Three paradigms are used in information systems research, namely positivist, interpretivist and pragmatism paradigms. According to Murshed and Zhang, (2016) the positivist paradigm is the viewpoint of investigating whereby the researcher seeks to find facts only. This paradigm guarantees that the truth is static and facts are measured to test the hypothesis of the study. However, the interpretivist paradigm is mainly based on human interpretation (Murshed & Zhang, 2016). It pursues to record human behaviour, understands the insight and meaning derived in a particular environment. Kaushik and Walsh (2019, p. 3) states that pragmatism is an "approach that evaluates theories or beliefs in terms of the success of their practical application". For the purpose of this study, an interpretivist paradigm was chosen as the most suitable as it allows the researcher to explore different interpretations accessible from data collection of this study. This paradigm was relevant for this study as it allowed the researcher to understand different views of adults about how they can monitor their health using gamification.

1.8.2 Research approach

Three research approaches exist, namely quantitative, qualitative and the mixed approach. The quantitative approach utilises facts, and quantifies and tests the hypothesis as a premise of the study (Murshed & Zhang, 2016), while the qualitative research approach seeks to understand the research problem by exploring the environment. This approach allows researchers to examine the situation in order to develop meaning which will later serve as the findings of the study (Murshed & Zhang, 2016). Due to the explorative nature of this study, a qualitative research approach was found to be the most suitable approach because it enabled the researcher to comprehend the ways in which adults are influenced to monitor their health using gamification. This study used interviews to answer the research questions of the study.

1.8.3 Research design

Research design is a basic plan to study a scientific problem. The main aim of a research design is to provide credible results (Ginsburg, 2011). A case study is an experimental examination that explores an existing phenomenon in depth and within its actual context. Yin (2014) argued that a case study research is a challenging attempt that pivots around the knowledge and abilities of the researcher; thereby becoming very vital and rigorous methodology. Additionally, case studies can be utilised to apprehend the difficulty of a case and to further discover the appropriate conditions of the case.

According to Ryan, Coughlan and Cronin (2009), an interview is a verbal communication that takes place between two parties in order for the interviewer to gather information voluntarily from the interviewee. William (2015) argued that semi-structured interviews allow the interviewer to explore the topics under discussion in more detail and to address the research topic in obtaining the information from the participants. Semi-structured interviews were deemed appropriate for this study because they allow the researcher to pose exploratory, open-ended questions to the participant with the goal of obtaining deeper insights of the subject. These questions in the semi-structured interview provide more detailed information on issues related to behavioural intention of adults in using gamification for health monitoring.

1.8.4 Population and sampling

It is critical to understand the population group of the study before commencing with the research. The population that was used for this study comprised adults (age 18-59 years) that are members of the Discovery Vitality in East London, South Africa. The sample size for this study was predicted to be 20 citizens that belong to Discovery Vitality; however, the researcher

had to continue with interviews until saturation point was reached. In this group, both citizens that actively make use of the gamification features of Vitality to secure rewards and non-users of gamification that do not make use of these features were included to represent both sides of the argument.

During the planning stage of a study, it is important for a researcher to consider target population and the sampling size of the research. In this study, the target population are the adults between the ages of 18-59 that are members of Discovery Vitality and living in East London. This target population fits the study objectives of this research and supports the depth of case-oriented analysis. Additionally, the sample size of this study was estimated to be 20 citizens that belong to Discovery Vitality. This sampling size was chosen because it is impossible to conduct interviews with the entire population as a sample that is too big will cost money, time and resources and without a projected sampling size, the results derived from the study may be biased. With the selected sampling size, a researcher can gather sufficient data to have an estimate with a desired level of accuracy.

There are two types of sampling, namely probability and non-probability sampling. In this study, non-probability sampling which is associated with the purposive sampling technique was chosen. Etikan, Musa and Alkassim (2016, p. 2) argued that "purposive sampling technique, also called judgment sampling, is the deliberate choice of a participant due to the qualities and knowledge the participant possesses". The researcher advertised on social media and other platforms for research participants that belong to Discovery Vitality. The next section addresses the data collection, analysis, trustworthiness, delimitation of the study and ethical approval.

1.8.5 Data collection

Data gathering is considered as the critical step of any research study. The data collection method comprises primary and secondary data collection. The primary and secondary data was collected to answer the research question. Murshed and Zhang, (2016) stated that primary data is gathered at source to respond to an exact research question, while secondary data is the data utilised by the researcher which was gathered by someone else from different sources. The primary data can be collected using: surveys, interviews, and questionnaires, among others, while secondary data includes accessing previous literature and publications from sources such as journals, books and other sources.

Semi-structured interviews were used in this study in order to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification: A case of Dicovery Vitality. To this end, the interview questions were adapted from the self-determination theory (SDT) in order to address the research questions of this study. Prior to data being collected by the researcher in the form of interviews, respondents were asked permission to partake in this study and for their responses to be recorded. Finally, these interview questions were used to understand the behavioual intentions of adults in using gamification for health monitoring. The next section explains the analysis of the data

1.8.6 Data analysis

According to Braun and Clarke (2006) , data analysis is a process of converting raw data into usable information to see and understand the experiences of the people or the occurrence being considered. This study adopted thematic analysis to analyse the data due to its accessibility and flexibility. Braun and Clarke (2006, p. 57) stated that thematic analysis is a "method that systematically identifies, organise, and offer insights into, patterns of meaning (themes) across a dataset". In addition, using thematic analysis for this study was deemed appropriate because it provides the opportunity to broadly distinguish between theoretical and conceptual issues. As pointed out by Braun and Clarke (2006, p. 2), this study made use of thematic analysis to examine how adults' behavioural intention to monitor their health making use of gamification can be influenced.

1.8.7 Data trustworthiness

According to Nowell, Norris, White and Nancy (2017), data trustworthiness is a way of influencing the readers or the researchers themselves that their research study is worthy of courtesy. Shenton (2010) stated that data trustworthiness is made up of four criteria, namely credibility, transferability, confirmability and dependability. Thus, trustworthiness is critical in evaluating the quality of the study.

The positivist perception of internal validity relates to credibility. However, as pointed out by Nowell et al. (2017), the study is credible when the results of the research justification are believable and appropriate between the researchers and the readers. Thus, credibility can be addressed by a number of methods including: observation, data collection triangulation as well as research triangulation (Gunawan, 2015). During the data collection process of the study, responses from adults in the form of interviews were thoroughly analysed to support the validity and reliability of the study under discussion.

Moon, Brewer, Hartley, Adams and Blackman (2016) argued that transferability is a form of external validity, referring to the degree to which the occurrence or results of qualitative research are useful or can be transferred to other studies or contexts. Transferability has been found to be the most critical criteria of the research results as it is a way of determining whether the research is relevant to other settings or not (Moon et al., 2016). The methodology and examination of this study were properly conducted and evaluated in a way that it can be transferred to or used by other studies or contexts in the future.

Dependability involves consistency and reliability of the research results. Hence, data is found to be dependable when it is able to deliver the same results when subjected to other methods in similar ways (Moon et al., 2016). Thus, as an indication of data dependability, consistency and reliability may be utilised by external sources. This research study used the best practices of qualitative studies by making sure that their individual opinions would not impede with the analysis and data collection of the study.

According to Moon et al. (2016), confirmability refers to the degree to which the research results could be authenticated or confirmed by others. Confirmability is proven when transferability, credibility and depandability are all accomplished. However, to attain confirmability, the researcher needs to determine that the research results are consistent and the data can be analysed to specify objectivity (Nowell et al., 2017). Finally in this study, a detailed methodological explanation allows the readers to determine the confirmability of the study. The next section describes the delimitation of the study.

1.9 DELIMITATION OF THE STUDY

The study evaluated the behavioural intention of adults to monitor their health making use of gamification: A case of Discovery Vitality in East London, South Africa. Gamificaton in the information systems perspective is known as an efficient way of keeping adults' private information confidential. The target group was limited to adults between the ages of 18-59 years, located in East London, South Africa and who belong to Discovery Vitality. The following section explains the ethical considerations of this study.

1.10 ETHICAL CONSIDERATIONS

According to Winterfeld, Weber-schöndorfer, Schaefer and von Elm (2018), the aim of ethical approval is to ensure the safety of the researcher and the research participants when conducting a research study.

Additionaly, participants need to be informed about the goals and objectives of the study as well as any benefits and concerns that may arise (Cacciattolo, 2015). Before commencing with this research study, permission was requested from the participants. The research was voluntary and only intended for those who understood the reasons for carrying out the study (World Health Organisation, 2019). No private information was disclosed to any party except for the means of collecting and analysing of the data solely for the purpose of this study (Cacciattolo, 2015). During and after the course of this study, the participants were treated with confidentiality and their identity remained anonymous. In ensuring that the researcher abided by the ethical principles of the institution, ethical approval to conduct this study was sought from the University of Fort Hare's Research Ethics Committee. The study obtained the required ethical clearance from the University of Fort Hare Research Ethics Committee before embarking on data collection. The collected data is confidential as it is jointly owned by the researcher and the university and only the researcher and the university has access to the collected data.

1.11 CONCLUSION

This chapter provided the introduction to the entire study. Chapter 1 consisted of the background to the study followed by the problem statement. Thirdly, the research questions including a brief discussion of each has been provided. This chapter also highlighted the objective and the significance of this study, also providing the important literature review and the theoretical review which supported and provided a foundation for this particular study. A discussion of the research methodology that was used to complete this study has also been provided, followed by a discussion regarding the delimitation of the study and the ethical considerations that the researcher applied to this study. Chapter 2 next discusses how gamification can contribute in health monitoring of adults in South Africa.

CHAPTER 2: HOW CAN GAMIFICATION CONTRIBUTE IN HEALTH MONITORING OF ADULTS IN SOUTH AFRICA?

2.1 INTRODUCTION

According to Hattingh, Matthee, Smuts, Pappas, Dwivedi and Mantymaki (2020), the biggest number of deaths in South Africa arises from chronic diseases. Therefore, achieving an active and healthy lifestyle is essential for adults to monitor their health. Technology such as gamification can help adults to be more proactive about their health. According to Cugelmn (2013, p. 1), "gamification is defined as the use of game design elements in non-game contexts". The growth of gamification in the healthcare context has increased over the past few years with the potential to motivate adults to live a healthy lifestyle (Hattingh et al., 2020). The main theoretical premise behind gamification in healthcare is that it has a positive effect on adults' health and wellness, offering advanced solutions to enable them to improve their physical activity levels. However, motivating adults for continuous usage of gamification remains a problem.

This chapter aims to address how can gamification contributes in health monitoring of adults in SA. The first section provides an overview of the healthcare in SA. The next section introduces technology in healthcare, followed by the private medical aid in South Africa, and the Discovery Vitality. The last section discusses other studies related to Discovery Vitality.

2.2 HEALTHCARE IN SOUTH AFRICA

For many years, problems related to the South African Healthcare System have reverted back to the Apartheid era where the healthcare system was highly fragmented (Delobelle, 2013). The healthcare facilities in SA are divided into public and private services. In addition, literature reveals the quality of healthcare, especially in the public sector, as the main challenge in SA. Several studies indicate that since 1994, National Government has made many efforts to advance the quality of healthcare delivery in SA (Malakoane, Heunis, Chikobvu, Kigozi, & Kruger, 2020; Maphumulo & Bhengu, 2019). Yet the healthcare sector in SA remains overwhelmed by the double burden of chronic and infectious diseases including obesity, cancer, diabetes, stroke, heart diseases, HIV/AIDS and asthma.

Goedecke, et al., (2017, p. 65) defined obese or obesity as "an imbalance between energy intake and expenditure such that excess energy is stored in fat cells, which enlarge or increase in number". A person is usually considered obese when their body mass index (BMI) is between 20-29.9kg/m2 and obese when their BMI is between 30-39,2kg/m2 (Goedecke et al., 2017).

Obesity often leads to early death and causes chronic conditions in adulthood (Lemamsha, Randhawa, & Papadopoulos, 2019). Over the years, the worldwide prevalence of obesity has doubled, as a result, 2.1 billion people from the ages of 15 years and older are considered obese or overweight, according to the World Health Organisation (2019). With regards to that, 2.8 million people die globally as a result of being overweight or obese (World Health Organisation, 2020). Given that chronic diseases such as obesity are a worldwide concern that causes financial burden to the healthcare system, it also poses serious implications for adults.

2.2.1 Causes of obesity in South Africa

The rapid prevalence of overweight or obesity conditions in adults has become a worldwide epedemic, that is slowly spreading throughout the childhood population. According to Fonseca, Sala, Ferreira, Reis, Torrinhas, Bendavid and Waitzberg (2018), the cause of obesity is an energy imbalance between consumed calories and calories expenditure. Despite the healthcare concerns related to under-nutrition, poverty and infectious diseases facing South Africa, obesity is considered as one of the main public health issues of the country and this enforces a substantial economic burden on the healthcare system (Department of Health, 2018).

The number of overweight adults has been increasing drastically and this has a major impact on our lives and societies. However, several studies reveal that the primary cause of obesity in South Africa relates to low consumption of fruits and vegetables, poor dieting and consumption of alcohol beverages and foods containing sugar (National Obesity, 2017; Department of Health, 2018). In addition, lack of physical activity due to inactive nature of work, methods of transportation and urbanisation also cause this condition in adults. According to the Department of Health (2018), the lower income households have been found to have a higher occurrence of obesity due to low affordability and consumption of least expensive foods.

Additionally, obesity increases health risk conditions related to type2 diabetes, cardiovascular disease, high blood pressure etc. that are the leading risks for global deaths and that diminish adults' life expectancy (Health Weight, 2020). According to Tabasum, Mushtaq and Syed (2018), factors related to poor quality food consumption (poor diet), lack of physical activity, depression and anxiety, genetic factors and lack of knowledge play a major role and are regarded as the main causes of obesity in adults. These factors are discussed below.

i. Food consumption

Tabasum et al. (2018) stated that excessive consumption of food is interrelated with obesity. Several studies indicate that weight gain occurs from consumption of large portions of

unhealthy food including fried fast foods, alcohol and sugar beverages, snacks, and limited intake of vegetables and fruit (Patterson, Risby & Chan, 2012; Tabasum et al., 2018). Tabasum et al. (2018) further found that consumption of sugary beverages contributes to weight gain as it is less satisfying than food consumption and can be consumed much quicker. Additionally, poor diet results in excess calories stored in the body cells that manifest as obesity (Bora, 2018). Also, lack of sleep can cause changes in hormones that makes adults feel hungrier and crave high-calorie foods.

ii. Physical inactivity

Many studies reveal that sedentary lifestyle leads to obesity (Tabasum et al., 2018). Additionally, the amount of time spent on television viewing is rapidly increasing, meaning that many adults in South Africa spend less time in physical activities than in watching television. As a result, the amount of time spent on watching television raises the pervasiveness of obesity by 2% a day (Balentine, 2020). Furthermore, less physical exercise leads to low metabolic rate in burning food efficiency (Balentine, 2020). Studies reveal that inactive groups often burn few calories compared to active groups, which is due to the strong correlation found between inactive lifestyle and weight gain (National Health and Nutrition Examination Survey, 2020)

iii. Depression and anxiety

According to Balentine (2020), people respond differently to emotions related to depression, anxiety, boredom, and stress. Hence, for some individuals, emotions such as stress impact their eating habits such that some may eat less while others may consume more (Choi, 2020). Among others, depression and stress in adults were found to be of the biggest contributing factors towards weight gain. Studies reveal that the consequence of depression and stress among adults is often that of excessive eating of unhealthy foods such as fast-foods, snacks and sugar beverages (Discovery Centre for Health Journalism, 2013).

iv. Genetic actors

According to Balentine (2020), genetic factors as well as environmental factors contribute to weight gain, which increases the rate of obesity occurrence in adults. Some data indicates that genetic factors may be the main driving force behind weight gain (Obesity Medicine Association, 2020; Thaker, 2018). Furthermore, science proves that genetic conditions can contribute to obesity and to avoid this requires consumption of healthy food and an active lifestyle to monitor one's healthcare (Albuquerque, Nóbrega, Manco & Padez, 2017). These multiple genes i.e. fat mass and obesity-associated conditions apply to 43% of the population.

Genetic factors have also been found to be the source of obesity conditions in some disorders (Obesity Medicine Association , 2020). Consequently, an individual is likely to become obese more especially when parents are obese too (Tabasum, et al., 2018).

2.2.2 Consequences of obesity

According to Health Weight (2020), adults who are diagnosed with obesity compared to those with a normal body weight are at a higher risk of developing many chronic diseases. Hence, obesity can have serious effects on a person's health. There are many health risks that adults with obesity are exposed to, these include hypertension, cardiovascular diseases related to stroke, type 2 diabetes and cancer (World Health Organisation, 2020). These health conditions can cause impulsive death and significant disability. Meldrum, Morris and Gambone (2017, p. 836) further found that the "metabolic disorder of dyslipidemia, insulin resistance (IR), and central adiposity is strongly associated with obesity". In agreement with the above, the degree of health deficiency is determined by three aspects related to amount of fat, dissemination of fat and the occurrence of other health risk factors (Ali & Crowther, 2016). Although many studies have revealed that most health conditions related with obesity in aldults can be preventable and treated when an individual practises living a healthly lifestyle, it was also found to portray undesirable concerns throughout adulthood (Tabasum, Mushtaq & Syed, 2018; Meldrum, et al., 2017). In worst case scenarios, the outcome of some of these health conditions is related to death. These conditions are discussed below.

i. Hypertension (high blood pressure)

The issue of obesity or overweight is related to hypertension or high blood pressure. This is due to the fact that every 5kg gained accounts for a 20% increase in high blood pressure (Meldrum, Morris & Gambone, 2017). Furthermore, 78% and 65% of obesity in men and women respectivley leads to hypertension. In addition, high blood pressure can be the result of excessive weight gain because the heart struggles to pump blood to body cells caused by fat (Meldrum et al., 2017). By comparing a BMI<25kg/m in men with 18.2% and women with 16.5% high blood pressure, the prevalence of high blood pressure in obese adults is estimated to increase to 38.4% in men and 32.2% in women (Ali & Crowther, 2016). However, adults can maintain high blood pressure or normalise it by being physically active or through weight loss control. Furthermore, various studies have revealed that losing weight results in lower blood pressure and is related with reductions in vascular conflicts, development in insulin resistance and reduction in sympathetic nervous system activity (Xavier, 2018).

ii. Cardiovascular diseases (Stroke)

Bose, Bhadra and Mukhopadhyay (2017) stated that being overweight increases the risk of stroke conditions. According to Coupland, Thapar, Qureshi, Jenkins and Davies (2016), a stroke occurs when there is lack of blood flow to parts of the brain, interrupted or condensed, inhibiting brain tissue from oxygen supply and nutrients thereby causing brain cells to die. Additionally, as the BMI of adults rises so does the risk of stroke. Approximately 137% of women with a BMI>32 are at higher risk of an ischemic stroke, than those with a BMI<21 (Bose, et al., 2017). An ischemic stroke is one of the most common strokes which happens when a blood clot blocks a vein that transmits blood to the brain (National Institute of Diabetes, Digestive & Kidney diseases, 2020). Obesity/overweight conditions increase high blood pressure and are the primary cause of stroke.

Furthermore, disability in adults is caused by the rapid prevalence of a stroke which usually occurs due to obesity conditions. Thus, a stroke is one of the primary causes of death in adults over 60 years (National Institute of Diabetes, Digestive & Kidney diseases, 2020). According to the WHO (2020), in every two seconds, there is at least one patient in a hospital that suffers from stroke and in every six seconds, a patient either dies or experiences a disability condition. Due to estimated 5.8 million deaths caused by strokes every year, a stroke is therefore becoming a global epidemic of the 21st Century. Additionally, various studies suggest that more than 30% of patients youner than 65 years are being admitted to hospitals due to the rapid increase in strokes. Hence, it is important for adults to control their high blood pressure and weight gain in order to reduce the risk of a stroke, and which at the same time would help to keep their cholesterol and blood sugar levels normal (Kinlen, Cody & Shea, 2017).

iii. Cancer

A study conducted by Meldrum et al. (2017) revealed that adults who are overweight or obese are at high risk of being diagnosed with cancer which comes in many different types such as breast, kidney, colon, esophagus, uterus, pancreas and gallbladder cancers. According to the National Cancer Institute (2017), it is more common among obese people that the fat tissue releases excessive amounts of estrogen and this is linked to high risks of breast, ovarian and endometrial cancers. The studies conducted by the American Cancer Society (1913) found that excessive body weight contributes to many cancer-related deaths. The National Cancer Institute (2017) stated that chronic low-level infection associated with overweight people is the main cause of DNA impairment that leads to cancer. Additionally, overweight people are often diagnosed with high blood pressure, or even type 2 diabetes as a result of the high level of

insulin in the blood, i.e. IGF-1, which stimulates the increase of colon, kidney, and prostate cancers (National Cancer Institute, 2017).

Many observational studies related to obesity, have found that physically active people with low weight gain during the stages of adulthood have lower risks of kidney and colon cancers (Meldrum et al., 2017; Arnold, Leitzmann, Freisling, Bray, Romieu, Renehan & Soerjomataram, 2016). Based on the evidence of these studies, it appears that physical activity or weight loss practices among adults is encouraged to mitigate the risks of contracting cancer in the future. The next section discusses technology in healthcare.

2.3 TECHNOLOGY IN HEALTHCARE

The rapid growth of digital technologies is recognised globally and is progressively advancing each day. As the world is embarking towards the fourth industrial revolution, these technologies contribute positively towards health monitoring of people (World Economic Forum, 2019). Hence, the inventive solution that develops healthcare systems and improves people's healthy lifestyle is known as the information and communication technologies (ICTs) (Acetoa, Persicoa & Pescap, 2018). In addition, there are many technologies in healthcare, including gamification, wearable devices, mobile applications etc. (Changjun, Kyoungsun, & Daeho, 2017). These healthcare technologies are recognised worldwide as their use is endorsed by health practitioners and recommended for individuals when monitoring their health. The use of the technologies assists individuals to be more proactive regarding their health, i.e. with physical activities, intake of calories, medication intake, as well as encouraging their healthy behaviour (Taeho, 2015). The next section below discusses the use of gamification in healthcare.

2.3.1 Gamification in healthcare

The foregoing discussion implies that the adoption of gamification has raised significant interest in different industries and in academics (Johnson et al., 2016). According to Antonaci, Klemke and Specht (2019), gamification is available in many areas including finance, productivity, education and in healthcare. Conceptually, gamification in healthcare stands at the intersection of persuasive technology, serious games and personal informatics (Johnson et al., 2016). Gamification is used to monitor and manage individuals' health and wellness in the form of gaming features that motivate users to keep fit and live a healthy lifestyle (Johnson et al., 2016). The primary aim of gamification is to motivate and promote individuals to engage

in healthy eating behaviours, as well as to teach, offer entertainment and to develop users' experience (Stepanovic & Mettler, 2018).

2.3.2 Role of gamification in healthacare

The concept of gamification has developed in recent years as a tool for motivation, and behavioural and lifestyle change (Alsawaier, 2017). Hence, gamification in healthcare plays a positive role in the healthcare system. In addition, gamification is linked with applications based in mobile devices, i.e. the Nike running app, which transforms tasks into fun activities. According to Changjun, Kyoungsun, and Daeho (2017), applying gamification in healthcare enables users to adhere to their prescribed medication, and also encourages them to live a healthy lifestyle by being physically active and adhering to a healthy diet. Across the globe, healthcare practitioners in hospitals and wellness companies, including Discovery Vitality, recommend the use of gamification (Antonaci et al., 2019). Hence, gamification applications portray positive results for the healthcare system.

Changjun et al. (2017) stated that gamification in the form of applications enables its users, i.e. adults, to control and monitor their health conditions. For example, the DIMA application allows adults/patients to monotor their calories and food intake by providing daily feedback on their consumption. Johnson et al. (2016) agrees that gamification applications provide adults with feedback about their daily food consumption and allow them to monitor their health. Health monitoring in the form of physical activities improves muscle strength, enhances endurance and helps the cardiovascular system to work more proficiently, which motivates adults to improve their healthy lifestyle (Koivisto, Multisilta & Haavisto, 2017).

Recent studies revealed that adults are inspired to change their behaviour based on the intrinsic and extrinsic rewards received (Changjun et al. 2017). This elevates positive emotional states and improves adults' satisfaction and self esteem. Through rewards such as badges and points, gamification enables adults to feel a sense of achievement which promotes their behaviour. Based on the study conducted by Stepanovic and Mettler (2018), it is evident that gamification makes non-convenient activities to be exciting, pleasant and understandable which sustains adults' engagement. Gamification improves adults' obedience of health-related activities and enhances their capability to monitor their conditions while adhering to treatment (Johnson et al., 2016). Although various digital-related technologies are known to improve users' health and wellbeing, physical activity levels and disease management, gamification holds a higher

position regarding positive experiences in the healthcare sector. The next section discusses private medical aid in South Africa.

2.4 PRIVATE MEDICAL AID IN SOUTH AFRICA

Although the apartheid era ended in 1994, inequality in access to healthcare services is still a major problem in South Africa (National Health Insurance, 2016). As previously mentioned, the South African healthcare system is divided into public and private sectors. The public sector relates to unemployed, low income earners, while the private sector relates to employed individuals who can afford access to private healthcare services. In addition, the public sector contributes to public healthcare services such as public hospitals and lower medical schemes (Council for Medical Schemes, 2019). The private sector includes private healthcare service providers related to doctors and nurses, access to private healthcare facilities, and funding mechanisms of private health services (such as medical schemes, life insurance) (Council for Medical Schemes, 2019). It is evident that although many people have access to private healthcare services in the form of medical schemes, more than 30% of people still make use of practitioners and pharmacies (Dambisa & Modipa, 2016).

The private medical schemes in South Africa are regulated by the Council for Medical Schemes (CMS) (Council for Medical Schemes, 2019). According to Erasmus, Ranchod, Abraham, Carvounes and Dreyer (2016), the Medical Scheme Act of 1998 comprises social solidary principles including: open enrolment, community rating for all members, and a prescribed minimum benefit package. Hence, the only financial service providers (for health) in South Africa are the medical schemes that are structured by a distinct self-governing regulating authority.

Consequently, the medical scheme is the primary private health financial mechanism in South Africa that functions as a non-for profit trust fund, and is managed by the Board of Trustees (BoT) (Kaplan & Ranchodi, 2015). The BoT aims to confirm that the funds observe the requirements of the Medical Scheme Act. According to Kaplan and Ranchodi (2015), each medical scheme offers a number of products to its consumers, usually known as benefit options. The benefit options are diverse in design in each medical scheme. It is a priority for all medical schemes to obey the requirements of the Act in return for a premium or contribution (Kaplan & Ranchodi, 2015).

Although the affordability in the medical schemes industry has become a point of discussion over the years, there are many private medical aids in South Africa that individuals can chose

from based on their level of income. This brings forward the discussion of Discovery Medical Aid.

2.4.1 Discovery Medical Aid in South Africa

For the purpose of this study, Discovery Medical Aid's use of gamification was chosen as the case study of this research. According to the Discovery Health Medical Scheme (2019), Discovery Health Medical Aid is known as the self-governing, non-profit company administered by the Medical Schemes Act and structured by the Council for Medical Schemes (CMS). In addition, Discovery Medical Aid is controlled by a company known as Discovery Health, a financial services provider company. The Discovery Health Medical Scheme (DHMS) is a listed medical organisation (Discovey Health Medical Scheme, 2020). The main aim of DHMS is to support its members' healthcare and wellness through constant innovative solutions that provide access to unbiased, quality-based healthcare that meets their needs.

Based on the studies conducted and reported in the Discovery Intergrated Annual Report (2018), Discovery Vitality is a worlwide health promotion programme, with approximately 1.9 million members in South Africa. Hence, Discovery Vitality covers over 5.1 million clients all over the globe as its vitality sales increase up to 10% each year (Discovery Intergrated Annual Report, 2018). Currently, with over 10 million vitality members in 22 markets, this predicts the progressive improvement of members in the future of Discovery Vitality (Discovery Vitality, 2020). Additionaly, the vitality programme was developed with the purpose of helping people reach their goals; starting with living a healthy lifestyle behaviour and increasing their level of physical activities.

According to Discovery (2020), a disruption in the vitality programme puts the entire Discovery shared value model at high risk. The Discovery Vitality health market share increased from 25% in 2016 to 31% in 2019 (Discovery Vitality, 2020). Discovery Vitality's main aim is to develop a distinctive and exciting marketing brand in SME markets with the focus on employee health and productivity (Discovery Intergrated Annual Report, 2018). By enabling commitment to the Vitality programme, the businesses will produce industry leading loss ratios and lapse rates, consequential to viable margins and a return on capital, with an improved increase in normalised operating profit and headline earnings (Fin24, 2020). Through the development of new products, i.e vitalityactive, vitalityhealth, vitality move, Discovery Vitality has expanded their market share. Hence, Discovery Vitality strives to be the world's

best known incentives and behavioural change programme. The next sections discusses the history of Discovery Vitality.

2.4.2 History of Discovery Vitality

Over the years, amongs the many medical insurers in South Africa, Discovery Vitality has become known as a worldwide health medical insurance company and has earned the top position in the healthcare sector. Discovery Vitality was introduced two decades ago as a small insurance company with the aim of encouraging people to live a healthy lifestyle and protect their lives (Discovery, 2020). Through innovation, Discovery Vitality has advanced over the years to incorporate the insurance and the banking sector.

As pointed out by Discovery Vitality (2020), they comprise three programmes, namely healthcare, driving and banking. In addition, Vitality inspires and rewards its members for living a healthy lifestyle, for driving well and for banking well. This is achieved through the Vitality Health programme, Vitality Drive programme and the Vitality Money programme (Discovery Vitality, 2020). Additionally, members earn vitality health points by living an active physical lifestyle, by eating healthy food and by undergoing health screenings.

Although Discovery Vitality is known for its active rewards for members who live an active lifestyle, and driving and banking well, members of the Discovery Vitality have raised complaints about receiving fewer rewards than guaranteed, i.e. in Discovery Miles rewards (Fin24, 2020). In addition to that, members have also complained about their points not updating on the workout app as the points were not reflecting on the app (Fin24, 2020). The next section discusses different aspects of Discovery Vitality.

i. Mission and vision of Discovery Vitality

Discovery Vitality (2020) is a global leading science-based behavioural change programme that inspires people to live an active healthy lifestyle and thereafter rewards them for it. As previosuly mentioned, Discovery Vitality includes the three programmes – Vitality Health, Vitality Drive and Vitality Banking that inspire and reward individuals for living an active healthy lifestyle (Discovery , 2020). Practising a healthy lifestyle is fun and it has been found that the members that belong to the Vitality Health programme live longer and are less vulnerable to lifestyle-related diseases.

Initially, Discovery Vitality was known as a small health insurer determined to inspire people to live healthier. However, with constant invention over the years, Discovery Vitality has advanced to a complex, integrated financial services organisation and expanded with the goal

of improving and saving lives (Discovery, 2020). Throughout the continuous growth and persistent innovation, the mission and vision of Discovery Vitality to help people to live healthier, enhance and safeguard their lives have remained unchanged but progressed into the central purpose that shapes the determination, plan and business procedure of Discovery Vitality (Discovery Vitality, 2020).

The health and financial products presented to almost six million members worldwide express the central purpose of Discovery Vitality, focusing on health, wellness and financial security of all (Discovery, 2020). This represents the customer-based approach which is determined to deliver significant value and protection and improve customers' quality of life. The main vision of Discovery Vitality is to be the worldwide leading best health and insurance company, well known for excellence, invention and monetary strength (Discovery Vitality, 2020).

ii. How does it work?

In order to become a Vitality member, one has to sign up for Vitality and pay R250 a month. In terms of Vitality Health, a member has to download the Discovery Vitality app available in Apple app store or Android play store (Discovery Vitality, 2020). Once downloaded and installed, the user has to register and create a profile in order to login. Thereafter, the user has to specify the vitality age by answering the questions available on the app to enjoy the benefits of the app including the rewards (Frith, 2016). Hence, the goal of the user is to earn a minimum amount of points to win weekly rewards. Once the weekly target has been achieved, a rewards notification will be sent to the user. Thereafter the user can claim the rewards and enjoy the benefits of living a healthy lifestyle (Discovery Vitality, 2020).

In addition, there are many Discovery Vitality devices that users can use to access their health i.e. Apple Watch, health app, Fitbit, Garmini, Samsumg gear, Polar etc. (Armstrong, Lambert & Lambert, 2016). These devices can be linked to the Vitality app on the website or the mobile app to earn Vitality points, hence users can choose to link their smartphones or smart devices to the Discovery Vitality website (Smith, 2018). Depending on the proficiency of the device, Apple Watch and Fitbit can be utilised in Discovery Vitality to track daily steps, heart rate and speed of an individual.

Furthermore, Digital News (2016) stated that the emergence of gamification in the healthcare sector has altered the healthcare system. The main aim of gamification is to inspire and endorse individuals to engage in healthy eating behaviours and wellness (Thaverson & Hattingh, 2020). Additionally, there are many applications that use gamification i.e. Discovery Vitality related

to the Vitality Health programme. This programme inspires and rewards its members for living a healthy lifestyle by providing its members with their health information, as well as tools and tips for improving their healthcare (Frith, 2016). Based on the evidence currently available, it seems fair to suggest that the worldwide emergence of gamification, amongst others, in the healthcare system has a positive impact in our lives.

2.5 STUDIES RELATED TO DISCOVERY VITALITY

Based on the observational studies conducted by Hafner, Pollard and Stolk (2018) on incentives and physical activity, Discovery Vitality is critical in ensuring the safety and health of adults. This is due to the benefits offered by physical activities which reduce the risk of non-communicable diseases such as diabetes, high blood pressure, cancer and heart diseases. In addition, doctors advise and recommend that adults keep fit by being physically active to reduce the risk of non-communicable diseases and to maintain a healthy body weight and mental health (Hafner et al., 2018). Furthermore, the findings conducted by Hafner et al. (2018) revealed that by encouraging physical activity in adults in the form of Vitality Active Rewards with Apple Watch can boost their activity levels even higher.

The observational studies conducted by Till (2014) on dietary risk assessment of Discovery Health Medical Aids Vitality Member in South Africa suggest that being physically inactive and poor dietary practices contribute to the worldwide epidemic of obesity. In addition, poor dieting and lack of physical activity relate to the main causes of global illnesses and deaths (Till, 2014). The rising occurrence of non-communicable diseases (NCD) such as cancer, diabetes, cardiovascular diseases suggest poor dietary practices and a lack of physical activity among adults. Improving poor dietary practices in adults mitigates the risks of NCD morbidity and mortality (Till, 2014).

Armstrong, Lambert and Lambert (2016) in their study of physical fitness of South African primary school children, aged 6 to 13 years: Discovery Vitality of health on the nation, revealed that the development of children depends highly on healthly nutrition as well as an active physical lifetyle. In addition, it was discovered that most children come from poor backgrounds with families that stuggle to provide and have restricted opportunity to participate in the required amount of physical activity (Armstrong et al., 2016). This leads to malnutrition which causes premature conditions in babies and an unhealthy lifestyle. This situation suggests the need to introduce Discovery Vitality in schools and encourage children to actively engage in and practice daily physical activities.

2.6 CONCLUSION

This chapter explained the role of gamification in monitoring the healthcare and lifestyle of obese adults. The causes and consequences of obese adults were discussed. It was found that the use of technology in the form of gamification to motivate adults to engage in living a healthy lifestyle is the most effective way of motivating adults to monitor their health and wellness. The literature highlighted the efficiency of using gamification as a mode of motivation for physical fitness and weight loss. Gamification enables individuals to monitor their health and also serves as a tool for behavioural and lifestyle change. Additionally, the public and private healthcare sector in the healthcare system in South Africa was explained which then led to discussing private medical aid in South Africa such as Discovery Medical Aid. Lastly, other studies related to Discovery Medical Aid were referred to for more information and understanding of the situation. Chapter 3 next discusses the different types of gamification elements that promote health monitoring.

CHAPTER 3: WHAT ARE DIFFERENT TYPES OF GAMIFICATION ELEMENTS THAT PROMOTE HEALTH MONITORING?

3.1 INTRODUCTION

This study focused on different types of gamification elements that exist in promotion of health monitoring in South Africa. Since the emergence of gamification in 2010, gamification elements interlinked with mobile devices have gained extensive popularity worldwide (Johnson et al., 2016). There are many gamification elements found within mobile devices which can range from ranking, rewards, points, feedback, market places and economies to team, self-representation with avatars, and competition under rules that are explicit and enforced. This study aimed to assess various gamification elements and how they can be used to track individuals' level of activity. According to Ngamntwini and Cilliers (2021), the use of gamification has a huge impact on the health of overweight adults in SA as it improves their motivation, engagement and promotes living a healthy lifestyle. Additionally, gamification elements enable adults to effectively monitor their heath and wellness, and rewards them for it (Lavy, 2017).

This chapter discusses the different types of gamification elements found in healthcare monitoring. The first section introduces gamification in healthcare, types, advantages and disadvantages. The following section discusses behavioural intention of adults when using gamification. Lastly, the self determination theory (SDT) is explained in this chapter

3.2 GAMIFICATION IN HEALTHCARE

Recent studies reveal that gamification can be applied in many areas including education, finance, productivity, and in healthcare, referred to as 'digital healthcare' to develop entertaining, appealing experiences that transform users into players (Johnson et al., 2016). Antonaci, Klemke and Specht (2019) agree that gamification interlinked with mobile devices is specifically utilised in health and wellness to monitor users' weight management, medication adherence, self-management related to lifestyle and fitness etc. Furthermore, the rapid growth and adoption of smart devices plays an essential role in gamification and improves the delivery of healthcare. The following section defines gamification in detail.

3.2.1 What is gamification?

The term 'gamification' was introduced in 2010 and invented in the digital media industry with a goal to motivate and encourage individuals to change their behaviours (Sebastian, Rilla, Lennart & Dan, 2011). Furthermore, "gamification is defined as the use of game design

elements in non-game contexts to engage and solve problems" (Sebastian et al., 2011, p. 2). In other words, gamification is the application of video games that allow users to solve real problems. Additionally in healthcare, gamification is used as an educational instrument that motivates and inspires users to take full responsibility of their healthcare lifestyle and change their behaviours.

3.2.2 Different types of gamification elements

According to Firas, Noraidah, Wook, Meriam and Amirah (2016), there are many gamification features/elements around the globe that are used to motivate and manage the individual's health and wellness. These elements were also found to provide feedback to users about their food intake and to monitor their daily calories. Some of these involve programmes related to Vitality offers that rewards individuals for being physically active, for eating well, screening and for taking precautionary tests. These rewards are usually in the form of points. The popularity of fitness, wellness devices and health monitoring applications is increasing (Sebastian et al., 2011) and it is especially critical for obese adults to monitor their lifestyle. According to Ngamntwini and Cilliers, (2021) these gamification elements motivate overweight adults to live an active, healthy lifestyle and are capable of helping them to achieve their fitness goals. Although there are many gamifying features or elements used to inspire overweight adults to monitor their weight, these varied features were found to serve almost the same purpose. The discussion below includes some of the popular gamification elements such as ranking, leaderboards, scoreboards, rewards, badges, points, feedback, teams, and lastly, competition under rules that are explicit and enforced.

i. Ranking, leaderboards and scoreboards

According to Gafni, Achituv, Eidelman and Chatsky, (2018) elements related to ranking, leaderboards and scoreboards are used to reveal users' or participants' position when compared to others. These are used to manage users' accomplishments during the course of a game and also used as a source of competition with other users/players. Additionally, ranking, leaderboards and scoreboards include activities like gamifying features whereby participants gather points based on the completion of any given activity, e.g. Nike run app (Kiryakova, Angelova & Yordanova, 2016). In Discovery Vitality, a member can use the Vitality Health tracker app to invite friends and family for a health activity challenge, whereby each and every one's profile, progress and performance are seen, rated and scored to see how one compares on the leaderboard (Discovery Vitality, 2020). This serves to motivate others to achieve their desired goals and performance. Although leaderboards/scoreboards are visible to all the

participants, they are used as a tool of motivation to others, so that the competitors can see where they stand and actually compare their accomplishments with those of their colleagues. Recent studies reveal that ranking, leaderboards and scoreboards inspire competition among players, while influencing them to be more active during the course of a game (Kiryakova et al., 2016; Gafni, et al., 2018).

ii. Rewards and badges

Zhao and Guo (2019) stated that rewards and badges are known as one of the critical game design elements in gamification utilised to inspire users to act in a gamified manner. Rewards and badges are used to indicate the successful completion of a task or challenge. Based on the level of Vitality Health status, an individual can get rewarded for up to 35% off on flight travels ranging from local and regional to international. Additionally, by using the Discovery app and by having a high Vitality health status level, one can be rewarded with healthy living rewards of up to 75% back on grocery shopping at Woolworths/ PicknPay, for active rewards, movie rewards as well fuel and uber rewards (Discovery Vitality, 2020). This can range from getting vouchers from Kauai, Nu and many more (Discovery Vitality, 2020). These rewards are used to inspire members to live an active, healthy lifestyle. The use of rewards in a gamifying context enhances users' motivation and desire to complete or continue with a challenge or task, showing pleasure and interest (Gafni, et al., 2018). According to Ritchie (2018), badges are trophies that are awarded for the accomplishment of a task. Badges inspire users to complete a task. In addition, rewards and badges serve as an acknowledgement that the user has reached a new level and has effectively completed the challenges (Zhao & Guo, 2019). Users can choose to share their badges among each other while attaining social acknowledgment.

iii. Points

Gafni et al. (2018) reported that points are used as a tool of reward for every successful completion of a level or category accomplished by users. Additionally, users are awarded points based on the accomplished level of a goal (Gafni et al., 2018). In Discovery Vitality, members who partake in outdoor activities or a parkrun earn about 300 points and 100 vitality points for working out in a gym club as well as 1000 points for a health checkup related to flu vaccination (Discovery Vitality, 2020). Additionally, organisations reward their employees for excellent perfomance in the form of points, which can in the future be exchanged for prizes or gifts. In other cirmcumstances, points can be used to track progress of each challenge for each user and provide feedback (Bohyun, 2015). One of the most critical purposes of points is to offer feedback, permitting players in the game to be measured or scored (Sailer, Hense, Mayr

& Mandl, 2017). According to Ritchie (2018), points inspire self-efficacy by providing performance and progress of the users.

iv. Feedback

According to Sailer et al. (2017), feedback is an essential part of gamification in the healthcare system. Rezvan (2017, P. 19) defined feedback as a "set of progress bars, numbers, statuses etc in a well organised dashboard that clarifies being acquainted with users current state of the game". It allows the participants to track their progress, assess their results and make informed decisions about the next steps. In addition, rapid positive feedback stimulates users' motivation, their engagement, and encourages them in their actions (Erickson, Lundell, Michela, & Pfleger, 2018). Hence, feedback in gamification is provided to reveal to the player their progress in achieving behaviour expectations. In gamifying applications, feedback is related to earning points/badges, proceeding to the next level or moving up on a leaderboard, and receiving achievements (Erickson et al., 2018). Although leaderboards are used for visual demonstration of achievements, they also offer acknowledgement amongst the players and stimulate others to perform well.

v. Teams

According to Rezvan (2017), teams are a group of team players working towards a common goal. Recent studies reveal multiplayer games as the most common games in gamifying applications that encourage conflict, competition, collaboration and team experience (Sailer, et al., 2017; Rezvan, 2017). Vitality Health tracker promotes competition among players and encourages high performance in accomplishing a desired goal (Discovery Vitality, 2020). However, competition in gamifying applications was found to encourage users to improves for better perfomance, while it also discourages users' motivation. Collaboration brings team players together and inspires excellent team experience (Erickson et al., 2018). Games enable interactions and construct a joyful environment between players, which creates a social bond in return. For example, a 'welltok', the health management app for enterprises that enables users to monitor their physical and fitness level activities (Rezvan, 2017). This app includes various gamification elements such as leaderboards, scoreboards and team challenges which enable players to compete towards a shared goal.

vi. Competition under rules that are explicit and enforced

Rezvan (2017) pointed out that the primary goal of playing games is to win. Hence, competition amongst players inspires some players to perfom better, while it discourages others. In competitions, rules are essential to properly manage the game. According to Nah, Telaprolu,

and Rallapalli (2017), rules need to be clear and compulsory so that players can recognise them as fair. It is interesting to note that the most amusing part of playing games is to learn the rules. As soon as the rules have been learned and understood by the players, the game becomes trustworthy and players remain engaged in the game (Rezvan, 2017). Enforced and explicit rules improves users' control, which in turn surges their level of engagement. However, in games where players can make the rules of the game, their sense of personal control is improved and their degree of engagement increases. The next section presents the advantages and disadvantages of gamification for health monitoring.

3.2.3 Advantages of gamification

Several studies have revealed the benefits of instigating game procedure in gamified eHealth applications (Johnson et al., 2016). The benefits can range from improved user motivation, wellness and self-esteem to enhanced behavioural intention. Hence, gamification established in the eHealth interventions has proved to be very advantageous to obese adults as they positively impact their lifestyle, satisfaction and self-esteem (Ngamntwini & Cilliers, 2021). Gamification has positively influenced obese adults' lifestyle as it is perceived to inspire users to transform their health behaviours while remaining engaged with the use of gamification. Although gamification was recently found to fail in terms of motivating adults to continually use gamification, many studies revealed that gamifying elements enable regular use of gamification application by adults (Koivisto, Multisilta & Haavisto, 2017). Moreover, gamification elements help to encourage users to remain enthusiastic about using gamified applications. The advantages of gamification for overweight adults are summarised below.

i. Increases overweight adults' compliance with health interventions and improves their ability to self-monitor their conditions, wellness and adherence to treatment

The exponential growth in the rate of chronic diseases that increases the risk of health problems has led to various changes in the lifestyle of adults. Thus, overweight adults who are not observing weight loss protocols such as treatment, physical activities and health interventions are unable to lose weight within the allocated period of time (Lemstra, Bird, Nwankwo, Rogers & Moraros, 2016). The occurrence of gamification in the healthacare sector has positively changed the healthcare system as it has been found to motivate and promote individuals to engage in healthy eating behaviours and wellness.

According to Dounavi and Tsoumani (2019), gamification in the form of gamified applications is considered to be an effective tool for overweight adults to monitor their health. Gamification enables adults to be more proactive when it comes to their health in number of ways, i.e. it

enables them to monitor their food/calories intake, encourages an active lifestyle, and inspires medication adherence (Taeho, 2015). For overweight adults to maintain a healthy lifestyle, gamification has been found to be the best technique for monitoring of treatments related to chronic conditions (Lemstra et al., 2016). This enables early detection of diseases related to obesity. As pointed out by Podina, Fodor, Cosmoiu and Boian (2017), gamification can be used by overweight adults who are unable to access health facilities to monitor a healthy and active lifestyle. Overweight adults can also utilise gamification to track their daily food consumption, calories intake as well as medication intake (Podina et al., 2017). Additionally, overweight adults can utilise gamification to check their overall health status in real time, instead of standing in long queues for a health practitioner.

ii. Promotes active lifestyle to prevent detection of diseases

According to Lucretia (2017), physical activity is critical for an individual's overall wellbeing and quality of life. Recent studies have revealed that poor eating habits related to consumption of unhealthy food or over eating harm individuals' nutrient intake, health and wellbeing (Alamgir, Sami, Salahuddin, Syed, Naimatullah, Manzoor, 2018; Shridhar, Rajendra, Murigendra, Shridevi, Prasad , Mujeeb, Arun, Neeraj,Vikas, Suneel & Vijay, 2015). This in turn contributes to stress, fatigue and lack of physical activity which are seen as the main causes of obesity in adults. Hence, the emergence of gamification features in the healthcare sector can be used by overweight adults as a tool to monitor their health and wellness (Johnson et al., 2016). Additionally, gamification evaluates users' daily lifestyle, health and wellness and tracks their level of physical activities, and provides feedback to the users.

Gamification features increase users' engagement in healthy behavioural activities. It enables users to track and monitor their weight loss, heart rate, and exercises, e.g. MyFitnessPal (Johnson et al., 2016). Further, gamification applications like MyFitnessPal allow the users to keep track of their eating behaviours, diet and physical exercises. Shridhar (2015) stated that gamification features, i.e. MyFitnessPal, improve physical activities of the users and help overweight adults to monitor their health which is an efficient method in sustaining health monitoring.

iii. Enhances intrinsic and extrinsic users' motivation

According to Hartman (2017, p. 14), intrinsic motivation is "to act for the fun or for the challenge and will occur only for activities that have the appeal of novelty, challenge or aesthetic value for the individual". Additionally, intrinsic motivation is about completing a task solely for the enjoyment the task provides the individual with no desire of obtaining a reward

(Khalil & Yuserrie, 2015). It is basically about engaging in a rewarding behaviour, e.g. practise a physical activity like soccer. Activities that are fun and enjoyable are associated with intrinsic motivation.

Khalil and Yuserrie (2015, p. 162) defined extrinsic motivation as "the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are different from the activity itself". In other words, extrinsic motivation is associated with engaging in a certain behaviour only for the purpose of receiving a reward, i.e. performing well in a gamified application to obtain points. Although intrinsic motivation plays a positive role, extrinsic motivation in gamification including rewards and feedback has a major impact on individuals wellbeing (Dahlstrom, 2016).

While the goal of gamification is to facilitate intrinsic motivation, extrinsic motivation related with rewards and continuous feedback improves users' engagement with the tool. Many studies have argued that gamification only creates extrinsic motivation in the sense that users complete a task with the goal of achieving points, badges and rewards (Kianoosh, 2017; Dahlstrom, 2016). However, it was found that intrinsic and extrinsic motivation are co-dependent on each other as they endorse high performance, improve wellbeing and quality of effort in undertaking a task, thereby acquiring long-term engagement (Khalil & Yuserrie, 2015).

iv. Sustains overweight adults' engagement with the tool

Many healthcare facilities around the globe have invented various nutrition and weight loss programmes to help overweight adults to lose weight (Lagerros & Rössner, 2018). Although some methods have been more effective than others, gamification in healthcare has provided a lucrative option designed to exceed people's needs. It enables overweight adults to stay motivated and persevere to reach their target weight (Godino, Merchant, Norman, Donohue & Marshall, 2016). Gamification allows its users to track their weight loss progress on a daily basis and thereby sustain their engagement with the tool.

According to Godino et al. (2016), weight loss management programmes are allocated to two segments, namely weight loss and weight maintenance. Weight maintenance is related to physical activies such as active exercises and is the most critical element in a weight maintenance programme. Dietary restrictions relate to weight loss programmes whereby overweight adults consume limited amounts of food in order to lose weight (Lagerros & Rössner, 2018). Gamification has provided a tool that is cost effective and helps stimulate overweight adults to perform their exercises without being administered by health practitioners.

Consequently, gamification makes physical activities fun and enjoyable, which inspires overweight adults to exercise and do more. The benefit of fun is that it stimulates relaxation and motivation which enables overweight adults to continuosly use gamification in the long-run without antipathy (Dorian, Rafael & Richard, 2018). Additionally, gamification allows adults to monitor and manage their health; however, immediate feedback related to progress of an individual increases users' motivation and engagement with the tool (Dorian et al., 2018).

3.2.4 Disadvantages of gamification

Although the majority of studies have indicated various benefits related to the use of gamification, a few studies discovered some concerns which indicate that the use of gamification elements may not be sustained in the long term, especially if gamified applications are not regularly advanced (Garde, et al, 2015). Moreover, gamification is found to be poorly modified to meet objectives of the health applications and not correspondingly suitable to all age groups. According to Koivisto et al. (2017), cheating in gamified application is increasingly becoming a concern in eHealth applications, especially when users incorrectly manipulate the application to gain rewards. Discussed below are the main disadvantages that impede the efficacy and effectiveness of fulfilling gamified eHealth applications for overweight adults.

i. Users might feel motivated and excited about the gamification elements but the interest declines over time

Many studies encountered a number of issues related to eHealth applications and gamification. These studies revealed lack of commitment as one of the issues found in gamification in the sense that inspiring users by means of gamification elements may be not be sustained in the long term, especially if the gamification elements are not constantly developed (Wafa, Leclercq & van Riel, 2017). Moreover, this means that overweight adults might feel encouraged and enthusiastic about gamification elements, but their interest tends to deteriorate in the long run. According to Hamari, Koivisto and Sarsa (2014), this is regarded as one of the challenges that would weaken the potential accomplishment of gamification. Wafa et al. (2017) found that overweight adults enjoy the benefits such as rewards and feeback provided by gamification features; however, the motivation and engagement viability with the use of gamification declines over time.

ii. High development costs of applications

According to the investigation carried out by Johnson et al. (2016), development cost of gamifying applications, specifically for healthcare, causes major problems in the Healthcare Industry. A study conducted by Johnson et al. (2016) indicated that the costs of development

and design of gamification health applications are too high, which makes the comprehensive adoption of health games among users difficult. It was found that gamified applications have no established market and business model as the health industries have not moved into the space yet. Presently, the healthcare system is overwhelmed with the rapid development costs of gamifying applications. This discourages overweight adults to obtain the gamifying applications.

In addition, various studies have recognised development costs as the substantial impairment of health application adoption in the healthcare sector and usage amongst overweight adults (Furdu, Tomozei, & Köse, 2017). Additionally, access to technology is also seen as the next adoption hurdle for overweight adults. This is due to lack of knowledge in the sense that many overweight adults at first struggle to navigate throughout the applications and rapid advancement in these makes it even more difficult for overweight adults to keep up (Furdu, et al., 2017).

iii. Gamification solutions are not user-centered as they overlook the traits and demographic characteristics of potential users and may reduce their performance and lower their credibility

As pointed out by Koivisto et al. (2017) and Almarshedi, Wanick, Wills and Ranchhod (2015), many studies reveal that gamifying applications lack additional information that may assist overweight adults to express their level of perfomance; users are unable to apprehend the content hints. In other words, some gamifying applications are not properly customised to counterpart the health devotions of the application (Almarshedi et al., 2017). Hence, applications incorporating gamifying elements were found to be improbable to suit the ages of all overweight users in the same way.

Irrespective of the functionality of the game, it is critical to allocate content into the gamification elements for comprehensive understanding among all users. Although gamifying features offer entertainment, fun, motivation and engagement, it is important to note that the very same gamification feature may be different for some users (Koivisto, et al., 2017). Hence, there is a need to understand the gaming procedures first to fully accommodate and improve motivation of other users. As suggested by González (2017), a gamifying application that includes a distinct set of guidelines is critical as it helps overweight adults to avoid confusion and elevates users' experience in the game.

Similarly, various gamification applications are not user-centered as they neglect the picture-based features of the objective users to a substantial degree; thus failing to provide the desired suitable application. Part of the above challenge is that there is a significant lack of healthcare specialists involved in the design and implementation of the gamified eHealth applications, which in turn lessens the credibility and admiration among overweight adults (van Buul, Kasteleyn, Arends, Shi, Kelly, Chavannes & Meijer, 2020).

iv. Cheating may increase as users might work to achieve higher levels solely for the sake of rewards

According to Johnson et al. (2016), cheating is obeserved as a significant problem that undermines gamified health applications. Cheating in gamified applications involves a user who competes with others for a common goal, and who plays the game but purposely provides the wrong data just to achieve rewards. Additionally, users might intentionally enter incorrect data to acquire rewards and move to the next higher level (Koivisto, et al., 2017). Many overweight adults whose intention is solely to achieve rewards might be tempted to cheat as their desire is to win. This leaves the rest of the competitors in a game feeling incompetent. Hence, cheating in eHealth applications defeats the main purpose of the game.

3.3 BEHAVIOURAL INTENTION

According to Olander, Fletcher, Williams, Atkinson, Turner and French (2019), the occurrence of obesity in overweight adults has doubled over the past decades, with substantial concerns for life expectancy. Moreover, obesity is related to several health risks including diabetes, heart diseases, cancer and depression (Ngamntwini & Cilliers, 2021). To lessen these health risks in overweight adults, behavioural intention has been suggested by health practitioners to address behaviours intimidating the healthcare sector.

Chao (2019) defined behavioural intention as a point at which an individual has conscious plans to accomplish or not to accomplish definite future behaviour. In other words, behavioural intention is a measure of an individual's power and intention to accomplish a particular behaviour (Hung-Che, 2018). Alternatively, the perception of behavioural intention is associated with individuals' opinions about what behaviour they would display in certain circumstances.

In this study, gamification in healthcare was applied as a tool to inspire behavioural change in overweight adults. Hence, the primary goal of gamification is to influence overweight adults' behaviour. Gamification is commonly accessible and plays an essential role in motivating

adults to change their health behaviour. The current studies reveal that in order to influence behavioural intention of users in this regard, motivation must be intrinsic and extrinsic to be successful (Olander et al., 2019). However, Boff, Domingues, Feoli, Gustavo and Oliveira (2018) stated that the adoption of behavioural change among overweight adults helps to diminish or even prevent the risk of contracting health issues. Moreover, behavioural intention stipulates the desire or intention of overweight adults to be engaged in activities related to gamification in the healthcare sector, i.e. 'I intend to use gamification to monitor my health for the next 3 years'.

Although health facilities are regarded as the most operative industries, addressing the importance and consequences of being physically active in obesity management is essential (Muangsrinoon & Boonbrahm, 2019). These facilities are the main contributing sectors to health promotion and the proactive approach to lessening the prevalence of obesity (Boff et al., 2018). However, evidence indicates an urgent necessity for change and involvement in obese adults. Hence, for any involvement to be effective, overweight adults need to understand the necessity of changing their behaviour and their way of thinking concerning obesity. This stimulates healthy behavioural change and reinforces overweight adults' efforts to change their behaviour (Ngamntwini & Cilliers, 2021).

3.4 SELF DETERMINATION THEORY (SDT)

The self determination theory (SDT) was initially proposed by Edward (2000) in healthcare research, mostly to analyse individual behaviour based on two factors: intrinsic and extrinsic motivation (Ryan & Edward, 2000). According to Legault (2017A, p. 391), the SDT is a "broad theory of human personality and motivation concerned with how the individual interacts with and depends on the social environment". Moreover, the SDT clarifies the factors of intrinsic and extrinsic motivation that support behaviour and personality development in order to advance the wellbeing and performance of others. The main purpose of the SDT is to explain human motivation and behaviour based on the individual alterations in motivational alignments, effects on motivation and relational perceptions (Deci & Ryan, 2015). The SDT is articulated based on four quadrants, namely perceived autonomy, competence, relatedness, and satisfaction of basic psychological needs leading to intrinsic and extrinsic motivation (Coccia, 2019). Hence, the basic need for competence, autonomy and relatedness must be fulfilled across the lifespan for individuals to experience a constant sense of reliability and comfort. These five quadrants are described next

3.4.1 Perceived autonomy

Corinne (2016) revealed that autonomy is when an individual performs according to their own preferences, wellbeing or capabilities. Thus, it is about empowering users to have control of their own behaviours and goals. With regards to this study, the sense of having control and acting upon their behaviours enables overweight adults to alter their unhealthy eating habits and this plays a major role in their health (Legault, 2017A). Autonomy is associated with one experiencing behaviour as self-expression, for example 'actions that are subjective to external sources, the users tend to agree with the impacts' (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher, 2019, p. 97). Consequently, the SDT specifies that when the environment supports the autonomy of the users, additional independent motivation will arise. Additionally, enabling the autonomy of users increases intrinsic motivation; however, discouraging users' sense of autonomy diminishes their intrinsic motivation (Arvanitis & Kalliris, 2017). This leads to the importance of self-assurance and enthusiam for health monitoring in overweight adults.

3.4.2 Perceived competence

According to Corinne (2016), competence is about gaining competencies and capabilities. Moreover, competence is about pursuing challenges that are best for one's capabilities. Hence, it is not related to acquired skills or experiences, but to a sense of assertion and effectiveness in action. Recent studies indicated that self assured individuals with the potential to accomplish success are most likely to take actions to achieve their goals (Deci & Ryan, 2015). In this study, for example, overweight adults in gamification revealed their attained competency especially when determining abilities and replicating the task through knowledge retrieval.

In situations where the ability of overweight adults to complete gamifying applications is high, it also stimulates their motivation because they observe themselves to to be capable of completing tasks (Corinne, 2016). This belief is regarded as self-efficacy and overweight adults with self-efficacy are more likely to become essentially motivated and confident when overcoming a challenge.

3.4.3 Perceived relatedness

Ankli (2009) stated that relatedness is the sense of belonging with one another and within the community, the sense of caring and being cared for by the others. Additionally, relatedness is essential to sustain a sense of belonging by connecting with others (Coccia, 2019). It imitates the integrative feeling of life, the tendency to be associated with people and be recognised by others. Wang, Liu, Kee and Chian (2019) agreed with the present study that overweight adults

need to feel connected with their competitors and with gamification applications utilised. Hence, when overweight adults are satisfied with these needs, they become more motivated (Wang et al., 2019). This in turn improves their levels of engagement, performance and knowledge.

Furthermore, the SDT identifies the feeling of competency as unable to improve intrinsic motivation unless it goes along with the sense of autonomy (Coccia, 2019). That is why autonomy, competence and relatedness together are able support intrinsic motivation. In other words, the fulfilment of basic psychological needs for autonomy, competence and relatedness is essential in preserving intrinsic motivation (Deci & Ryan, 2015). Moreover, the SDT advises that failure in supporting the mentioned psychological needs can cause negative effects of isolation and depression in adults. With regards to this study, the perceived autonomy, competence and relatedness of gamification by adults play a major role in monitoring health.

3.5 OTHER STUDIES RELATED TO SELF DETERMINATION THEORY

According to Ankli (2009), the SDT can be used in many studies including finance, education, healthcare and business with the purpose of motivating users' behavioural intention. Based on the study conducted by Teixeira, Carraça and Markland (2017) on the systematic review of exercise, physical activity and self-determination theory, being phyically active on a daily basis is beneficial for individuals' wellbeing. In this study, the SDT addresses the basic psychological need for autonomy, competence and relatedness as vital in understanding the progression of internal motivation. Satisfactory of these basic psychological needs results in improved feelings of vigour and wellbeing. Furthermore, the findings of Teixeira et al. (2017) revealed the value of SDT in understanding the importance of exercising and autonomous procedures.

The observational studies conducted by Ntoumanis, Johan, Prestwich, Quested, Hancox, Thøgersen-Ntoumani, Deci, Ryan, Lonsdale and Williams (2019) on a meta-analysis of the self-determination theory informed intervention studies in the health domain: effects on motivation, health behaviour, physical and psychological health, suggest that applications of the SDT in the field of health have improved in the last few years. This is due to considered and measured motivation within the SDT interferences that portrayed positive effects on users' physical health. Reviews and tests conducted in this study on the psychological needs also showed a drastic increase in motivation and health outcomes (Ntoumanis et al., 2019).

Broeck, Ferris, Chang and Rosen (2016) on their study of the self determination theory's basic psychological needs at work revealed that when humans' psychological needs are satisfied, their level of motivation and wellbeing rises. Particularly, employees were found to retain several motivation methods for engaging in a specific behaviour (Broeck et al., 2016). For example, an employee can strive to produce excellent results in the company mainly because they enjoy their job. This is known as an example of intrinsic motivation. However, when employees strive for success solely for the sake of earning a salary or receiving rewards, it is known as extrinsic motivation. Finally, the SDT claims that the satisfaction of the psychological needs for autonomy, competence and relatedness are critical for employees to attain emotional growth, internalisation and comfort (Broeck et al., 2016).

Finally, in the study conducted by Leal, Miranda and Souza Carmo (2018) on an analysis of student motivation in an accounting degree programme, the self determination theory revealed that lack of motivation can impact students' learning and perfomance. The objective of this study was to assess the accounting science motivation of students from Brazil University with regards to the SDT. In this study, the two concepts of intrinsic and extrinsic motivation have been introduced (Leal et al., 2018). Research shows that intrinsically motivated students' performance tends to positively progress as a result of student interest in accomplishing a required task; however, extrinsically motivated students perform a task only for the purpose of external rewards. The SDT was therefore recommended for use in this study to intrinsically motivate students to achieve higher results

3.6 CONCLUSION

This chapter discussed the different types of gamification elements that promote health monitoring. Gamification in healthcare has been explained along with its types. The common advantages and disadvantages of gamification were also discussed. The use of gamification in healthcare is applied as a tool to inspire behavioural change in overweight adults and to help prevent and lessen the risk of health diseases. Although users' interest in gamification tends to decline over time, the literature highlighted the effectiveness of gamifying applications used for weight loss, physical activities and health monitoring. Gamification helps overweight adults maintain a healthy lifestyle – while it tracks their eating behaviour, it inspires them to stay active and prevent conditions of obesity. However, behavioural intention along with the self determination theory are introduced in this study to influence the adoption of gamification in the healthcare sector more especially in obese situations. Chapter 4 next discusses the factors

that influence behavioural intention of adults to monitor their health using gamification in South Africa.

CHAPTER 4: WHAT ARE THE FACTORS THAT INFLUENCE BEHAVIOURAL INTENTION OF ADULTS TO MAKE USE OF GAMIFICATION FOR HEALTH MONITORING IN SOUTH AFRICA?

4.1 INTRODUCTION

The previous chapter examined the different types of gamification elements that have been used to promote users' engagement to achieve their health and wellness goals. The world population has been increasing during the past decades, with approximately 2% or more increase a year (United Nations, Department of Economic and Social Affairs, Population Division, 2019). This rapid growth of population, especially elderly population, has major impacts on the health and medical care facilities (Cristea, Noja, Stefea, & Sala, 2020). The World Health Organization (WHO) reports that inadequate food consumption, malnourishment, chronic diseases related to malaria and respiratory infection are all a consequence of overpopulation (World Health Organization, 2021). This results in increased patient admissions, and a need for more development of healthcare infrastructures.

The healthcare industry is forced to implement innovative solutions to lessen the healthcare problems. Although the massive advancement in ICT technologies has disrupted every industry including healthcare, it has helped medical practitioners to diagnose and treat their patients much better (Thimbleby, 2018). Thus, technology has brought significant changes to the healthcare industry including better treatment, equipment, accessible medical information etc. (Organisation for Economic Co-operation and Development (OECD), 2019). However, concerns have been raised with regards to modified healthcare services that can be used to ensure that adults live an active healthy lifestyle.

Although technology is the main driver behind healthcare, implementing mobile health solutions on smart phones and wearable trackers to track the health and wellbeing of others is crucial (Martinho, Carneiro & Corchado, 2020). Importantly, the use of technology in healthcare has fast-tracked to artificial intelligence and virtual reality, which has led to the emergence of gamification. Gamification was introduced with a goal to stimulate behavioural change, health and wellbeing of people. Thus, the use of gamification in healthcare has proven to be very valuable in supporting adults to improve their health and enhance their wellbeing.

Despite the use of gamification in healthcare, maintaining an active healthy lifestyle in the long run remains a big problem as adults' motivation tends to decline over time and behavioural intention becomes affected (Mdunyelwa & Cilliers, 2021). Thus, the self determination theory

(SDT) is discussed in this chapter to understand users' behaviour in improving their health and wellbeing (Deci & Ryan, 2018).

This chapter classifies the different factors that influence the behavioural intention of adults to monitor their health making use of gamification. In this study, SDT has been used as a framework to evaluate the willingness of overweight adults to monitor their health making use of gamification and for hypothesising weight loss. The SDT includes factors of autonomy, competence, relatedness and satisfaction of basic psychological needs. These factors are explained in detail in this chapter.

4.2 SELF DETERMINATION THEORY

According to Ryan and Deci, (2000, p. 64), the SDT is a "macro theory pertaining to the individuals growth tendencies and innate psychological needs that inform self-motivation and personality integration, specifically the conditions that foster intrinsically motivated behaviour". In other words, the SDT is about an individual's capability to make their choices and manage their own health and wellness (Deci & Ryan, 2018). In fact, the SDT is related to healthcare and is one of the theories that discovered autonomy by means of experimental methods. This theory sets to investigate individuals' ability to feel as if they are in control of their own lives and choices (Patrick & Williams, 2019). In most cases, this happens when individuals' need for autonomy, competence and relatedness is satisfied.

Furthemore, SDT was used to investigate factors influencing the behavioural intention of overweight adults to monitor their health using gamification. The study explored three the psychological needs of autonomy, competence, relatedness with reference to a specific category of users of gamification. Hence, the theoretical framework illustrated below indicates the areas of investigation and parameters of the study. To answer the research question of the study, the developed framework below was used to construct the factors influencing the behavioural intention of overweight adults to use gamification for healthcare purposes. The three constructs of SDT are discussed below.

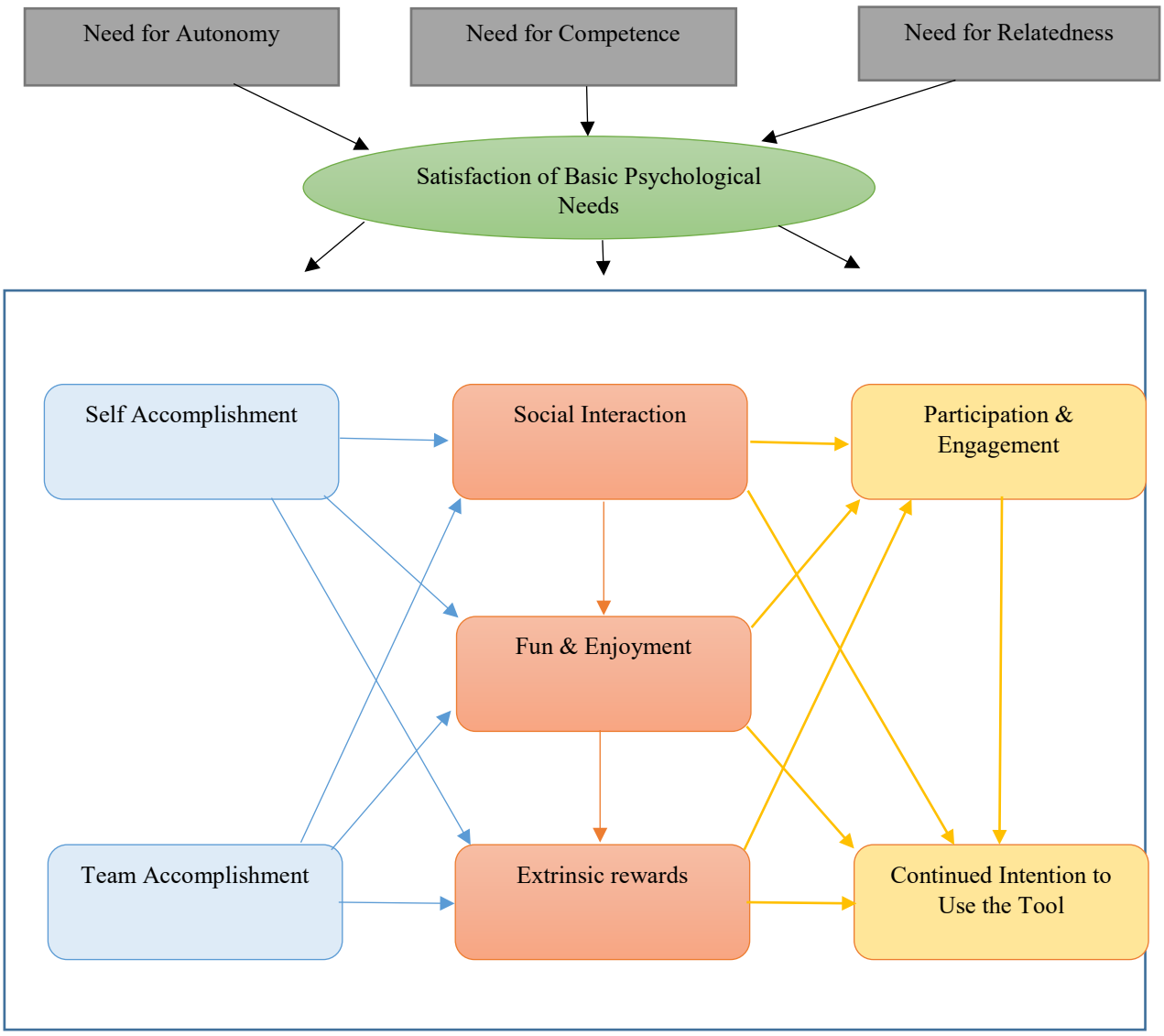

Figure 2: SDT theoretical framework and areas of investigation

This theory has recognised the three psychological needs of autonomy, competence and relatedness as factors that are important in supporting the internalisation procedure, enthusiasm and personal wellbeing. The theory has underlined the significance of motivation and the complete approach towards learning health behaviours through its conceptualisation and depth of autonomy, competence, relatedness to others and its prominence in the role of basic psychological needs (Patrick & Williams, 2019). However, these three concepts of SDT related to competence, relatedness and autonomy centre upon a point at which a person observes their basic psychological needs to be either satisfied or dissatisfied (Roger, 2015).

In situations whereby these three basic psychological needs of autonomy, competence and relatedness are perceived as being satisfied and constant, the outcome can be estimated to result in a person that is more intrinsically motivated (Rodgers et al., 2016). Furthermore, Roger

(2015) revealed that the satisfaction of the three psychological needs of SDT endorses the internalisation of intrinsically and extrinsically motivated principles, which results in behaviours that forecast engagement analytic behaviours. The three basic psychological needs of SDT are discussed below in relation to the healthcare and wellbeing of overweight adults (Martela & Riekki, 2018).

4.2.1 Autonomy

Perceived autonomy refers to acting with a sense of preference and the experience of willingness (Martela & Riekki, 2018). To influence users' motivation, users need to be in control of their own behaviour and goals. In other words, autonomous motivated individuals are more engaged, determined and effective than when they are controlled (Martela & Riekki, 2018). Studies show that positive behavioural intention is influenced by experience and perceived autonomy, and that it plays a main role in helping individuals feel more self-determined (Patrick & Williams, 2019). For example, perceived autonomy promotes overweight adults' intention to use the tool and motivates them to be more engaged and use gamification when monitoring their health.

Additionally, according to the literature, perceived autonomy has been found to be one of the most vigorous factors of SDT that will help improve long-term usage of gamification of overweight adults (Knight, 2016). Stimulating autonomy among overweight adults enables them to make efficient and effective decisions about their lifestyle and wellbeing (Deci & Ryan, 2018). Martela and Riekki (2018) suggested perceived autonomy as the most appropriate factor that can be utilised in estimating the usage intention of overweight adults and their willingness to improve their health status. Based on the literature discussed in Chapter 2, features of gamification related to weight loss monitoring, tracking of physical activities and data collection increase users' engagement with the tool (Johnson et al., 2016).

Knight (2016) stated that perceived autonomy influences users' attitude concerning the use of gamification. Additionally, long-run continuance or discontinuance of gamification usage is determined by perceived autonomy (Ng, Ntoumanis, Deci, Ryan, Duda, & Williams, 2019). For example, overweight adults that choose to use gamification to track and monitor their weight loss out of their own will receive rewards for acting that way. Thus, their interest tends to improve, which might lead to a substantial influence of continuance intention. The following section discusses the competence factor.

4.2.2 Competence

According to Kremer, Moran, Walker and Craig (2017), perceived competence is seen as a degree to which an individual feels that they have the essential aspects to succeed. It is about a person's verdict related to their ability in a certain area. Moreover, Deci and Ryan (2018) highlighted perceived competence as insight into how experienced people are in certain tasks or fields and it is known as the most behavioural forecaster of intrinsic motivation.

As previously mentioned, competence in the SDT is presumed to be one of the three important psychological needs that support an individual's health and wellbeing (Rodgers, Markland, Selzler, Murray & Wilson, 2016). As a result, perceived competence is evaluated and utilised in many studies along with perceived autonomy to forecast sustained behavioural change and effective performance (Rodgers et al., 2016). The feeling or observation of competence with regards to any activity or area is conceived to be essential as it enables individual goals and accomplishment, providing them with a sense of satisfaction from partaking in an activity they feel operational at (Kremer et al., 2017).

Intrinsically motivated individuals often participate in activities out of their own interest and satisfaction, without expecting external rewards or incentives in return (Patrick & Williams, 2019). These are therefore the prototype of self-determined behaviours and are described by perceived competence and autonomy. The factors that promote intrinsic motivation relate to persistence, challenges, control, recognition, cooperation and competition. Moreover, perceived autonomy enhances these factors and promotes the long-term use of the tool (Deci & Ryan, 2018). The next section discusses the relatedness factor.

4.2.3 Relatedness

For the purpose of the current research, relatedness is more about the personal aspect, reflecting the point to which a person feels that they are connected to others, to caring for and being cared for by others and to a feeling of belonging to a certain community (Singer, 2016). Indeed, relatedness is defined by the quality of the relationship between overweight adults and the use of gamification (Wang, Liu, Kee & Chian, 2019). An affirmative relationship is most likely to improve individual capacity, desire and central need to pursue, initiate, endure and achieve effective gratification such as pleasure from interactions with the tool (Roger, 2015). When overweight adults feel satisfied with gamification, they become more motivated to use the tool. This in turn leads to higher levels of engagement and performance (Xiang, Agbuga, Liu & McBride, 2017).

Although relatedness is the only non-instructional construct of the three psychological needs within SDT, it is one of the most important needs because without interaction or control of the tool, overweight adults are less likely to be interested to support the tool (Roger, 2015). However, Xiang et al. (2017) argued that the three psychological needs are common in the sense that their relationship to wellness and positive operation should persist vigorously regardless of the cultural circumstance. When the impacts of relatedness and competence are commonly brought together, they are the source of intrinsic motivation. Although, the three basic psychological needs are viewed as highly interconnected, and in most perspectives worldwide, they are projected through the SDT (Roger, 2015). Autonomy is speculated as a potential outcome of both competence and relatedness, which results in efficiency informed aspiration to be autonomous (Roger, 2015).

In summary, the SDT is a macro-theory of human motivation applied to influence behavioural change in healthcare and when combined with the three basic psychological needs of autonomy, competence and relatedness, it has the potential to improve overweight adults' motivation and engagement with the tool (Cherry, 2019). In addition, when these three psychological needs are satisfied, this leads to intrinsic motivation that promotes users' engagement with the tool. The next section explains the mechanisms that encourage the adoption of gamification.

4.3 MECHANISMS THAT MOTIVATE THE ADOPTION OF GAMIFICATION

There are many mechanisms that can be used to motivate individuals to utilise gamification; however, below are the chosen mechanisms used to promote users' engagement with the tool to improve their healthcare (Ritchie, 2018). These mechanisms are known as the simple procedures that drive the user's action forward in a gamified system (Vanhaesebroeck, 2021). Indeed, when one of these mechanisms has been initiated, an individual becomes more inspired to engage with the tool and gamified concepts become even more effective.

4.3.1 Satisfaction of human needs

According to Ritchie (2018), many different types of gamification elements were found to positively impact users' motivation due to the needs of competition, achievement, rewards and so on. Indeed, users of gamification are primarily motivated by competition; however, more than competition is needed to sustain their commitment with the tool. Based on the research findings of Chen and Pu (2014) in relation to gamification, competition is outdone by cooperation when physical activities are motivated. For example, Apps related to Strava, FitBit,

AppleWatch promote community-based competition and showcase that engagement is improved when extrinsic rewards, i.e points, leaderboards, and status, are available (Goodwin & Ramjaun, 2017).

Although gamification is the best approach for influencing and motivating overweight adults' behaviour in monitoring their health and wellbeing (Legault, 2016), satisfaction of basic human needs takes priority. As mentioned in this study, elements of rewards, points, badges, leaderboards, competitions and achievements aid as extrinsic inducements that are used to stimulate the anticipated behaviour and wellbeing (Ritchie, 2018). However, not all users can be motivated by extrinsic incentives. Others might need intrinsic incentives related to fun, enjoyable and interesting activities in order to motivate and satisfy their needs (Legault, 2016).

This relates to the SDT, which defines the three psychological needs of autonomy, competence and relatedness as needs that promote behavioural intention by making tasks meaningful (Martela & Riekki, 2018). Hence, when these three needs are fulfilled, users will be inspired about their health and wellbeing. It has been found that users depend entirely on the satisfaction of certain needs to adopt gamification (Ritchie, 2018). This has consequences for the design of gamified interventions.

4.3.2 Social needs as an incentive

Within the context of the present study, social needs as an incentive relate to applications that integrate social interactions, i.e community-based competitions. For example, Strava is a fitness app that permits an individual to connect with their peers and share their activities or challenges (Goodwin & Ramjaun, 2017). This app tracks the number of steps taken, heart rate, pace improvements and so on. It also allows users to share with each other their scores, rewards, feedback and goals (Goodwin & Ramjaun, 2017). Social needs are therefore satisfied through social interactions related to competition and cooperation with others (Khosla, Chu & Nguyen, 2013). Consequently, social interactions are found to be the vital source of motivation in partaking in physical activities and enhancing users' engagement and individual performance (Goodwin & Ramjaun, 2017). This influences team perfomance to work and strive for the common goal.

The foregoing discussion implies that social influence as a social incentive is another aspect that possesses success. Ritchie (2018) stated that social influence in gamified activities along with positive recognition has a positive impact on users' motivation and willingness to exercise using the gamification tool in the long run. Social influence is even more prominent when an

individual circle of friends is bigger, especially when using the same tool. Thus, Chen and Pu (2014) highlighted that social interaction and positive recognition are comprehensively dependent upon the most successful gamified applications in healthcare. Prior to this research, social needs as an incentive was discovered to improve participation and user engagement, thereby encouraging adoption and continued intention to use the tool (Ritchie, 2018).

4.3.3 Intrinsic vs self-determined extrinsic motivation

According to Deci and Ryan (2018), intrinsic motivation is mainly about doing a task because it is fun, interesting and enjoyable, while extrinsic motivation is about engaging in an activity mainly for its rewards or outcome. When individuals are intrinsically motivated, they are encouraged to perform better and engage in an activity soley because they enjoy it and are satisfied from doing it. However, when individuals are extrinsically motivated, they complete a task to achieve an external reward or outcome e.g rewards, points or badges. Johnson et al., (2016) submitted that the commencement and sustained performance of health and wellness behaviours can be intrinsically encouraged by gamified systems. Further, intrinsic motivation is reflected as the most ideal form of motivation and is supplementary to many benefits such as fun, enjoyment, diligence and psychological wellbeing (Patrick & Williams, 2019). Legault (2016) highlighted that extrinsic motivation is helpful when encouraging action for behaviours that are intrinsically interesting. Both intrinsic and extrinsic motivation are the best techniques used to guide gamified experience.

Moreover, Ritchie (2018) argued that the occurrence of extrinsic motivation including rewards, points, or badges might discourage interest in the tool of individuals who are mainly intrinsically motivated. Thus, if the rewards are not observed as necessary or attainable, they may not motivate extrinsically (Roger, 2015). It is therefore essential to understand and consider the anticipated user's interest when designing a gamification intervention. Based on the research findings of Goodwin and Ramjaun (2017) on gamified health and fitness mobile apps, Nike+ and FitBit discovered that intrinsic rewards are enjoyed by their users.

Additionally, an example of intrinsic and extrinsic motivation is Discovery Vitality, known as the world leading insurance company that inspires and rewards its members for living a healthier lifestyle (Discovery Vitality, 2020). Discovery Vitality has many programmes that showcase the impact of rewards as a source of motivation to follow an active, healthy lifestyle. Discovery Vitality rewards its members for achieving or meeting their health goals. These rewards vary from discounted healthy food to discounts in flights, kitchenware, gadgets and

dream holidays (Gore, Harmer, Pfitzer & Jais, 2017). The following section identifies other factors that can influence the behavioural intention of overweight adults to use gamification for healthcare purpose.

4.4 FACTORS INFLUENCING THE BEHAVIOURAL INTENTION OF ADULTS TO MONITOR THEIR HEALTH USING GAMIFICATION

The current literature has shown the three psychological needs of autonomy, competence and relatedness as the main factors that influence adults' continuance intention to use gamification in monitoring their health. Moreover, the study has also provided other factors that influence the behavioural intention of adults to monitor their health using gamification to support the findings of the SDT. These factors are discussed below.

4.4.1 Broad appeal, applicability and accessibility through mobile technology and pervasive sensors

In recent years, gamification has been recognised worldwide as a tool that can be used to help individuals realise and change their health behaviours (Schmidt-Kraepelin, Warsinsky, Thiebes, Sunyaev, 2020). Over the years, the perception of gamification became more and more prevalent and began to be accepted in the commerce of digital media. In fact, the rapid growth of gamification in ICT digital technologies has been recognised worldwide (Patel, Small, Harrison, Fortunato, Oon & Rareshide, 2019). Since gamified intervention's main goal is to inspire behavioural change, health and wellbeing, the health and fitness mobile applications have now integrated elements of gamification to improve users' motivation and engagement, and this includes wellness programmes such as Discovery Vitality and digital health applications (Johnson et al., 2016).

Schmidt-Kraepelin et al. (2020) reported that gamification has established itself in the world and has reached the overall population. With that being said, the more people engage in gamified applications, the more it becomes amicable and interesting for populations comprehensively (Patel et al., 2019). Whilst, gamification is widely available in various areas including finance, productivity, education and healthcare, gamification in healthcare includes all fields related to chronic health risks such as weight conservation, physical activity, medication obedience, physical and mental wellbeing, and chronic conditions such as diabetes, stroke or cancer (Johnson et al., 2016). This inspires individuals to continually use gamification when monitoring their health.

As previously mentioned, mobile health applications assimilated elements of gamification to promote active lifestyle and improve user experience. However, the wide-ranging convenience through mobile technology and abundant devices, including activity trackers, are platforms that are accessible globally and they have the ability of incorporating health behaviours into everyday lifestyle (Johnson et al., 2016). Interestingly, gamification in healthcare primary objective isn't mainly to improve users' enthusiasm in and commitment to monitoring their health, but also to alter their current behaviour in a favourable wellbeing manner (Patel et al., 2019).

4.4.2 Development and accomplishment

There are various factors that determine adults' intention to continuously use gamification for healthcare purposes, such as development and accomplishment (Chou, 2019). Accomplishment refers to progress, improvement and advancement, whereas development refers to augmentation of a person's capacity through quality, growth and positive change (Vanhaesebroeck, 2021). According to Chou (2019), development and accomplishment are among the main drivers of gamification where individuals are motivated by progress and a need to achieve a certain goal. With this type of factor, people feel challenged and are frequently emerging. In fact, development and accomplishment improve an individual's eagerness and the obligation to learn new skills (Johnson, et al., 2016). This inspires individuals as it is shown through points and badges which confirm the accomplishment of a challenge.

Beyond encouraging health behaviours within individuals, it was found that engaging with gamification applications contributes to positive wellbeing through involvement of basic psychological needs (Johnson et al., 2016). Although all gamified applications pose a challenge, they are fragmented into smaller stages to assist the user complete the challenge (Chou, 2019). Thus, points, levels, badges, stages, the progress bars, leaderboards etc. are used to represent a sense of accomplishment (Chou, 2019). Hence, development and accomplishment enable people to overcome obstacles, and when obstacles are combined with limitations it makes gaming experience fun and pleasurable.

Chou (2019) stated that the main goal of gamification is to integrate the feelings of development and accomplishment into the everyday experiences of users. Development and accomplishment are therefore linked to game dynamics related to achievement, leaderboards and collection, which play a vital role in promoting users actions and managing their experience (Vanhaesebroeck, 2021).

4.4.3 Empowerment of creativity and feedback

According to Lord and Peggy (2017), empowerment is a point of autonomy and self-determination found in individuals and communities. In other words, empowerment of creativity is the procedure of becoming stronger and well-balanced in managing one's life. Whereas feedback is defined as the return of information about a result or an individual's performance in a certain task, which is often used as a source for improvement (Mamoon, Rezaul, & Ismat, 2016). Empowerment of creativity and feedback is whereby individuals are in a space of trying different things and have the prospect to discover new things, get feeback and use it effectively (Chou, 2019). For example, the Discovery Vitality app offers its members real time feedback, which they can use to improve their score. In addition, it also provides tools and support to its members to enhance their health and wellbeing by inspiring them to eat healthily and live an active lifestyle.

Hence, the empowerment of creativity and feedback is related to motivational factors of autonomy and rapid feedback (Mamoon et al., 2016). Empowerment of creativity and feedback is crucial for the users because it gives a sense of direction or a goal to strive towards. In fact, it provides users with various tools and methods that they can use to achieve their goals (Lord & Peggy, 2017). In terms of this study, this factor of empowerment of creativity and feedback is vital for overweight adults as it provides them with consistent feedback of their health and how they can use that feedback to improve their perfomance and achieve their health goals. As a result, this enables them to be self aware and offers them with precious opportunities for personal growth (Chou, 2019). This therefore increases their confidence levels with the tool, and improves their motivation and performance to achieve their wellness goals.

4.4.4 Social influence and relatedness

A study conducted by Chou (2019) revealed that social influence and relatedness are one of the core drivers that inspire and motivate users to monitor their health. Woo (2018) in his study relates social influence to activities that involve competition, cooperation, friendship or social possessions, while relatedness is about longing and sensitive relations. Moreover, relatedness is more like affection to demonstrative relations and the feeling of reminiscence (Chou, 2019). This driver integrates social features that motivate people to perform activities more especially when stimulated by others including their thoughts, or what they say or do.

Further to this study, social influence and relatedness are whereby a person feels a sense of recognition within a group. As a result, this driver constructs its accomplishment based on the

needs of people to unite and to compare with one another (Johnson et al., 2016). There are many studies of social influence that integrates social norms and makes major contibutions to our behaviour. Reynolds, Subasic and Tindall (2018, p. 2) defined social norm as formal or informal values of behaviour within a social group. In other words, social norms are more like rules of accepted behaviour in a particular group or the general public.

Based on the findings conducted by Reynolds et al. (2018), social norm is the key to behavioural effect and change. Thus, social norm is progressively being acknowledged as a vital element of motivation and behaviour in gamification (Johnson et al., 2016). In this study, for example, overweight adults often compare their scores or statuses with each other when engaging in gamified applications. This enables them to compete with each each to achieve a common goal. Regardless of the situation, competition is one of the best motivators that influences users to perform better and strive towards living a healthy and active lifestyle (Jagust, Boticki & So, 2018).

4.5 CONCLUSION

In this chapter, the researcher has reviewed the factors influencing the behavioural intention of overweight adults to use gamification for healthcare purposes. The self determination theory was utilised in this study to understand users' behaviour and how they are motivated, integrating the satisfaction of basic pychological needs. Thus, the satisfaction of basic pychological needs related to autonomy, competence and relatedness improves users' motivation and engagement, thereby promoting users' intention to continually use the tool. Further to this, the theoretical framework represented in Figure 2 was developed to construct the factors influencing the behavioural intention of overweight adults to use gamification for healthcare purposes. The findings from the literature revealed the three pyschological needs of autonomy, competence and relatedness as the most crucial in ensuring that overweight adults continue to use gamification to monitor their health and wellness, followed by the four factors discussed above. Subsequently, to improve continued usage of gamification, this study recognised broad appeal, applicability and accessibility through mobile technology and pervasive sensors as the factors that contribute most to influencing the behavioural intention of overweight adults to use gamification for healthcare purpose because the tool is user-friendly and a lot of fun or pleasurable to use.

CHAPTER 5 : RESEARCH METHODOLOGY

5.1 INTRODUCTION

As previously mentioned in Chapter 1, the main objective of this study was to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. A case study approach making use of Discovery Vitality was used to investigate gamification for healthcare purposes. This chapter provides an in-depth discussion of the research methods that were chosen to conduct this study. According to Goundar (2019, p. 10), research methodology "is systematic and persistent, planned to provide data on a specific research problem". It is an efficient way of solving a problem, and serves as a guidline of how the research will be carried out (Chinelo, 2016). Koppolu (2016) argued that research methodology enables the researcher to form and endorse facts, solve problems and support or cultivate theories.

This chapter is structured as follows: First the various research paradigms, approach, and design are discussed. Thereafter, the chapter presents and describes the selected population and sampling, as well as the method of data collection used in this study. This chapter also discusses how the data was analysed, data trustworthiness, and ethical considerations as they relate to the study. This study concludes with the summary of the chapter.

5.2 RESEARCH PARADIGM

A paradigm is known as a cohesive mass of fundamental perceptions, variables and problems interlinked with consistent methodological approaches and tools. However, Saunders, Lewis and Thornhill (2015) argued that a paradigm represents the beliefs, principles and assumptions that various researchers have in common regarding the nature of the research they conduct. For the purpose of this study, three major paradigms known as *positivism, interpretivism and pragmatism* were explored.

5.2.1 Positivism

According to Saunders et al. (2015), the positivism paradigm was first proposed by Francis Bacon, August Comte and Vienna Circle. The positivism paradigm relates to the philosophical ideas that observations and reason are essential in understanding human behaviour. Positivism paradigm endorses unambiguous and precise knowledge, and agrees that the truth is always static and facts are measured to examine the hypothesis of the study (Ginsburg, 2011).

Furthermore, this paradigm allows for positivist researchers to fully understand the research question through empirical tests (Pham, 2018). Also, to cultivate the hypotheses, positivist researchers might use an existing theory. Hence, the hypotheses developed would have to be tested and verified or disproved (Saunders et al., 2015). This implies that the research can be generalised to a larger population scale (Pham, 2018).

5.2.2 Interpretivism

According to Saunders et al. (2015, p. 140), interpretivist research "emphasises that humans are different from physical phenomena because they create meanings". Interpretivist paradigm is mainly based on human interpretation. Pham (2018) argued that physical phenomena cannot be studied in the same way as human beings and their social worlds because human beings interpret their worlds and act based on those interpretations, wherears physical phenomena do not share this characteristic (Saunders et al., 2015). The main purpose of interpretivist research is to develop new understandings and interpretations of social worlds, that is to fully understand the context derived through meanings assigned to the environment by human beings.

Consequently, the interpretivist paradigm enables researchers to achieve deeper understanding of the occurrence and intricacy of the research question in its distinctive context (Ginsburg, 2011). Although the interpretivism paradigm is not only concerned with objects, humans or events, its priority is to obtain deeper understanding of various ways and experience the world through diverse context and beliefs (Pham, 2018). This allows researchers to discover interpretations available from the data collected through different contexts.

5.2.3 Pragmatism

Kaushik and Walsh (2019, p. 3) stated that pragmatism is an "approach that evaluates theories or beliefs in terms of the success of their practical application". According to Saunders et al. (2015), pragmatism states that there are various ways of interpreting the world and undertaking social research. Based on the nature of the research study in question, pragmatism could combine both the positivist and interpretivist positions within the scope of the research (Maddux & Donnett, 2015). Thus, it involves critical thinking of solving problems in a practical way.

However, this does not signify that the pragmatics have to make use of multiple methods to interpret the research; instead, they need to choose the methods that permit credible, well founded, dependable and applicable data to be gathered that answers the research question (Saunders et al., 2015).

In summary, interpretivism was found to be the most suitable paradigm for this study as it allowed the researcher to explore interpretations related to behavioural intention of adults to monitor their heatlh making use of gamification. The interpretivism paradigm relates to qualitative research methods as it enables researchers to conduct interviews. Thus, intepretivism allows the researchers to view and value the perceptions of others in order to restructure the intended meaning. The next section discusses the study approach.

5.3 RESEARCH APPROACH

The next section discusses the two research approaches available, namely the inductive and deductive approaches and the research methods related to this study, the quantitative and qualitative methods.

5.3.1 Inductive research approach

When conducting a study, an inductive or a deductive research method can be used. According to Stephens et al. (2020), an inductive approach is associated with qualitative studies of data collection and analysis, whereas a deductive approach is related to quantitative studies. Saunders et al. (2015) stated that an inductive approach, also known as inductive reasoning, includes data collection, observations and proposed theories based on the results of the data analysed by the researcher. Thus, its primary aim is to generate meaning from the data being gathered in order to distinguish patterns to develop a theory. Hence, a researcher is not prohibited from using the existing theory to articulate the question in study (Stephens, Dunn, Hayes & Kalish, 2020).

5.3.2 Deductive research approach

The deductive approach is concerned with formulating a hypothesis constructed on the existing theory and designing the research plan in order to test the hypothesis (Wilson, 2010). The goal of a deductive approach is to make use of a well-known theory and then test the theory for its validity or reliability in a given context (Wilson, 2015). The next section discusses quantitative and qualitative methods.

5.3.3 Quantitative research method

Eyisi (2016) stated that the quantitative research method is utilised to measure the problem based on creating numerical data or data converted into usable statistics. In addition, it is used to calculate attitudes, ideas and behaviours in order to produce the outcome from a larger population sample. In order to convey facts and reveal patterns in research, this method utilises quantifiable data (Moore, 2016). Elkatawneh (2016) agreed that this method is related to the

deductive approach and that quantitative data collection methods are structured compared to the qualitative data collection method. Thus, the quantitative research method involves many forms of surveys, for example paper, online, mobile surveys and telephone interviews (Moore, 2016).

5.3.4 Qualitative research method

According to Haradhan (2018), qualitative research provides insights into the research problem or helps to develop ideas or a hypothesis for qualitative research. A qualitative research approach discovers human experiences as well as aspects that define socio-cultural occurrences. Athough qualitative reseach is exploratory in nature, it is utilised to achieve deeper understanding of the fundamental reasons, views and motivations within similar contexts (Grundmeyer, 2012). In conducting this study, this research approach was adopted to gather and analyse data.

The qualitative research method related with the interpretive paradigm was chosen as the correct research approach. The purpose of this study was to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. This approach was deemed suitable as it would enable the users of gamification and the researcher to interact during the interview period in the course of the study.

5.4 RESEARCH STRATEGY

According to Wedawatta, Ingirige, and Amaratunga (2011), a research strategy provides the overall direction of the research including the process by which the research is conducted. Case study, experiment, survey, action research, grounded theory and ethnography are examples for such research strategies. Thus, it is a simple plan used to study a systematic problem while the main goal is to provide reliable results (Ginsburg, 2011). To this end, a research strategy aids to plan, construct and implement the research to expand the validity of the results. For the purpose of this study, a single case study was chosen and is explored in detail in the next section.

5.4.1 Case study

According Phelan (2011), a case study is an established in-depth examination of a single individual, group or event to discover the origins or underlying principles that underpin the research question. Although case studies are known for their descriptive and exploratory nature, this research method is often used to analyse a phenomenon, create a hypothesis and to confirm a method. Based on the definition provided by Yin (2014), there seems to be consesus

that a case study is an experimental examination to obtain an in-depth explanation of an existing phenomenon within its actual context. Case studies are different from other types of research because they utilise various data collection methods including interviews, obervations and reviews (Yin, 2014). The main goal of a case study is to discover and obtain full understanding of the case by investigating the relevant features in more detail (Braxter & Jack, 2010). This corresponds with the aim of the study in question, which was to understand the behavioural intention of adults to monitor their health making use of gamification.

Yin (2014) stated that there are various categories of case studies, including: exploratory, descriptive and explanatory. These case studies are discussed below.

i. Exploratory case study

According to Yin (2014), exploratory case studies aim to discover the occurrence found in the data that aids as a point of interest to the researcher. Thus, a small sample of data collection is conducted prior to the research questions and the hypothesis is anticipated. An example of exploratory studies is a pilot study (Yin, 2014).

ii. Descriptive case study

A descriptive case study "aims to define the natural phenomena which occurs within the data in question" (Yin, 2014, p. 3). Hence, the main objective of descriptive case studies is to analyse data as they continue to occur. An example of descriptive studies is a survey.

iii. Explanatory case study

According to Yin (2014), explanatory research aims to answer the questions on behalf of the researcher regarding a phenomenon of events. This type of case study focuses on real life occurrences of various events. Hence, its focus for example aims to answer how and why questions.

Based on the adopted interpretive approach and the nature of the research study, the exploratory case study design was found to be the most approprite approach to employ because it provides an efficient way of gathering data, analyses and reports the outcome. The following section discusses population and sampling.

5.5 POPULATION AND SAMPLING

Banerjee and Chaudhury (2010) stated that a population is a group of individuals with set of specialised features, while sampling involves a procedure utilised in statistical analysis in which a determined number of perceptions are taken from a larger population. In research,

sampling is considered to be very crucial as it is one of the aspects that governs the accuracy of a research (Taherdoost, 2016). Hence, it is critical for researchers to clearly understand their study population group before the research is conducted. There are approximately 1.9 million vitality members in South Africa (Discovery Vitality, 2018). The population group used in this study were adults between the ages of 18-59 years and who are members of the Discovery Vitality in East London, South Africa.

The sample was 20 citizens that belong to Discovery Vitality. Ten of the participants actively made use of gamification features of Vitality to monitor their health status, while ten of the participants were members of Discovery Vitality, but did not utilise the gamificaition features. Data collection continued until the saturation point was reached, after which no new data was collected from participants.

According to Showkat and Parveen (2017), sampling techniques are divided into two categories: probability and non-probability sampling. Probability sampling indicates that all individuals have an equivalent chance of being chosen and the outcome is more likey to accurately imitate the whole population (Adwok, 2015). In addition, probability sampling is made up of different types of sampling, including simple random sampling, stratified sampling, systematic sampling, cluster sampling and multistage sampling (Etikan & Bala, 2017). This sampling technique represents an accurate sample of the entire population. In this study, non-probability sampling associated with the purposive sampling technique was adopted which is dicussed below.

5.5.1 Non-probability sampling

According Etikan and Bala (2017, p. 215), non-probability sampling is known as a "sampling technique in which the researcher chooses samples based on the subjective judgement of the researcher rather than random selection". This technique relies purely on the knowledge of the researcher as well as the nature of the study. Furthermore, for exploratory studies related to pilot surveys, non-probability sampling was found to be the most convenient technique to use. Also, non-probability sampling is the most efficient way used to find the respondents easily and produces quick responses compared to probability sampling that relies heavily on random selection of respondents (Alvi, 2016). Adwok (2015) identified methods of non-probability sampling as convenience sampling, consecutive sampling, quota sampling, snowball sampling and purposive sampling. In this study, purposive sampling was employed to identify adults that monitor their health making use of gamification.

i. Purposive sampling

Sharma (2017, p. 751), stated that the "purposive sampling technique, also known as judgmental, selective or subjective sampling, reflects a group of sampling techniques that rely on the judgement of the researcher when it comes to selecting the units (e.g. people, case/organisations, events, pieces of data) that are to be studied". In other words, purposive sampling allows the researchers to identify the individuals they consider suitable to participate in the study. This technique was selected as the best technique due to the small sample size of this study population and because that it can be active in discovering individual ways where the discovery of meaning can benefit from an instinctive method (Black, 2010).

As previously mentioned, the sample size of the participants was envisioned to be 20 adults between the ages of 18-59 years that are members of the Discovery Vitality in East London, South Africa and who utilise gamification features to monitor their health. In this study, the researcher's plan was to advertise on social media and other platforms to find volunteer respondents that belong to Discovery Vitality. The advertisement needed to include Discovery Vitality coverage such as healthcare activities, healthy food, active rewards, prizes, and gamification applications e.g 'MyFitnessPal, Google fit', the expected age group of volunteers, and location. The following section addresses the data collection.

5.6 DATA COLLECTION

Data collection is an essential part of any research process. According to Kabir (2016), data collection involves gathering and measuring of data from various sources to answer the research question and assess the results. Data collection consists of two types including primary and secondary data (Saunders, 2015). This study adopted both secondary and primary data to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification: A case of Discovery Vitality in East London, South Africa. Below are the detailed explanations of both secondary and primary data collection.

5.6.1 Secondary data

According to Martins, da Cunha and Serra (2018), secondary data refers to the existing data that has already been gathered and can be accessed by researchers from published literature and from sources such as journals, books, documents as well as conference proceedings. Thus, secondary data collection describes the nature of the problem and enables the researchers to solve them using the existing techniques (Boslaugh, 2018). Although secondary data is an

essential technique, it also provides reliability to the data collection methods (Martins et al., 2018). In addition, for this study, existing studies from previous literature related to gamification were used to explore the concept of gamification in more detail. While conducting this study, literature was collected from reliable databases, including: Science direct, Sage publications and Google scholar, using keywords to search for sources that are related to the study such as behavioural intention, adults, gamification and health monitoring.

5.6.2 Primary data

Unlike secondary data, primary data refers to the data gathered from the original source through interviews, surveys, experiments, case studies, observations and focus groups (Salkind, 2011). The main aim of primary data is to obtain solutions to the problem experienced at hand. Driscoll (2011) argued that primary data is more consistent and valid than secondary data because it is raw data that is unpublished nor altered by anybody else.

According to Edward and Holland (2013), interviews are known as qualitative research techniques used to gather data and it includes steering a rigorous individual interview with a small number of people to discover their perceptions on a specific idea or study. Thus, it involves verbal communication that takes place between two individuals in order to gather information voluntarily. Interviews are crucial to achieve respondents' detailed perceptions or insights of the research question of the study (Saunders et al., 2015). Interviews are categorised into three formats including: structured, unstructured and semi-structured interviews.

Structured interviews include a list of scheduled and fixed questions that the respondents answer in an orderly manner (Muller & Segal, 2015). The expected answer is mainly straightforward as it is either a yes or a no.

An unstructured interview or non-directive interview are interviews in which questions are not planned before the interview (Muller & Segal, 2015). These interviews are the opposite of a structured interview that provides a set amount of standardized questions. Unstructured interviews are not reliable as no questions are compiled before the interview. Hence, the respondents provide their opinions freely without a focus on a particular subject (Muller & Segal, 2015).

Semi-structured interviews are made up of both structured and unstructured interviews. In this type of an interview, a list of similar questions are arranged in order to be answered by respondents. However, the interviewer has the opportunity to ask additional questions to the respondents during the interview process to clarify an uncertain point (Muller & Segal, 2015).

Semi-structured interviews were deemed appropriate for this study because they permit the researcher to pose exploratory questions to the respondents with the goal of achieving deeper insights into the subject (Muller & Segal, 2015). To this end, interview questions were used in this study to provide more detailed information or opinions based on issues related to behavioural intention of adults to monitor their health making use of gamification. As previously mentioned in this study, semi-structured interviews were adopted in order to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. The interview questions were developed using the self determination theory (SDT) in order to address the research questions of this study. Finally, these interview questions enabled the researcher to understand the behavioual intentions of adults to monitor their health makign use of gamification. The next section explains the analysis of the data.

5.7 DATA ANALYSIS

Ashirwadam (2014) stated that data analysis involves a process of transforming raw data into usable information to solve the research question. The aim of data analysis is to extract usable information from the raw data to come up with decisions established upon data analysis. Although qualitative data analysis involves statistical processes and is based on the interpretative philosophy, at various times it is a constant iterative procedure whereby the data is always gathered and analysed at the same time (Lacey & Luff, 2011). Consequently, the accuracy and applicability of analysing the research outcome is a vital element of guaranteeing data intergrity. According to O'Connor and Gibson (2014), qualitative data analysis can be carried out in many ways. To this end, this research study adopted thematic analysis to analyse the data due to its accessibility and flexibility and to investigate qualitative data gathered from the users of gamification.

5.7.1 Thematic analysis

According to Braun and Clarke (2006, p. 2), thematic analysis is a “method that systematically identifies, organise, and offer insights into, patterns of meaning (themes) across a dataset”. Furthermore, this analysis is most relevant for any qualitative research method that is commonly utilised through a variety of research questions. Braun and Clarke (2006) argued that thematic analysis is suitable for inspecting the perceptions of various research respondents; thereby interpreting and highligting similarities about the subject domain. Although there is no precise arrangement on how the researchers can apply this method, thematic analysis helps in distinguishing the data collected and can provide reliable and perceptive research results

(Nowell, Norris, White & Moules, 2017). In this study, the six phases of data analysis used when developing themes were informed by Braun and Clarke (2006). These phases are explained in detail below.

i. Phase 1: Familiarisation with data

According to Braun and Clarke (2006), the first phase is about the reseachers familiarising themselves with the data collected. In this phase, the researchers ensure to familiarise themselves with the collected data during the interviews by recording information to obtain an extensive understanding of the data. In this phase, after the interview has taken place, the researchers familiarise themselves with the feedback received from the participants.

ii. Phase 2: Generating initial codes

This stage follows once the researcher is familiar with the data as mentioned above; thereafter they classify initial codes by developing list of ideas that seem exciting and significant in the data (Braun & Clarke, 2006). As these codes are explanations, they are also measures of classifying data into meaningful groups. In this phase, the researcher analyses/transforms the feedback received from the participants into meaningful context.

iii. Phase 3: Searching for themes

The third phase of data analysis includes interpretive analysis of the codes across a data set into apparent patterns (Braun & Clarke, 2006). Thereafter, the appropriate data collected is arranged according to the primary themes (Nowell et al., 2017). The themes describe the researcher's understanding of the different insights provided by the respondents. In this phase, the researcher's aim is to obtain deeper insights of the participants' view of the study in question.

iv. Phase 4: Reviewing themes

According to Nowell et al. (2017), this phase involves a comprehensive review of the identified themes whereby the researcher is concerned with refinement, combination, separation or elimination of the themes. However, the data found within the themes should adhere together expressively, while there should be recognisable distinctions between the themes (Braun & Clarke, 2006). To this end, the themes identified were reviewed to understand if they responded to the research question of how the behavioural intention of adults to monitor their health making use of gamification: A case of Discovery Vitality in East London, South Africa.

v. Phase 5: Defining and naming themes

Braun and Clarke (2006) stated that this phase includes defining and refining of the themes and sub-themes presented for the analysis of the data. Hence, it is critical for themes to be less

diverse and difficult. Furthermore, the researcher names each theme and describes definitions that would capture the essence of each theme in a short manner to provide the reader with the meaning of each theme (Nowell et al., 2017). In this phase, the collected data is therefore transformed and refined into meaningful information so that it is easily understood by everyone.

vi. Phase 6: Producing the report

Finally, the last phase of the data analysis involves the researcher converting the analysis of the data into an interpretive way and describing all the applicable themes (Braun & Clarke, 2006). The main objective of producing a report is to convey the outcome of the analysis by means of influencing the reader of the value and validity of the research. In this phase, the researcher produces the results of the analysis in the form of a report. The next section discusses the data trustworthiness of the research.

5.8 DATA TRUSTWORTHINESS

Nowell et al. (2017) stated that data trustworthiness is a way of influencing the readers or the researchers themselves that their research study is worthy of courtesy. Shenton (2010), states that data trustworthiness can be established using criteria including credibility, transferability, confirmability and dependability. Thus, trustworthiness is essential in assessing the quality of the study.

According to Nowell et al. (2017), the study is credible when the data and data analysis are believable and appropriate for the researchers and the readers. Thus, credibility is made up of vaious methods including: observation, data collection triangulation as well as research triangulation (Gunawan, 2015). During the data collection process in the form of articles, academic journals and interviews, responses from adults were efficiently analysed to support the validity and reliability of the study in discussion.

Moon et al., (2016) stated that transferability is a form of external validity, referring to the degree to which the occurrence or results of qualitative research are useful or can be transferred to other studies or contexts. As pointed out by Moon et al. (2016), transferability is viewed to be the most challenging in qualitative studies as it is a way of determining whether the research is relevant to other settings or not (Moon et al., 2016). The methodology and examination of this study was properly conducted and evaluated in a way that it can be transferred or used in other studies or context in the future.

Dependability involves consistency and trustworthiness of the research results. Hence, data is found to be dependable when it is able to deliver the same results when subjected to other methods in similar ways (Moon et al., 2016). As an indication of data dependability, consistency and reliability may be used by external sources. The best practices of qualitative studies were used in this research study in order to ensure that their individual opinions would not obstruct the analysis and data collection of the study.

According to Moon et al. (2016), confirmability refers to a point in which the research outcome could be authenticated or established by others. When transferability, credibility and dependability are accomplished, confirmability is demonstrated. However, to achieve confirmability, the researcher needs to determine that the research outcome is consistent and that the data can be analysed to specify objectivity (Nowell et al., 2017). Finally in this study, a detailed methodological explanation is illustarted which permits the readers to determine confirmability of the study. The next section describes the delimitation of the study.

5.9 DELIMITATION OF THE STUDY

The question under discussion sought to evaluate the behavioural intention of adults to monitor their health making use of gamification. From an information systems perspective, gamification technology is known as a proficient way of ensuring safety of adults' personal information. Thus, the study population was limited to adults between the ages of 18-59 years, located in East London, South Africa and who belong to Discovery Vitality. The following section explains the ethical considerations of this study.

5.10 ETHICAL CONSIDERATIONS

According to Rich (2015), ethical relates to beliefs about what is morally right and wrong. Hence, it was the researcher's responsibility to ensure that intergrity and transparency are practised in this research study. According to Mohd Arifin (2018), the purpose of ethical approval is to ensure that both the researcher and the respondents are safe when the research study is conducted.

In order to achieve the intergrity and transparency in this research study and to ensure the confidentiality of the respondents, certain measures needed to be taken into consideration. These measures involved the following:

- The researcher obtained ethical clearance from the University of Fort Hare Research Ethics Committee before embarking on data collection (see Appendix 3 - CIL031SNTS01).
- Respondents were informed about the goals and objectives of the study as well as any benefits and concerns that may arise.
- Before the research study began, permission was requested from the respondents.
- The research study was fully voluntarily only for the respondents between the ages of 18-59 that belong to the Discovery Vitality.
- No private information was disclosed to any party except for the means of collecting and analysing of the data solely for the purpose of this study
- Respondents were assured of confidentiality and their identity remained anonymous before, during and after the course of this study.
- During the interview process, the data gathered from the respondents was kept private and safely stored.

5.11 CONCLUSION

The study adopted an interpretive paradigm to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. The main aim of enterpretivism was to obtain deeper understanding of interpretations of social worlds, and to understand the context derived through meanings assigned to environments.

In conducting this study, an interpretive followed by an inductive reasoning approach was utilised in order to understand the behavioural intention of adults in using gamification to monitor their health. The qualitative research method was adopted as a method for this study. Furthermore, both primary and secondary data were made use of, as discussed in this chapter.

Semi-structured interviews were found suitable for this study as they enable the researcher to pose exploratory, open-ended questions to the respondents with the aim of achieving deeper insights into the subject. The SDM concepts were used to develop the interview questions in order to address the research questions of this study. Thus, purposive sampling was employed in order to determine whether the adults that belong to the Discovery Vitality group in East London, South Africa utilise gamification features in monitoring their health.

This study adopted thematic analysis to analyse data and to inspect the perceptions of various research respondents obtained during the interview. In assessing the quality of the research

study, four criteria of data trustworthiness including: credibility, transferability, dependability and confirmability were validated. To this end, the chapter concludes with a discussion of ethical considerations and the measures considered suitable for this research study.

CHAPTER 6: DATA ANALYSIS AND DISCUSSION

6.1 INTRODUCTION

The aim of this study was to to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. In order to accomplish this goal, data was collected from 20 adults through interviews. These adults were between the ages of 18-59 and are members of Discovery Vitality, living in East London, South Africa. Only members of the Discovery Vitality programme were chosen to partake in this study because the programme supports its members' healthcare and wellness through rewards and constant inventive solutions which provide access to unbiased, quality-based healthcare that meets their needs. Correspondingly, the use of gamification motivates adults to monitor and manage their health lifestyle, which promotes their engagement with the tool. Gamification therefore shares the same goal as that of the Discovery Vitality Programme.

This chapter presents the analysis and discussion of the data that was collected from the interviews. The chapter is divided into two sections: the first section discusses the demographic factors, while the second section discusses the questionnaire sub-theme findings. The demographic factors are discussed below.

6.2 DEMOGRAPHIC INFORMATION OF THE PARTICIPANTS

This study found that there are many factors that play a role in influencing the behavioural intention of adults to use gamification when monitoring their health. These have been divided into two groups: demographic factors of the participants and findings from the interviews which were categorised into sub-themes. Moon, Brewer, Januchowski-Hartley, Adams, and Blackman (2016) defined demographic factors as the characteristics of a population, i.e age, gender, ethnicity, education level etc., while the sub-theme are outcomes of the research project discovered during the process of data collection. According to Tamtekin and Bayır (2016), demographic factors are the most reported factors in literature for these types of studies. Even though the sub-theme on motivation to influence the behavioural intention of adults to monitor their health using gamification is given less attention in most studies, these findings have a more robust influence on behavioural intention of overweight adults than demographic factors (Ögel Aydın & Argan, 2021).

Table 1 below provides the demographic information of the participants in this study. The demographic information of the participants was divided into the following categories: age group, membership years, gamification types, types of physical activities, and types of devices.

This information is critical as it helps us to understand the interviewee age group, and their opinions about the research study.

Due to the COVID19 restrictions, face-to-face interviews could not take place and therefore the participants between the ages of 18-59 years were invited via the online platform, 'Teams', to take part in the research study. Hence, the research study was marketed on social media and other platforms to find volunteer respondents. The sample size of this study was 20 citizens that are members of Discovery Vitality, living in East London. The participants were given the individual information sheet and the informed consent form to sign to make sure that they understand the purpose of the research, research process and sources of information in order for them to give informed consent to participate in the research study voluntarily. The information shown in Table 1 below was obtained from the interview guide conducted with the participants.

Table 1: Socio-demographic information of the participants

Participant	Age group	No of years as a Discovery Vitality member	Knowledge of gamification and how it is used in healthcare	Types of gamification health applications	Types of active physical activities done + how often they are monitored	Types of devices used when recording the activity
1	36-50 years	20 years	No	Samsung Health app	Not exercising	Samsung watch
2	36-50 years	15 years	No	Samsung Health app	Not exercising	Samsung watch
3	26-35 years	5 years	No	Samsung Health app	Running & weight lifting, on a weekly basis	iPhone watch
4	26-35 years	10 years	No	Huawei Health app	Not exercising	FitBit
5	26-35 years	15 years	No	Samsung Health app	Running, Cycling, weight lifting on a weekly basis	FitBit
6	18-25 years	5 years	Yes	Samsung Health app	Yoga, running on a daily basis	FitBit
7	36-50 years	20 years	No	Huawei Health app	Not exercising	FitBit
8	36-50 years	15 years	No	FitBit	Not exercising	FitBit
9	36-50 years	15 years	No	FitBit	Not exercising	FitBit
10	26-35 years	10 years	No	Strava	Running on a daily basis	Garmini
11	26-35 years	10 years	No	Huawei Health app	Not exercising	Garmini
12	26-35 years	10 year	No	Huawei Health app	Not exercising	iPhone watch
13	26-35 years	10 years	No	FitBit	Aerobic exercises including biking & swimming on a daily basis	iPhone watch
14	26-35 years	10 years	No	Strava	Not exercising	Garmini
15	26-35 years	15 years	No	FitBit	Running on a daily basis	FitBit
16	26-35 years	10 year	Yes	Samsung health app	Yoga and swimming on a daily basis	iPhone watch
17	26-35 years	10 years	Yes	Samsung Health app	Yoga exercises on a weekly basis	Samsung watch
18	26-35 years	10 years	No	Strava	Not exercising	Garmini
19	26-35 years	10 years	No	Huawei Health app	Running or jogging on a daily basis	iPhone watch
20	18-25 years	5 years	No	None	Not exercising- I do not like to exercise	Not applicable

6.2.1 Age group

Table 1 above illustrates that 65% of the participants were between the ages of 26-35 years, while 25% of the participants were between the ages of 36-50 years. Only 10% of the participants were found to be between the ages of 18-25 years. This means that the majority of the participants were between the ages of 26-50 years for this study. Commonly, this age group is already working, is part of the medical aid scheme and is one of the age groups that are most concerned about their health. According to the World Health Organization (2020), being physically inactive negatively impacts one's health and could cause chronic illnesses such as cancer, type 2 diabetes, hypertension and coronary heart diseases. Althought these illness are very common in adults, they are also one of the major public health challenges facing the world (World Health Organization, 2020). However, these chronic illness could be reduced by regular execises, according to Discovery Vitality (2021). Discovery Vitality has over 500 000 active Vitality members, and out of that, over 300 000 members are between the ages of 26-65 years (Discovery Vitality, 2021). It is therefore evident that the age group of this study corresponds with the age demographic of Discovery members. The next section discusses the number of years the participants have been with Discovery Vitality.

6.2.2 Number of years as a Discovery Vitality member

This section discusses membership years of participants at Discovery Vitality Medical aid. In this study, 50% of participants have been members of Discovery Vitality Medical Aid for at least ten years, while 25% of participants have been a member for at least 15 years. The number of participants that have been a member of this medical aid for at least five years increases to 15%, but the majority of participants (50%) reported that they have been members of Discovery Vitality Medical Aid for over a period of 10 years. Discovery Vitality Medical Aid was introduced in 1992, 29 years ago, as a small insurance company with the aim of encouraging people to live a healthy lifestyle and protect their lives (Discovery, 2020). Vitality Active rewards was only launched in 2015 to motivate individuals through rewards to live an active healthy lifestyle. Members of this medical aid have increased since the launch of the Vitality Active rewards programme, with over 500 000 new members. Since this launch took place, there has been a rapid increase of 39% in physical activities undertaken by members (Discovery Vitality, 2017). In fact, the launch of Vitality Active rewards is seen as the main reason behind the rapid growth of members in Discovery Vitality. The following category involves the knowledge of gamification and how it is used in healthcare.

6.2.3 Knowledge of gamification and how it is used in healthcare

According to the participants' responses, 85% of participants reported lack of knowledge in gamification and how it is used. However, 15% of the participants reported that they knew what gamification was and how it is used in healthcare. Moreover, this technology is relatively new in healthcare and not many people have knowledge of how it works, therefore, it is expected that many adults will have no knoweledge background of this technology. This corresponds to the findings reported by Furdu, et al. (2017) in Chapter 3 of this thesis. Furdu et al. (2017) clearly stated that accessing technology is one of the most impeding challenges that impact the adoption of this technology by adults. He further outlined that lack of knowledge in technology applications and rapid development of these technologies makes it even more difficult for adults to understand and actually keep up (Furdu et al., 2017). The next section discusses types of gamification health applications.

6.2.4 Different types of gamification health applications

According to the participants' responses, the most common types of gamification health applications that participants use, other than Vitality, is the Samsung Health app (35%), followed by (25%) Huawei Health app, and (20%) FitBit. Only 15% of the participants used Strava. The mHealth applications are the leading apps in the market, with a market share of over 70% in 2019, and with Samsung Health app recognised as the first popular app in South Africa with over 60% users (mHealth Apps Market Size, 2021). The Huawei Health app is the second leading health app in the market, projected to have over 40% users, while FitBit only has 29% users. The Global Mobile Health Market predicts the size of mobile health apps to reach over $2 Billion from 2016 to 2025 (Statista, 2021). This information corresponds with the study conducted and analysed by the researcher and, based on the outcomes or insights provided by the participants, the Samsung health app is the leading health application among other apps that are commonly used in South Africa for wellness management including fitness, lifestyle, diet and nutrition etc. The next section discusses the most common types of physical activities that participants engage in and how often they are monitored.

6.2.5 Different types of physical activities completed by adults and how often they are monitored

Globally, physical inactivity has been recognised as an autonomous risk factor for a variety of chronic conditions (Mlangeni, Makola, Naidoo, Chibi, Sokhela, Silimfe & Mabaso, 2018). Based on the participants' responses derived from the study, it was found that 11 participants (55%) reported that they were physically inactive and are not motivated to engage in any

physical activity in monitoring their health, while 45% of the participants were either moderately physically active or stongly active and enjoy aerobic exercises. From the 45% of the active participants, only six participants out of nine engage in physical activities on a daily basis, and the remaining three participants engage in physical activities on a weekly basis.

According to the World Health Organization (2020), 1.4 billion of the world population, or 38,2%, is estimated to be inactive (Medical Brief, 2018). Moreover, physically inactive individuals are prone to chronic conditions related to cardiovascular diseases, cancer, type 2 diabetes, dimentia and coronary heart diseases. Increased physical activity among the global population was found to lower the risk of contacting these diseases (Mlangeni et al., 2018). The next section discusses different types of devices that adults use when recording their physical activities.

6.2.6 Different types of devices used when recording physical activities

According to Africa Health (2021), South Africa is one of the leading health wearable device markets in the Middle East and Africa region. South Africa spends 0.3% of the country's gross domestic product on wearable devices and 4.0% of the health expenditure known as the medical and public health, family welfare, nutrition activities and others. Furthermore, the South African device market recorded 9.1% of the Compound Annual Growth Rate from 2017-2018 (CAGR) (Fitch Solutions, 2021). This means that the market share will grow even more. This section discusses the types of devices used to record an activity. According to the respondents, the most common devices that they utilise to record or monitor their physical activities are FitBit (35%), followed by of Apple Watch (25%). Only 20% of participants used Garmini to record their activities and the remaining three participants (15%) used Samsung smartwatch. According to Statista (2021), the global health wearable device industry is controlled by the following leading vendors: FitBit, Apple, Garmini, and Samsung. According to the Global Market Share of Wearable Devices Q4, 2016, FitBit records the highest market share value of 19.2% and is one of the leading wearable devices that individuals use to track and monitor their health, followed by Applewatch (13.6%), and Garmini (6.2%) (Iyer, 2017). Only 5.6% was recorded as the market share for Samsung smartwatches. This data corresponds with the literature research conducted for this study. The next section discusses awareness of participants about available gamification features in health applications.

6.3 AWARENESS OF AVAILABLE GAMIFICATION FEATURES IN HEALTH APPLICATIONS

This section deals with awareness of available features in gamification applications among users. According to the responses, 85% of participants reported lack of awareness with regards to features of gamification health applications. This corresponds with the section in the literature which reported the lack of knowledge of gamification among adults as one of the issues (Smiderle, Rigo, & Marques, 2020). However, 15% of the participants are aware of the available gamification features. Participant six reported that he/she is aware of the available gamification features and expressed the features, such as:

"Rewards and badges motivates him/her to use the apps continuosly, while Leaderboards increases his/her self-confidence to perform better" (Participant six).

Another participant agreed with the above and expressed that:

"Points encourages him/her to monitor his/her health more closely to detect any early signs of chronic illnesses" (Participant sixteen).

Additionally, Participant seventeen agreed with the above that:

"Points or badges encourages him/her to engage in physical activities on a daily basis so that he or she can achieve more points and live a healthy lifestyle".

Although gamification applications have features such as points, rewards, badges and leaderboards, which influence positive behaviour among users (Hidi, 2016), it is clear that these gamification features, including rewards and points, boost users' motivation and self-esteem, which encourages them to improve their performance, health and wellness. The next section discusses mechanisms that motivate the usage of health applications.

6.4 MECHANISMS THAT MOTIVATE THE USAGE OF HEALTH APPLICATIONS

The digitisation of the healthcare system is advancing at a rapid rate, with health-related applications saturating the market and digital offerings in the healthcare sector becoming gradually prevalent (Hermes, Riasanow & Clemons, 2020). This section focuses on what motivates users to use a health application to monitor their health. Throughout the study, participants expressed various reasons as to why they are motivated to use health applications when monitoring their health. They further highlighted how the health applications have helped them to improve their lifestyle and agree to the use of gamification. Although health

applications are designed mainly for users in health and fitness, in this study, various segments related to health behaviour are explored.

6.4.1 Weight tracking, dieting and nutrition monitoring

As many people are concerned about maintaining an active, healthy lifestyle, technologies have been developed to encourage physical activity and weight loss among users. Bove (2019) suggested that the distribution of the advanced digital technologies in the healthcare sector such as mobile health applications, fitness trackers, or smart watches are designed to help people with their health and wellness. The adoption of these technological-based interventions allows users to keep track of their weight loss, diet, calories intake, physical activity, heart rate, blood pressure, and sleept pattens to enhance a healthy lifestyle (World Health Organization, 2020). Zenun, Fallaize, Lovegrove and Hwang (2016) correspond with the above that health apps targeting weight tracking, dieting, nutrition monitoring are the most common within the group of mobile health applications. Moreover, the findings from Higgins (2016) revealed that mobile apps inspire adults to monitor and manage their weight by tracking their nutrition consumption on a daily basis and are strict about dieting.

In this sub-theme, participants were asked whether gamified health applications enable them to track their weight and help them to monitor their daily nutrition and dietary intake. The majority of the participants expressed that one of their objectives for using these apps is to monitor their weight, daily nutrition and dietary intake. For example, a participant expressed that:

"During COVID19 pandemic restrictions, I noticed that I was gaining weight because I am always at home, doing nothing. I decided to exercise more by using health apps to monitor my weight. In this app, I can track my calories burnt after every activity, monitor my diet, blood pressure, and my nutrition intake. Ever since I started using health apps, I have seen tremendous results and I am happy with my current weight" (Participant ten).

Another participants agrees and expressed that:

"Ever since I have used the health apps, I have become more conscious of the food I eat because the app records the calories that I burn. It shows me what I should not take or what I should take in a week and sometimes suggest healthy food I should be eating "(Participant three).

Furthermore, the healthly lifestyle behaviour of adults has been enhanced, more especially the nutrition intake and weight management ever since the emergence and integration of ICTs and other related technologies (Ghelani, Moran, Johnson, Mousa & Naderpoor, 2020). Hence, it is very easy for adults to manage and monitor their health through the use of mobile health applications as it improves their lifestyle by evaluating their nutritional intake, physical activity and other fitness behaviours (Ghelani et al., 2020). Thus, mobile health applications promote healthy lifestyle, especially weight management and healthly eating by monitoring adults' consumption style. To this end, it has improved overweight adults' digestion and activity behaviours and more and more overweight adults are tracking their health, fitness and nutrition on mobile applications everyday.

6.4.2 Physical activity

According to the World Health Organization (2020), physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure. Over 80% of the adolescent population worldwide is estimated to be physically inactive, which increases the risk of contacting chronic conditions which threaten individuals' health and wellness (World Health Organization, 2020). It is therefore of utmost important for the population to be physically active to improve our overall wellbeing. In this sub-theme, participants were asked whether gamified health applications motivate and encourage them to be physically active. The majority of the particpants were found to physically inactive.

The development of mobile health apps was found to curb the behaviour of physical inactivity among adults (Buckingham, Williams, Morrissey, Price & Harrison, 2019). Moreover, some studies indicate that health apps are mainly used to support individuals to monitor their physical activities. Hence, some participants in this study agreed that health apps improve and stimulate their physical activity levels. For instance, Participant five mentioned that:

"I use health apps to track and monitor my running and cycling activities and these apps have improved and increased my daily activities because I exercise on a daily basis now" (Participant ten).

Another participant agreed and stated that:

"Ever since I started to exercise, I feel lightweighted and healthy. I am always fresh an active and I have not felt sick in a long time" (Participant eight)

Nevertheless, the majority of participants had different perspectives regarding physical activities for sustained health monitoring. For example, participant eight expressed that:

"I used to be fit and healthy because I was exercising everyday and I was still strict on my diet as well, but since I stopped dieting I gained a lot of weight and now I'm not motivated nor interested to be active again" (Participant eight).

Similarly, another participant argued that:

"In our days, being physically active and consistant at it is very difficult. I try to keep fit every now and then, but lately I have been feeling very lazy to exercise. I need motivation to keep at it"(Participant two).

Although it is clear from the narratives of the participants that the majority of them are physically inactive, it can be assumed that their lack of physical inactivity is caused by lack of motivation to exercise and eat healthily. Additionally, the findings from Higgins (2016) show that mobile health apps inspire adults to engage in various types of exercises and are helpful as they motivate and encourage them to keep track of their daily activities electronically for secured personal information. The most common types of exercises that adults engage in are aerobics, which include running, swimming, cycling, and yoga. Since the emergence of smartphones and the integration of health apps onto smartphones, it can be assumed that there will be general improvements in the level of physical activity among users (Coughlin, Whitehead, Sheats, Mastromonico & Smith, 2016).

6.4.3 Treatment adherence and chronic disease management

The worldwide impact of poor medication adherence grows tremendously as the burden of chronic diseases increases. Hence various researchers have explored many methods in improving medication adherence of adults suffering from chronic diseases, with no success, until the emergence of smartphones (Dwajani, Prabhu, Gurumurthy & Hiremathada, 2018). Smartphones include apps which can be used to improve medication adherence and patient behaviour. The World Health Organisation (2016) explained that these health applications can combine all the users' medical information, thereby providing a more simplified process to educate the individuals about their health status and wellness.

In this sub-theme, participants were asked whether gamification health applications could help them detect early signs of chronic illnesses and ensure that they adhere to treatments. While

responding to this question, the majority of the participants expressed that gamified health applications have streamlined the healthcare delivery: For example, a participants agreed that:

"The health app that I am using has nice features such as reminders and auto-generated messages that reminds and encourages me to take my medication. Also, instead of visiting hospitals to communicate with my doctor, these apps have streamlined everything because now I can reach my doctor electronically to get the support that I need"(Participant thirteen).

Although, poor medication adherence by individuals often results in a high number of hospitalisations (Brown & Bussell, 2011), the findings of Dayer, Heldenbrand, Anderson, Gubbins, and Martinayer (2013) explained that health applications have special features including personalised medical information that is easily accessible by patients and medical pratictioners, alarm reminders that can be set for dosages and automatic messages that encourage users to adhere to prescibed medication etc. These apps prove to be most beneficial for overweight adults living with chronic conditions that require daily medication treatment. Thus, health apps were developed to inspire, enhance and improve patients' level of adherence, healthcare and wellness (Oyebode, Ndulue, Alhasani, & Orji, 2020). Based on the above, it can be said that health applications can enhance medication adherence for adults.

6.4.4 Enhanced patient–doctor communication in real time

In recent years, communication in the healthcare sector has always been an issue. Hence, the process of traditional face-to-face communication has caused poor patient care and has proved to be ineffective (Designveloper, 2020). With the advancement of digital technologies related to mobile health applications, real time communication between medical practitioners and patients can be created to deliver the best quality care for the patients (Schade, 2017). This means that the adoption of mobile health apps can provide more proficient medical workflow by keeping the medical practitioners connected with patients remotely and effortlessly, for example, the adults who participated in this study can schedule medical appointments with their practitioners virtually. This means that overweight adults can now take a more active role as they are in charge of their health. Thus, this is beneficial as it allows doctors and patients to communicate across the globe in real time, while ensuring a health check, and it also allows doctors to enable discharge and increases patients' satisfaction (Schade, 2017). For example, a participant stated:

"I am happy with gamified health applications because it allows me to communicate with my doctor remotely in real time. The device is portable, easy to use, plus being able to

communicate with my doctor virtually regarding my health status is an added advantage" (Participant fourteen)

The next section discusses the sub-theme findings of this study.

6.5 SUB-THEME FINDINGS

Having presented the demographic information of the participants, further to this study it is also important to present the remaining themes and sub-themes from the data and literature.

These themes were developed based on the self determination theory (SDT). As previously mentioned in the literature, the SDT serves to analyse individuals' behaviour based on two concepts known as intrinsic and extrinsic motivation (Ryan & Edward, 2000). These factors of intrinsic and extrinsic motivation are therefore simplified to support positive behaviour and to improve the wellbeing and performance of people (Legault, 2017B). In this study, the SDT was used to develop the interview guide questions that were used for data collection. Thematic analysis was then used to analyse and interpret the collected data, and from there, the themes below were developed and represent answers to the main research question of this study.

These themes are: (i) perceived autonomy of gamification for health monitoring; (ii) perceived competence of gamification for health monitoring; (iii) perceived relatedness of gamification for health monitoring; (iv) satisfaction of basic pychological needs of gamification for health monitoring which lead to intrinsic motivation and self-determined extrinsic motivation. Table 2 below represents the above-mentioned themes and the sub-themes. The first section discusses perceived autonomy of gamification for health monitoring.

Table 2: Themes and sub-themes of the study

Themes	Sub-Themes		
1. Perceived autonomy of gamification for health monitoring	(a) Motivation and engagement in healthcare	(b) Feedback monitoring	(c) Discovery Vitality Assessments
2. Perceived competence of gamification for health monitoring	(a) User-friendliness of gamification	(b) Points or rewards in Discovery Vitality	
3. Perceived relatedness of gamification for health monitoring			
4. Satisfaction of basic pychological needs of gamification for health monitoring			
5. Intrinsic motivation and self-determined extrinsic motivation			

6.5.1 Theme 1: Perceived autonomy of gamification for health monitoring.

According to Martela and Riekki (2018), perceived autonomy is about motivation to act with a sense of preference, ownership, and willingness. It is one of the concepts of the self determination theory which ensures that users are in control of their own behaviours and goals to improve motivation and long-term usage (Patrick & Williams, 2019). This corresponds with the study conducted, which determined that overweight adults are encouraged to take control over their own behaviour and goals to improve their health and wellness.

In ensuring that overweight adults' health and wellness is maintained for sustained health monitoring, and positive behaviour is achieved, overweight adults should have control over their own health. In the main research question presented in this study, participants were asked various interview questions that relate to the first theme outlined above. These questions were formulated based on the applications of gamification found in Discovery Vitality and healthcare. These questions are listed below:

(a) Do you agree that using gamification in healthcare improves your motivation and engagement in monitoring your health?

(b) Do you think that Discovery Vitality provides sufficient feedback about your health? How do you use the feedback in monitoring your health?

(c) Are you aware that Discovery Vitality has assessments that help you detect early signs of chronic illnesses related to obesity and helps you improve your health? What are these assessments?

(d) Do you think that being a Discovery Vitality member promotes active healthy lifestyle? What is your opinion?

Additionally, the above listed questions were used as sub-themes of this study and are discussed below:

i. Sub-theme 1: Motivation and engagement in healthcare

Motivation is the reason for acting or behaving in a certain way, while engagement is an arrangement or commitment to do something. For this sub-theme, participants were asked if they agree that using gamification in healthacare improves their motivation and engagement when monitoring their health. The majority of the participants agreed that using gamification improved their motivation and engagement with the tool in the sense that when they, the users, are in control of their own behaviour and goals, their motivation is influenced. In addition, autonomous motivated individuals are more engaged, determined and effective compared to when they are controlled which is similar to the results reported from Alsawaier (2017).

While responding to this question, one participant agreed that gamification improves their motivation and engagement and expressed that:

"Gamification makes application activities fun and interactive and enhances learning experience which keeps me engaged with the tool" (Participant five).

Another participant agreed and expressed that:

"Gamification makes learning informative and exciting, while its competitive element makes it fun. I am motivated to use gamification because it helps me monitor my medication intake and my health conditions" (Participant six).

Further, another participant agreed and stated that:

"I am motivated to use gamification because it helps me achieve my wellness and fitness goals" (Participant three).

On the basis of the evidence currently available, it is clear that gamification plays a major role in improving users' motivation and engagement with the tool for sustained health monitoring and wellness.

The results thus provide confirmatory evidence about participants' agreement that using gamification increases their motivation and engagement when monitoring their health. This is also aligned with the existing literature presented in Chapter 3 that perceived autonomy promotes users' intentions to continuously use the tool for healthcare monitoring (Ngamntwini & Cilliers, 2021). For instance, the study of Martela and Riekki (2018) specified that

gamification's main goal is to improve users' motivation and behavioural intention. In addition to that, studies have shown that positive behavioural intention is influenced by knowledge and perceived autonomy, and plays a central role in assisting individuals to feel more self-determined (Patrick & Williams, 2019).

ii. Sub-theme 2: Feedback monitoring

Feedback is defined as "the response or information that occurs as a consequence of actions or particular behaviour commenced by a peson or group" (Henderson, Boud, Molloy, Dawson, Phillips, Ryan & Mahoney, 2018, 25). Sijbom, Anseel, Crommelinck, Beuckelaer, and De Stobbeleir (2017) agreed with the above statement and outlined that feedback is important as it provides the intellect of agreement and interactivity, which encourages the individuals to take ownership of their learning and improvement. In other words, feedback is related to an individual's performance of a task and is used as a source of improvement. Based on the above views raised by researchers, it is clear that receiving effective feedback is critical for overweight adults engaged in gamification activities because it informs them of their mistakes or areas for improvement, motivates individuals, encourages learning and development, promotes personal growth and improves performance.

In this study, it became obvious that Discovery Vitality provides its members with constant feedback on each physical activity undertaken to improve their overall score and wellness (Discovery Vitality, 2020). This is done by seamlessly assimilating data gathered from physical activity undertaken by a member, from all health and wellness services applications. This in turn aids to improve the quality of care and overweight adults' satisfaction and ultimately helps in new adults' achievement and perseverance (Discovery Vitality, 2020). For instance, one participant agreed with the above and expressed:

"I am happy with the feedback I am receiving from Discovery because it makes me even more keen to improve my performance next time" (Participant ten).

Another participant also agreed and had the following to say:

"Discovery offers effective feedback everytime I engage on a physical activity and I am happy with it because it informs me of my goals, progress and how I can achieve them" (Participant seventeen).

It is therefore critical for adults to monitor the effective feedback issued by Discovery Vitality in order to improve their health status. Additionally, effective feedback shows individuals their

level of performance and encourages them to perform better (World Health Organization, 2021).

Indeed, several publications agree with the views expressed above and highlight the main aim of Discovery Vitality which is to inspire its members to exercise frequently and to gradually improve their activity levels, without putting their health at risk (Discovery Vitality, 2020; World Health Organization, 2021). This is done through the use of gamification, which digitally supports overweight adults' health, promotes active lifestyle and offers wellness solutions via applications, devices and wearable devices etc. (Ogundele, Isabirye & Cilliers, 2019).

iii. Sub-theme 3: Discovery Vitality assessments

Discovery Vitality (2020) is an organisation known for providing programmes that encourage and reward one for living, driving and banking well. It is known for providing proactive wellness solutions digitally to support individuals towards their healthy lifestyle journey. Additionally, Vitality provides its members with many incentives and rewards them for steps taken towards achieving a healthy lifestyle (Discovery Vitality, 2020). For example, one participants emphasised that:

"I am happy with Discovery Vitality because it supports and pushes me to live a healthy lifestyle, not only myself but my family as well and for that I am rewarded by Vitality rewards" (Participant five).

Based on Henderson et al.'s (2018) study, the lifestyle that an individual chooses to live determines their health. In fact, poor lifestyle behaviours have been proven by various studies to lead to chronic diseases and approximately 60% of deaths internationally (Campaign, 2021; Discovery Vitality, 2020). Consequently, it is critical to conduct health screening tests to discover early signs of chronic diseases, which can lead to early development of successful treatments for the affected individuals (Discovery Vitality, 2020). This leads to the development of Vitality assessments.

Discovery Vitality is classified into two assessments known as Vitality health check and Vitality age assessment. According to Discovery Vitality (2020), Vitality health check is a simple and suitable set of critical health check screening and precautionary tests including: weight assessment in the form of BMI, hight blood pressure, cholesterol or lipogram. In Discovery Vitality, members complete the vitality health check to detect early signs of chronic diseases (Discovery Vitality, 2020). Upon completion of this check, an individual receives a

complete report underlining any health risks they may have. In addition, the report will recommend what an individual should do in order to improve their health status to save their life. Another participants raised that:

"Every year I book myself a Vitality Heath check assessment at a Wellness centre where they conduct preventive tests for blood pressure & BMI etc and conduct health screening tests to ensure that I'm still healthy and to identify any chronic conditions that I may have. I am happy for completing vitality health check every year because I earn up to 22 500 vitality points for doing so" (Participant thirteen).

Furthermore, the Vitality age assessment is an easy online assessment assessing how healthy a person is related to their real age (Discovery Vitality, 2020). This assessment evaluates all features of an individual's wellness related to their eating habits, stress management and physical activity, and supports them to learn a lot more about their healthy lifestyle choices (Discovery Vitality, 2020). This assessment helps individuals to discover any health risks early, and thus helps them to manage these health risks they might be facing. Many overweight adults are not aware of these assessments checks, it is therefore critical for them to complete in order to ensure that they live a long, healthy lifestyle.

6.5.2 Theme 2: Perceived competence of gamification for health monitoring

Kremer, Moran, Walker and Craig (2017) claimed that perceived competence is self-perception of an individual about their own capability or ability in completion of a task. Thus, it is how experienced and effective a person observes themselves to be in certain situations. Deci and Ryan (2018) agreed with the above statement and argued that perceived competence is the utmost behavioural predictor of intrinsic motivation in SDT and one of the three significant psychological needs that support individuals' health and wellbeing.

In this study, overweight adults with a high level of perceived competence were found to be more likely to enjoy the activities they are involved in than individuals who have low levels of perceived competence. Hence, rewards and admiration for adults were found to be the leading critical factors that increase perceived competence, which in turn is the leading motivational factor for adults. Thus, when individuals are intrinsically motivated, they participate in activities out of their own curiosity and gratification, without expecting external rewards or incentives in return (Hidi, 2016). This theme is divided into sub-themes and consists of the following: user friendliness of gamification, frequent achievement of points or rewards in Discovery. These sub-themes are discussed below.

i. Sub-theme 1: User-friendliness of gamification

As ICT-related technologies are progressively advancing each day, the ability to adapt to these technologies and accept change is one of the problems affecting the middle or older age groups in South Africa (de Wet & Koekemoer, 2016). According to Alsawaier (2017), gamification is the use of game mechanics and experience aimed to increase user engagement, loyalty, and motivate others to achieve their goals. Through the use of applications related to game-design elements, user engagement and motivation of the others can be improved.

Muangsrinoon and Boonbrahm (2019) stated that game-design elements are basically the building blocks of gamification applications and include the following: points, badges, rewards, leaderboards etc. The above-mentioned game-design elements originate from the gamification applications, for example apps that use gamification are i.e. the Nike run app or Vitality squares. According to Reem, Aliki, Muhammad, Zahra and Pedro (2017), the Nike run app is an exercise app that offers users with training, run tracking, and gamified experience to keep users active, whereas Vitality squares is a game that educates users and allows them to select and disclose information behind a number of cards for rewards (Vitality, 2021). These apps are helpful as they can support an individual to achieve their health and wellness lifestyle. However, the adoption of these depends on the level of usability or user experience associated with the apps, i.e. whether they are simple, user-friendly and easy to navigate. For example one participant agreed that:

"I enjoy jogging on a daily basis and using samsung health app while doing so encourages me to continue training to reach my goals, especially with GPS tracking my workouts. This app helped me overcome the motivation gap I was suffering from" (Participant thirteen).

Lapets and Kfoury (2012) explained user-friendliness as any machine or system that is very easy to understand and use. During data collection of this study, participants were asked if they considered gamification that uses Vitality to monitor their healthcare easy or difficult to understand. Many participants responded that they find gamification very easy to understand and to navigate the device. Additionally, respondents highlighted that the most common devices they use to record or monitor their physical activities were FitBit (35%), followed by Apple Watch (25%). Only 20% of participants used Garmini to record their activities and the other three participants (15%) used Samsung smartwatch. This reveals the level of understanding of gamification usage among users and it is clear that users consider gamification that uses Vitality to monitor healthcare very simple to use, easy to navigate and user-friendly. One participant agreed that:

"All these devices or applications that we use to track and monitor our health and physical activities whether its FitBit, apple watch, Garmini or samsung health include elements of gamification that stimulate our user engagement and retention, while also making training enjoyable. I personally use FitBit, and I find it very easy to use. I just love it." (Participant six)

ii. Sub-theme 2: Points or rewards in Discovery Vitality

Although Discovery Vitality is known for inspiring its members to live well, drive well and bank well by offering incentives and rewards in return (Discovery Vitality, 2020), it also provides its members with various ways of accumulating points to progress to the next level. These points offered by Discovery Vitality range from physical activities undertaken and healthy eating habits to screening and preventive tests (Discovery Vitality, 2020).

Moreover, Discovery Vitality rewards its members in the form of points on a dailys basis when they undertake a physical activity, eat healthily, or go for screening or preventive tests (Discovery Vitality, 2020). This means that the healthier an individual member becomes, the more they are being rewarded and supported to improve their health and wellness. This is done to encourage and inspire them to continue living a healthy lifetsyle.

For instance, members get rewarded and earn points by engaging in the below activities:

(i) 100 Vitality Active points for working out at a fitness centre
(ii) 300 points for taking part in Parkrun or any other outdoor activity
(iii) 3000 points for tracking any physical activity undertaken via a Vitality-linked fitness app

During data collection of this study, participants were asked how often do they achieve points/rewards in Discovery Vitality. Many participants responded saying that when they are consistent with everything that they do, including eating healthily, engaging in physical activities on a daily basis and doing some health screening every now and then, they would achieve even much higher points every day. In this study, 45% of the participants indicated they engage in physical activities on a daily basis, while the remaining 55% said they are inactive. Within the 45% physically active participants, Participant seventeen reported that:

"receiving points or rewards motivates me and encourages me to engage in physical activities on a daily basis to live a healthy lifestyle and to improve my performance".

Another participants agreed with the above and reported that:

"Points motivate to use the app because it promotes competition among members which encourages me to think & peform better." (Participant thirteen).

This implies how often the rewards or points are achieved by the participants and therefore reveals the frequent achievement of rewards or points by members of Discovery Vitality.

Although Discovery Vitality uses these rewards programmes to involve and stimulate people to achieve their goals, whether it is to lose weight, monitor their health and physical activities, eat well, or develop their vital health statistics (Discovery Vitality, 2020), Discovery Vitality ensures that these elements are assimilated to keep users motivated and encouraged to monitor their health in the long run (Discovery Vitality, 2020).

6.5.3 Theme 3: Perceived relatedness of gamification for health monitoring

According to Martela and Riekki (2018), perceived relatedness is the need to feel connected with others and need to belong to a community. Moreover, the need for perceived relatedness signifies the basic aspiration of the individual for comprehensible integration with the social environment (Wang, Chia Liu, Hwa Kee, & Khoon Chian, 2019). In this study, the three psychological needs of autonomy, competence and relatedness discussed above are common due to the fact that their relationship to wellness remains robust regardless of the cultural context (Wang et al., 2019). Thus, when the three psychological needs are satisfied, intrinsic motivation increases.

In order to understand whether Discovery Vitality uses gamification to improve sustained health monitoring of overweight adults and to promote achievement of points, rewards or badges, participants were asked how they feel when achieving rewards, points or badges in Vitality and how they used them when monitoring their health.

In responding to this question, 95% of the participants said that they feel very happy and excited when they achieve points or rewards from undertaking a physical activity. This motivates them to exercise even more and to engage in many physical activities to achieve more points or rewards For instance, one participant reported that:

"I am always pleased to engage on a physical activity because I know I will be rewarded with points which I use to get discount on shakes at the gym" (Participant nineteen).

Additionally, participants expressed that they use the points or rewards for many reasons, such as (i) to get discounts on local or international flights, (ii) discounts on holiday accommodation and car rentals, (iii) discounts on movies, fuel, gym, uber trips, (iv) discounts on healthly food

including smoothies, coffees, nandoos, (v) discounts on kitchenware, gadgets, or sportsware. Based on the findings conducted by Martela and Riekki (2018), perceived relatedness is the significant factor that estimates the intention of overweight adults' behaviour in ensuring that using gamification will improve their overall health status. This implies that overweight adults perceive Discovery Vitality that uses gamification to be effective in ensuring that they have control over their healthcare and wellness and are motivated to continue living a healthy lifestyle.

6.5.4 Theme 4: Satisfaction of basic pychological needs of gamification for health monitoring

In order to know the level of satisfaction of overweight adults with the available gamification applications that Vitality uses for sustained health monitoring, participants were asked to describe their user experience with the tool. In this study, 95% of the respondents indicated that they were satisfied with the available gamification applications and emphasised that using gamified apps to monitor their health has increased drastically. Only 5% of the respondents complained that gamification applications were not user-friendly and they were not satisfied with the tool.

Moreover, 19 out of 20 participants stated that the gamification applications are user-friendly. They further mentioned that the gamified applications they were using to monitor their health were easy to use. This implies that they were satisfied with their gamification applications. For instance, a participant stated that:

"I am happy with gamification applications because they are very easy to use, anyone can use it without being taught" (Participant twelve).

This input agrees with the findings of a systematic literature review conducted on the user-friendliness of gamified apps by Darejeh and Salim (2017).

Additionally, another participant described their experience with the application as follows:

"I am satisfied to use these apps to monitor my health because they are user friendly & easy to use" (Participant six).

Another participant expressed:

"I am satisfied with the available gamification applications because they are fun and enjoyable" (Participant fifteen).

Similarly, another participant stated that:

"gamified apps are user-friendly because you just click on the application and go with your activities" (Participant five).

From the above-mentioned narratives, it is clear that gamified applications are user-friendly, easy to navigate and very easy to understand. This means that overweight adults can now easily use the tools without any assistance from anyone to support their needs and goals and that their behavioural intention to continue using gamification is enhanced. The decision of these participants to continue using gamification is informed mainly by the fact that they are satisfied with the tool. Further, the empirical evidence of Mitchell, Schuster, and Jin (2018) revealed that continued behavioural intention to use gamification for sustained health monitoring is determined by the satisfaction of basic psychological needs, intrinsic motivation and self-determined extrinsic motivation.

6.5.5 Theme 5: Intrinsic motivation and self-determined extrinsic motivation

Within the context of this study, the SDT is differentiated into various forms of motivation, commonly known as intrinsic motivation and extrinsic motivation (Deci & Ryan, 2018). Intrinsic motivation is defined as the act of doing something out of interest and enjoyment without any expectations of external rewards or incentives (Reem et al., 2017). Thus, when an individual is intrinsically motivated, their goals comes from within and their outcome will satisfy basic psychological needs for autonomy, competence and relatedness.

However, extrinsic motivation is defined as the behaviour of the individuals to accomplish a task and in return receive rewards or other incentives (Legault, 2016). Unlike intrinsic motivation, external factors drive this form of motivation. In other words, intrinsic motivation is about individual development, a sense of obligation and persistence, while extrinsic motivation is more about securing financial freedom, eminence and public recognition (Ogundele, Isabirye & Cilliers, 2019).

This study brings forward the discussion on the issue of continuance usage of Discovery Vitality that uses gamification. The participants were asked whether they would continue to use Discovery Vitality that uses gamification to monitor their health in the long run. Nineteen out of 20 participants responded that that they would continue to use Discovery Vitality that uses gamification because they are happy with the results they are getting.

For example, *"I love being a member of Discovery Vitality because I enjoy being rewarded for living a healthy lifestyle"(Participant seventeen)*

Another participant emphasised that:

"I am motivated everyday to go to the gym because I receive 1000 points for a workout, ofwhich I then use to get 75% off my gym fees" (Participant six).

Similarly, another participant said: *"As an active Vitality member, I can use my 25 reward points that I accumulated from a workout to get a coffee, but non members do no have that benefit" (Participant three).*

This overall narrative implies that 95% of participants are happy with Discovery Vitality and are planning to continue using it when monitoring their health. Table 3 below shows available points or rewards in Discovery Vitality:

Table 3: Available points or rewards in Discovery Vitality (Discovery Vitality, 2020)

Points for physical activities (exercises) per day	**Points for eating healthy (nutrition) per year**	**Points for conducting screening or preventive tests (health checks)**
100 points a day for workout at health club or gym	1000 points for consultation with dietitian to learn healthy eating habits	22 500 points for Vitality Health Check
300 points for Parkrun outdoor activities	12 000 points for buying healthy food	7 500 points for Vitality Fitness Assessment
3000 points for tracking exercises on a vitality app		1 500 points for Vitality Age Check
		500 points for Vitality Mental Wellbeing Assessment

Discovery Vitality is known for offering tools and advice to help individuals manage their health and wellness conditions. It also allows its users to add or link their devices to the Discovery Vitality app or website to keep track of their health and in return receive more support in their journeys (Discovery Vitality, 2020).

For instance: *"Vitality that uses gamification is helping me achieve my fitness and wellness goals, and the fact that I get rewarded for it as well is an added advantage*" *(Participant four).* Also, another participant said, *"I will continue to use Discovery Vitality because I receive*

massive rewards ranging from discounts on healthy food, sportsware purchases, international or local travels, movies, fuel, gym, uber trips etc" (Participant five).

Another participant submitted that: *"The constant feedback I receive on a daily basis from Discovery helps me track and monitor my activities as well as my progress, I highly recommend others to join Discovery to achieve their health goals" (Participant six).* Lastly, another participant agrees with the above that, *"The gamification that Discovery uses helps me to efficiently monitor my health condition, medication adherence and above all my lifestyle, as a result I recommend it to others as well" (Participant ten).*

Although, many participants are satisfied with the gamification that Discovery Vitality uses, others expressed that they had some concerns with regards to the usage of gamification for sustained health monitoring. For instance, it was mentioned:

"*The cost or membership fees and excessive tracking of health information are the inhibiting factors that affect the adoption of gamification usage" (Participant twenty).*

Hence, it can be argued that the cost or Discovery Vitality membership fees is one of the major factors that could limit the continuous usage of gamification that uses Discovery Vitality, more especially among low income users. For the past decades, South Africa is known to suffer from its long and infamous history of poverty and inequality, with an overbearing racial footprint (Sulla & Zikhali, 2018). Additionally, this mainly impacts black South Africans being the most affected group, less educated, low income earners, or unemployed with larger families and children to support (Sulla & Zikhali, 2018). For example, a participant expressed that:

"I cannot afford to pay membership fees on a monthly basis as I am currently unemployed" (Participant twenty)

Based on the above, it can be said that a few participants are struggling to support their families and therefore cannot afford Discovery Vitality membership fees. It can be concluded that cost is seen as one of the factors that could inhibit the behavioural intention of users of gamification.

The participant further stressed that he feared that his health status or health information might be mistakenly leaked to third parties and might fall into the wrong hands. Moreover, when an external organisation keeps track of an individual's information, such personal information might be vulnerable to outsiders or unauthorised users (Cheng, Liu, & Yao, 2017). This results to data security breaches and privacy of others being penetrated. Breach of privacy is a concern because it means that unauthorised users have access to personal information, treatment,

medical records and can steal or damage an individual's identity. Another concern is the selling or sharing of personal information including age, gender, location, or profiles on social media accounts with third parties.

When the participants were asked whether this could hinder their behavioural intention to continue using gamification that uses Discovery Vitality for sustained health monitoring, one of the participants noted that:

"It can hinder my continuous intention to use gamification because once I notice that my medical personal information is breached, I will immediately stop using gamification and Discovery Vitality" (Participant twenty). The participant further said *"I am not happy with the way Discovery tracks my health information; it tracks my exercises, nutrition and my medical treatment, that's too much for me".*

Based on the above narratives, it can be assumed that these concerns can negatively affect someone's behavioural intention of gamification. Devar and Hattingh's (2020) findings also agree with the above and indicate that costs and privacy concerns are the main barrier hampering the continuous usage of gamification and Discovery Vitality. This influences the behavioural intention of users and might inhibit the adoption of gamification.

Though 5% of the participants have concerns with regards to Discovery Vitality that uses gamification, looking back on the above-mentioned narratives, it is clear that the behavioural intention of the participants to continuously use Discovery Vitality that uses gamification is high. The overall majority of participants revealed that their behavioural intention to continue using gamification that uses Discovery Vitality to monitor their health is entirely because of the psychological need of autonomy, competence and relatedness; such that when the psychological needs are satisfied, the level of motivation and individual wellbeing rises. Hence, the decision of these participants to continuously use gamification is basically informed by the fact that Discovery Vitality is the main company whose programmes basically aim to support individuals' health and wellness through rewards or points. This therefore agrees with the SDT adopted in this study (Deci & Ryan, 2018).

6.6 FRAMEWORK TO INFLUENCE THE BEHAVIOURAL INTENTION OF ADULTS MONITOR THEIR HEALTH MAKING USE OF GAMIFICATION: A CASE OF DISCOVERY VITALITY IN EAST LONDON, SOUTH AFRICA

This study suggests a comprehensive theoretical framework to represent and analyse the drivers behind continuance usage of gamification. The comprehensive theoretical framework was

developed from the self determination theory (SDT), endorsed and extended by the pragmatic data and current literature on the usage of gamification for health monitoring. Figure 3 represents the comprehensive theoretical framework (Fishbone diagram).

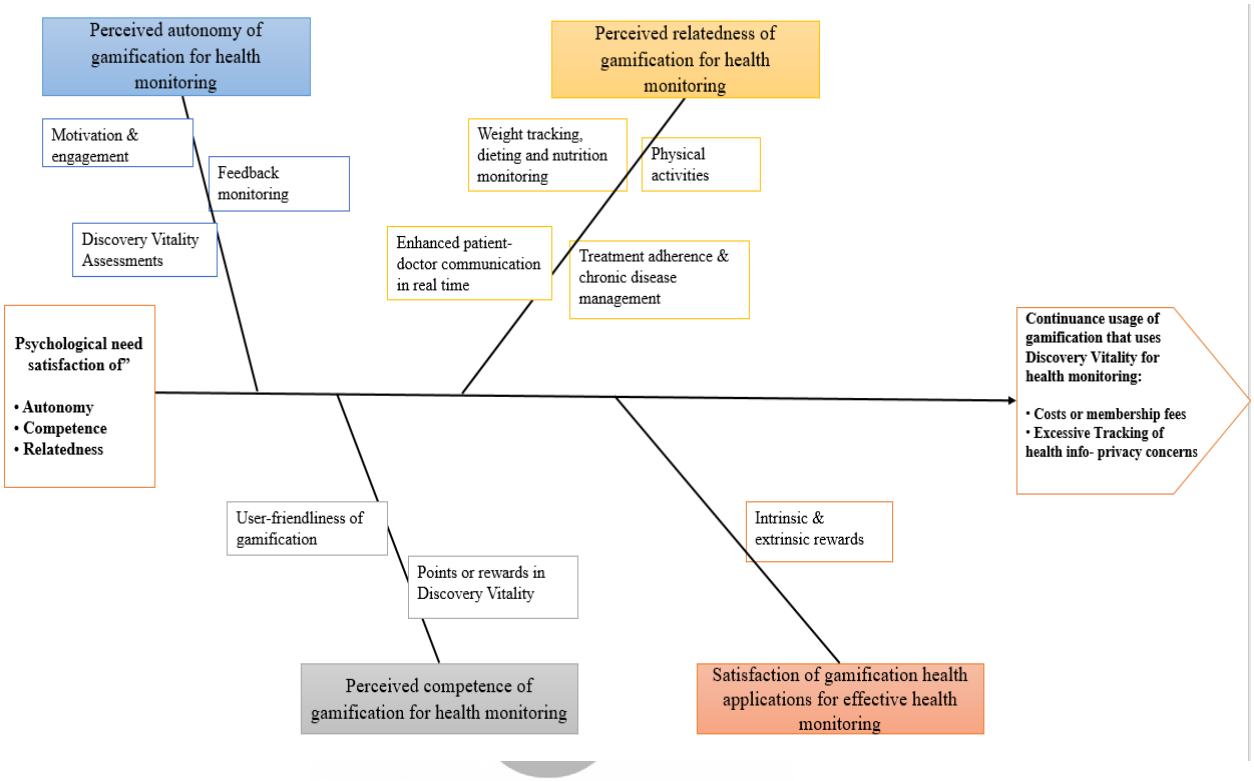

Figure 3: Framework for behavioural intention of adults to monitor their health using gamification

(Source: Author's own)

Based on the theoretical premise of this study, the fishbone diagram in Figure 2 reveals the continuance usage of gamification for sustained health monitoring. In particular, the constructs of this framework which are endorsed by the pragmatic data and literature are known as the satisfaction of the psychological needs of autonomy, competence and relatedness. These constructs are differentiated and discussed below.

The first construct of this framework is the peceived autonomy of gamification for health monitoring. From the presented data and literature of this study, gamification was found to improve users' motivation and engagement to perfom better because gamification makes activities fun and enjoyable. Additionally, for every physical activity undertaken by overweight adults, Discovery Vitality that uses gamification provides feedback to enhance learning, encourages users to improve their perfomance and overall score and in return rewards them for living a healthy lifestyle. This implies that when overweight adults are motivated to use

gamification that uses Discovery Vitality, their behavioural intention to use the tool is improved.

The second construct that emerged from this framework which was also validated by the empirical data and literature is perceived competence of gamification for health monitoring. As previously mentioned in the study, perceived competence is one of the psychological needs that support an individual's health and wellbeing. Through the progressive growth of ICT-related technologies, gamification remains the most simple, easy to understand tool, of which the main goal is to support overweight adults to live a healthy, fit lifestyle. This implies that the healthcare monitoring is improved mainly by the emergence of gamification because gamification supports overweight adults to achieve their goals, i.e weight loss, dieting, physical activities and nutrition monitoring in real time and in turn rewards them for it.

The third construct of this framework is perceived relatedness of gamification for health monitoring. This construct is the most important factor that estimates that the behavioural intention of adults when using gamification will improve their overall health status because the more adults engage in gamification health activities, the more they will be rewarded for living an active healthy lifestyle. This suggests that gamification is the most effective tool to be used to ensure sustained health monitoring because the tools help in tracking weight, diet and nutrition, monitor physical activities, and treatment adherence.

The fourth construct is the satisfaction of basic psychological needs of gamification for health monitoring. When the psychological needs of autonomy, competence and relatedness are satisfied, intrinsic motivation increases, this implies that continued behavioural intention to use gamification is determined by the satisfaction of basic psychological needs, intrinsic motivation and self-determined extrinsic motivation. As demonstrated by the participants (users) in literature, the frequent usage and user-friendliness of gamification reveals a high level of satisfaction with the gamification tool among overweight adults because it is more interactive, fun and enjoyable to use.

The fifth construct is continuance usage of gamification. For the previous constructs, participants (users) demonstrated that gamification is useful as it supports them to achieve their health and wellness goals. Consequenstly, they are satisfied with the tool for sustained health monitoring because it is simple, and easy to use. Participants (users) further demonstrated that their behavioural intention to continue using gamification to monitor their health is improved. However, cost or membership fees associated with gamification that uses Discovery Vitality

and privacy concerns were found to be inhibitive factors to continuance usage of gamification. One participant was seriously concerned that their personal information, medical records, medication treatment that is tracked by Discovery Vitality might be mistakenly leaked to third parties or unauthorised users, who can use that information to steal or damage the person's identity. For this reason, the person's behavioural intention to use gamification for healthcare monitoring might be badly affected.

6.7 CONCLUSION

In conclusion, this chapter brought forward the analysis and discussion of qualitative methods on factors influencing the behavioural intention of overweight adults to monitor their health using gamification. Based on the outcome of the analysis, it is clear that gamification is seen as the most useful tool that enables individuals to monitor their health and wellness, thereby encouraging them to achieve their goals. Furthermore, the data conducted in this study reveals that the majority of the participants were using gamification, with the involvement of Discovery Vitality to keep track of their health, and hence the perceived efficacy of Discovery Vitality that uses gamification was reached.

The significance of gamification with the involvement of Discovery Vitality has occurred from the analysis and discussion of this study. Based on the narratives received from the participants, it was evident that the majority of the participants agreed that Discovery Vitality that uses gamification has enabled and encouraged them to achieve their health and wellness goals. Since the majority of the participants agreed that gamification is useful and also confirmed the effectiveness of gamification in ensuring that an active healthy lifestyle is achieved, it can be concluded that the majority of the participants were satisfied with the use of gamification in Discovery Vitality when monitoring their health. Futhermore, from the analysis and discussion of the study, the majority of the participants revealed a vibrant intention of continuous usage of gamification for healthcare monitoring.

CHAPTER 7: CONCLUSION

7.1 INTRODUCTION

In Chapter 6, findings of the analysis were presented, analysed and discussed. From the collected data and analysis, the results highlighted the factors influencing behavioural intention of adults to continuously monitor their health using gamification. However, factors that prevent usage of gamification by users for sustained health monitoring were also noted. Hence, for a more comprehensive view of these factors, the pragmatic data, existing literature review and developed framework were used as a guideline. This chapter is divided into seven sections, whereby the summary of the literature is outlined first. Secondly, the research problem is presented while the third section presents the reseach questions of this study. In the fourth section, a summary of the theoretical framework is presented. In the fifth section, a summary of the research methodology is presented. The sixth section covers the recommendation and contributions of the study. Finally, the last section oulines the limitations of the study as well as the suggestions for future research.

7.2 LITERATURE

The literature chapter, Chapter 2, commenced by introducing the use of gamification technologies in improving the lifestyle of adults and how it contributes to the healthcare sector in South Africa. Section 2.2 of the chapter presented the overview of healthcare in detail. The common causes of obesity and consequences related to it were discussed. The rapid growth of digital technologies and their use is recognised as an innovative solution that enables adults to be more proactive regarding their health. The literature review in Section 3.2 of Chapter 3 further highlighted the role of gamification in healthcare and revealed that gamification plays a positive role in the healthcare system as it is linked with applications established in mobile devices, i.e. Nike running app (Alsawaier, 2017). By applying gamification applications in healthcare, adults are able to control and monitor their health conditions more efficiently, hence the introduction of Discovery Vitality was discussed in Chapter 2 to explain how it supports adults' health and wellbeing. Johnson et al. (2016) stated that gamification is more efficient in improving adults' lifestyle as it motivates them to live a healthy lifestyle, it also helps adults to keep fit, adhere to their prescribed medication and dieting. Gamification usage contributes positively in the healthcare system because it improves users' health and wellbeing and therefore provides a higher position towards optimistic experiences found in the healthcare sector. Overall, gamification facilitates the monitoring and managing of healthcare for adults.

In Chapter 3, the literature review included the different types of gamification elements that exist to promote health monitoring. These gamification elements are used to encourage overweight adults to live an active healthy lifestyle, while monitoring their health and wellness. Firas (2016) stated that many gamification elements exist in healthcare; however, the common ones include rewards and badges, ranking, leaderboards, scoreboards, points, feedback, teams, and lastly competition under rules that are explicit and enforced etc. The literature further discussed the advantages and disadvantages of gamification in healthcare. Improved user motivation and wellness, positive self-esteem and enhanced behavioural intention are seen as sone of the common advantages of gamification. However, concerns regarding continuous usage of gamification in healthcare were found to be the main constraining disadvantage, more especially when gamified applications are not frequently advanced. Thus, the self determination theory (SDT) was chosen for this study to positively influence overweight adults' behaviour. Lastly, gamification stimulates users to alter their health behaviours, while remaining engaged with the use of gamification.

The last section of the literature review, Chapter 4, observed factors that would influence behavioural intention of overweight adults to monitor their health using gamification. According to Deci and Ryan (2000), the SDT was utilised to examine individual behaviour established on two factors, i.e. intrinsic and extrinsic motivation. Furthermore, the SDT is about an individual's capability to make their choices and manage their own health and wellness. The SDT suggests that overweight adults' continuance intention usage of gamification is based on four quadrants. These quadrants are perceived autonomy, competence, relatedness and satisfaction of basic psychological needs. The findings from the literature revealed that satisfaction of basic psychological needs for autonomy, competence and relatedness were the main elements that influence continuous usage of gamification and improve users' motivation and engagement. The literature further discussed the mechanisms that promote the adoption of gamification in healthcare. Lastly, factors influencing the behavioural intention of overweight adults to monitor their health using gamification were discussed and found to be one of the factors that contribute most to promoting a healthy lifestyle.

7.3 RESEARCH PROBLEM

One of the challenges that is facing the healthcare system in SA is the integration of gamification into adults' daily lives. This is due to the fact that integrating gamification the lives of users portrays an array of challenges related to reliability, accuracy and lack of knowledge. Moreover, it is vital for adults to preserve an active lifestyle to monitor their health,

but encouraging them to continuously use gamification in the long term remains a problem (Johnson et al., 2016). Further to this study, it was found that when adults use gamification, their interest tends to decline over time; thus only using it for a short period of time. Until recently, few investigations have been conducted by researchers in the area of gamification; however, there is now growing interest identified and in the field of gamification in healthcare and the topic is being explored (Seaborn & Fels, 2015).

7.4 RESEARCH QUESTIONS

The main research question that was explored in this study is as follows:

How can the behavioural intention of adults in South Africa be influenced to make use of gamification for healthcare monitoring?

A previously mentioned, the purpose of this study was to develop a framework that can be used to influence behavioural intention of adults in South Africa to monitor their health using gamification. This study will investigate factors that improve the efficiency and quality of healthcare delivery in SA. Thus, constraining factors were investigated to understand adults' thoughts and beliefs. In order to achieve this goal, the following sub-questions were posed.

7.4.1 How can gamification contribute in health monitoring of adults in South Africa?

The research study answers this question in Section 2.3 of Chapter 2 which discusses the role of gamification in healthcare. The research brings forward the importance of using gamification to monitor and manage individuals' health and wellness using various gaming features that motivate individuals to keep fit and live a healthy lifestyle. The use of gamification enables adults to be more proactive regarding their health, it motivates and promotes adults to engage in healthy eating behaviours, while adhering to prescribed medication. Hence, the role of gamification in healthcare has been found to be effective in improving adults' lifestyle and wellness. Additionally, the adoption of gamification improves the delivery of healthcare, provides proficient medical workflow remotely and contibutes positively to the healthcare sector.

7.4.2 What are different types of gamification elements that promote health monitoring?

The research question is answered in Section 3.2.2 of Chapter 3 which summarises the different types of gamification elements. There are many gamification features/elements around the globe that are used to motivate and manage the individual's health and wellness. The study revealed that the most popular gamification elements that promote health monitoring are

known as ranking, leaderboards and scoreboards, rewards and badges, points, feedback, teams, and lastly competition under rules that are explicit and enforced. The study further provided a discussion of each of these elements and the study findings revealed these elements as effective tools that motivate and inspire adults to live an active, healthy lifestyle and are capable of helping them to achieve their fitness goals. These gamification elements exist to encourage adults to monitor their health and wellness efficientlty and effectively.

7.4.3 What are the factors that influence behavioural intention of adults to monitor their health makign use of gamification in South Africa?

The research question is answered in Chapter 4 where the factors that influence the behavioural intention of adults to monitor their health using gamification were discussed to support the findings of the SDT. The study revealed that although the three psychological needs of autonomy, competence and relatedness are the main factors that influence overweight adults' continuance intention to use gamification when monitoring their health, four various factors were identified useful in this study.

Furthermore, the research question is also answered in Section 6.6 of Chapter 6 where the comprehensive theoretical framework was developed to represent and analyse the drivers behind continuance usage of gamification. The framework has four constructs identified as perceived autonomy, competence, relatedness, and satisfaction of basic psychological needs. These four constructs of the framework were discussed in line with the themes of the study. The framework can be implemented by the healthcare sector in South Africa in order to promote and improve the use of gamification as a tool to achieve effective health monitoring and wellness and an active healthy lifestlyle. Therefore, Chapter 4 answers the research question and provides the factors which can influence the behavioural intention of adults monitor their health using gamification. For example, a factor that can influence the behavioural intention of adults is "**broad appeal, applicability and accessibility through mobile technology and pervasive sensors"** meaning that the rapid growth of gamification applications and its wide-ranging convenience can be accessed broadly and can improve users' enthusiasm and commitment. Finally, this chapter revealed that gamification technology has the potential of revolutionising the global healthcare sector.

7.5 THEORETICAL FRAMEWORK

The research study adopted the the SDT developed by Ryan and Edward (2000) as represented in Chapter 1 in Section 1.7. The SDT was developed with a purpose of clarifying human

motivation and behaviour based on the individual differences, effects on motivation as well as interpersonal insights (Legault, 2017B). Above all, this theory was developed to analyse individuals' behaviour using two concepts: intrinsic and extrinsic motivation. Furthermore, Section 1.7 of Chapter 1 shows that SDT is formulated based on the four main constructs known as: perceived autonomy, competence, relatedness and satisfaction of basic psychological needs leading to continuous intention, intrinsic motivation and self-determined extrinsic motivation.

The SDT has been reviewed and used in several studies such as: to understand users' motivation, adoption and continuous usage of self determination theory and its application to health behaviour (Patrick & Williams, 2019); to understand the effects of clinical instructor behaviour (Knight, 2016); healthcare and its relations to motivational interviewing (Deci & Ryan, 2012); to understand college students' motivation for physical activity (McDaniel, 2016); usage of self-determination theory facing health innovation challenges (Migliorini,Cardinali, & Rania, 2019); and to review basic psychological needs at work (Van den Broeck, Lance, Chu-Hsiang & Christopher, 2016). The findings for each of the above-mentioned studies revealed the four constructs of SDT as the factors that improve users' motivation and influence their continuous behavioural intention. Although SDT is used in many studies including: healthcare, education, finance and business to motivate users behavioural intention, based on the above-mentioned studies, it is clear that the majority of studies in which SDT is reviewed is in the healthcare context.

When applying SDT in this study, it has an impact on users' motivation, meaning that it allows users to feel motivated to take action. In addition, when the users' needs for autonomy, competence and relatedness are satisfied, they are able to become even more self-determined. In relationg to this study, this means that adults will be motivated to use gamification to monitor their health. The need for growth drives behaviour and the self-determination theory plays a significant role in how overweight adults behave. Further to this, when adults are in control and are intrinsically motivated, their committment, passion, interest and satisfaction increase. In this study, the consequence of implementing SDT determined the factors that improve users' motivation and engagement, which would determine continued future use of gamification by overweight adults. Hence, the SDT was used in this study as a foundation to identify the factors that influence adults' intentions to use gamification for healthcare monitoring.

7.6 RESEARCH METHODOLOGY

The research design is basically a plan to study a scientific problem to deliver credible results and to guarantee that the research problem is well addressed (Ginsburg, 2011). Due to the explorative nature of this study, a qualitative research approach was adopted. According to Yin (2014), the main objective of a qualitative approach is to understand the research problem by exploring human experiences. In addition, the qualitative approach follows inductive reasoning which includes exploration, contextual, complexity and selection of many empirical materials (Saunders, 2015). These are critical as they help the researchers to understand and distinguish factors that influence behavioural intention of adults to continuously monitor their health using gamification.

As previously mentioned in Chapter 5 of this study, the population group of this research project was adults who are members of the Discovery Vitality in East London, South Africa and utilise gamification features to monitor their health. The sample size of this study was 20 adults between the ages of 18-59 years and that belong to Discovery Vitality. In this study, non-probability sampling associated with purposive sampling was employed by the researcher to identify the participants of this study. This is because this sampling technique is one of the most rapid and efficient ways of getting responses from the participants (Etikan & Bala, 2017). Furthermore, due to the smaller sample size of this study, purposive sampling was chosen to be the best technique to apply.

This study adopted thematic analysis to investigate how adults' behavioural intention to monitor their health making use of gamification. Thematic analysis is relevant for qualitative research studies because it distinguishes the data gathered and provides reliable, accurate research results (Braun & Clarke, 2006). Furthermore, thematic analysis is utilised for documenting patterns, classifies, organises and examines perceptions of various research respondents across a dataset. Consequently, this data collected from the participants was clustered and summarised into relevant themes to answer the main research question of this study.

Interview: This study adopted a semi-structured interview to attain in-depth information regarding how adults' behavioural intention to monitor their health making use of gamification could be influenced for sustained health monitoring. To this end, the researcher conveyed a list of similar semi-structured interview questions to provide more information on issues related to behavioural intention of adults monitoring their health using gamification. These interview

questions were generated from the SDT and used as a guide to answer the presented research questions of this study. The respondents for this study were chosen through distributions of questionnaires to participants who voluntarily agreed to partake in the interviews.

Literature search: Further to the interviews previously conducted, a literature search was also conducted for this study to analyse the research questions and assist in finding solutions to the research problem. The researcher used publications from sources such as books, academic journals, conference proceedings etc. to conduct the literature search. Hence, various electronic databases such as Science Direct, Google Scholar, Research Gate, ACM Digital library, PubMed and other relvant sources were used to add value to the literature.

7.7 CONTRIBUTIONS MADE BY THIS STUDY

This study developed a framework to reveal factors that influence the behavioural intention of adults to continue using gamification for healthcare monitoring. As previously mentioned in Chapter 6 of this study, the developed framework represented both augmenting and hindering factors that influenced the behavioural intention of adults to continue with the usage of gamification for healthcare monitoring. Although the healthcare system in South Africa is regarded as "poor", and the issue of obesity is regarded as one of the contributing factors to the problematic global healthcare sector, the five themes discussed in Chapter 6 were identified as factors that promote the behavioural intention of adults to use gamification for healthcare monitoring. Furthermore, the three psychological needs of autonomy, competence and relatedness were found to be efficient constructs contributing towards adults' health and wellness. Lastly, the apprehension of weight loss, calories intake, medication adherence, effective feedback from physical activities undertaken etc. positively influence the adults behavioural intention even more to continuously use gamification when monitoring their health.

7.8 LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Due to the explorative nature of this research, a qualitative study was chosen as the most suitable since the sample size was small. This suggests that the findings from this study cannot be comprehensive. Athough the population of this study was small, the researcher was able to use the data to analyse the study and acquire some understanding regarding the continuance use of gamification by adults. However, for generalised findings, future researchers should consider using a larger population. The study was limited to only adults living in East London,

South Africa. Therefore, the researcher proposes that future studies should extend to teenagers, both with normal weight and those who are obese living in South Africa.

7.9 SUMMARY

The study developed a framework revealing factors influencing the behavioural intention of adults to continue using gamification for healthcare monitoring. In Chapter 4, factors influencing the behavioural intention were discussed and the psychological needs of autonomy, competence and relatedness were found to be augmenting constructs that influence adults' behavioural intention to continuously use gamification when monitoring their health. Moreover, weight loss, medication adherence, calories intake and tracking of health and wellness are an added advantage that promote the continuous use of gamification.

Nonetheless, from the analysis and literature chapters of this study, the following main issues were identified as factors that hinder the continuous usage of gamification: *high costs or membership fees related to Discovery Vitality, reliability and accuracy of gamification* and *excessive tracking of users' health information*. Futhermore, the examination that was conducted in this study also showed that, although the majority of users confirm gamification to be useful for weight loss, calories intake, medication obedience, tracking and monitoring of stress level and detection of early chronic diseases, they are still uncertain of their behavioural control in the long run to ensure persistent health monitoring. Recommendations to influence the behavioural intention of adults to monitor their health and wellness using gamification have been provided and the researcher anticipates positive outcomes when adults continuously use gamification as a method of managing and monitoring their health. This is due to the fact that gamification enables adults to be more proactive regarding their health, it motivates and promotes adults to engage in healthy eating behaviours, while adhering to their prescribed medication and improving their satisfaction and self-esteem.

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APPENDIX 1: PLAGIARISM REPORT

Thesis_201614246

ORIGINALITY REPORT

12%	10%	5%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

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9	Lamyae Sardi, Ali Idri, José Luis Fernández-Alemán. "A systematic review of gamification	<1%

APPENDIX 2: PROOF READING CERTIFICATE

Editing certificate

TO WHOM IT MAY CONCERN

I, Jeanne Enslin, acknowledge that I did the language editing of **Linda Ntshona's** dissertation submitted in fulfilment of the requirements for the degree Master of Commerce – Information Systems – at the University of Fort Hare.

The title of the dissertation is:

A framework to influence the behavioural intention of adults to monitor their health using gamification: A case of Discovery Vitality in East London, South Africa

All language corrections and changes are evident in the version of the dissertation in track changes and with several comments for the student's attention.

The quality of the final document, in terms of language, formatting and references remains the student's responsibility.

Jeanne Enslin

Language editor

jeanneenlsin@gmail.com

02 October 2021.

BA English and History (University of Stellenbosch)

Senior Teaching Diploma (University of Stellenbosch)

Honours in Translation Studies, cum laude (Unisa)

Post-graduate diploma in Editing, cum laude (University of Stellenbosch)

APPENDIX 3: ETHICAL CLEARANCE CERTIFICATE

University of Fort Hare
Together in Excellence

ETHICS CLEARANCE
REC-270710-028-RA Level 01

Project Number:	CIL031SNTS01
Project title:	**A framework to influence the behavioural intention of adults to use gamification for health monitoring: A case of Discovery Vitality.**
Qualification:	Master in Information Systems
Principal Researcher:	Linda Ntshona
Supervisor:	Prof L Cilliers
Co-supervisor:	N/A

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby grant ethics approval for CIL031SNTS01. This approval is valid for 12 months from the date of approval. Renewal of approval must be applied for BEFORE termination of this approval period. Renewal is subject to receipt of a satisfactory progress report. The approval covers the undertakings contained in the above-mentioned project and research instrument(s). The research may commence as from the 30/07/20, using the reference number indicated above.

Note that should any other instruments be required or amendments become necessary, these require separate authorisation.
Please note that the UREC must be informed immediately of

- Any material changes in the conditions or undertakings mentioned in the document;

- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research.

The Principal Researcher must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

The UREC retains the right to

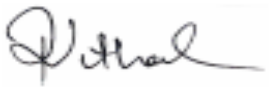
- Withdraw or amend this approval if
  - Any unethical principal or practices are revealed or suspected;
  - Relevant information has been withheld or misrepresented;
  - Regulatory changes of whatsoever nature so require;
  - The conditions contained in the Certificate have not been adhered to.

- Request access to any information or data at any time during the course or after completion of the project.

Your compliance with DoH 2015 guidelines and other regulatory instruments and with UREC ethics requirements as contained in the UREC terms of reference and standard operating procedures, is implied.

The UREC wishes you well in your research.

Yours sincerely



Professor Renuka Vithal
UREC-Chairperson
23 September 2020

APPENDIX 4: QUESTIONNAIRE/ INTERVIEW GUIDE

University of Fort Hare
Together in Excellence

INDIVIDUAL INFORMATION SHEET AND INFORMED CONSENT FORM[1]

(AGES 18 YEARS AND ABOVE)

Title of Study: A Framework to influence the behavioural intention of adults to monitor their health using gamification: A case of Discovery Vitality in East London, South Africa.

Dear participant,

My name is Linda Ntshona and I am studying at the University of Fort Hare.

I am conducting a study on Gamification in Healthcare.

Purpose of Study

We would like you to allow us to conduct a brief 30 min interview with you about what influence the behavioural intention of adults to use gamification for health monitoring.

Study Procedure

Some questions may be of a personal and/or sensitive nature. I will be asking some questions that you may not have thought about before. We know that you cannot be absolutely certain about the answers to these questions, but we ask that you try to think about these questions. When it comes to answering questions there are no right and wrong answers.

[1] Approved by UREC (13 November 2019)

Please understand that **your participation is voluntary** and you are not being forced to take part in this study. The choice of whether to participate or not, is yours. However, we would really appreciate it if you do share your thoughts with us. If you choose not to take part, you will not be affected in any way whatsoever. If you agree to participate, you may stop me at any time and tell me that you don't want to go on with the interview. If you do this there will also be no penalties and you will NOT be prejudiced in ANY way.

The information will remain confidential. This means that your name and address will not be linked in any way to the answers you give. We study and report on the answers given by all the people we interview and not on an individual basis. The research data will be anonymous – with all personal respondent information removed and will be archived at the University.

At the present time, we do not see any risks in your participation. The risks associated with participation in this study are no greater than those encountered in daily life.

There are no immediate benefits to you from participating in this study. However, this study will be helpful in finding out how medical aid companies can be more successful to influence their members to make use of gamification to improve their health care.

This research has been approved by the Inter-Faculties Research Ethics Committee (IFREC) as per delegated authority of the University Research Ethics Committee (UREC). If you have any complaints about ethical aspects of the research or feel that you have been harmed in any way by participating in this study, please call the IFREC delegate for the Faculty of Management and Commerce, Professor Cilliers, Liezel, +270437047067, LCilliers@ufh.ac.za.

Reporting and Complaints

If you have questions at any time about this study, or if you have concerns/questions you may contact the researcher/project leader whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the researcher/project leader, please contact the IFREC Chairperson, Prof. Muna Simatele on msimatele@ufh.ac.za.

If you have concerns or questions about this study, please feel free to contact the project coordinators: **Researcher/Project Leader:**

Name: Prof Cilliers, Liezel

Department: Information Systems

Address: East London Campus, 50 Church street, East London, 5201

Phone: +270437047067

Email: LCilliers@ufh.ac.za

INFORMED CONSENT FORM

I *(name of participant)* …… have been informed about the study by *Linda Ntshona*

I understand the purpose, procedures, and risk-benefit ratio of the study.

I have been given opportunity to ask questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any procedurals that I would usually be entitled to.

I have been informed about any available compensation or medical treatment if injury occurs to me as result of study-related procedures

I understand that I will be given a copy of this informed consent.

I understand that if I have any questions or complaints about my rights as a study participant, or if I may have concerns about any aspect of the study or the researcher/s then I may contact the Chairperson of the Inter-Faculty Research Ethics Committee, Prof M Simatele or Chairperson of University Research Ethics Committee, Prof Renuka Vithal (details available from the Researcher or by contacting the University of Fort Hare or Website www.ufh.ac.za)

Participant signature: ……

Consenting for Audio Recording– when necessary

YES / OR

Participant signature: ……

Witness signature: ……...

(to be altered according to the study)

Translator signature: ……...

(to be altered according to the study)

Data curation – I understand that the information that I provide will be stored electronically and will be used for research purposes now or at a later stage (to be altered according to the study)

Participant signature: ……

Date: ……

Investigating Factors Influencing the Behavioural Intention of Adults' to monitor their health using Gamification: A case of Discovery Vitality in East London, South Africa.

Interview Guide

Section 1: Demographics Information

This section aims at obtaining the basic information of the respondent.

1. Can you indicate your age?

18 – 25 years	26 – 35 years	36 – 50 years	> 59 years

2. How long have you been the Discovery Vitality Member?

   ……

3. Are you aware of gamification and how it is used in Healthcare?
   ……
   ……

   Are you aware that gamification applications has features such as leaderboards, rewards, badges or points? What is your opinion on this?

   Elaborate……
   ……
   ……

4. What type of gamification health applications, other than Vitality, are you using on your mobile device?

   ……
   ……
   ……

5. What motivated you to use these apps that makes use of gamification?

   ……
   ……
   ……

6. What type of active physical activities do you usually engage in/how often and do you monitor these activities consistently?

   ……
   ……

7. What device do you use to monitor/record the activity?

……
……
……

Section 2: Substantive Questions

Perceived Autonomy

8. Do you agree that using gamification in healthcare improves your motivation and engagement in monitoring your health?

   How……
   ……
   ……

9. Do you think that Discovery vitality provides sufficient feedback about your health? How do you use the feedback in monitoring your health?

   Explain……
   ……
   ……

10. Are you aware that Discovery Vitality has assessments that help you detect early signs of chronic illnesses related obesity and helps you improve your health? What are these assessments?

    Explain……
    ……
    ……

11. Do you think that being a Discovery Vitality member promotes active healthy lifestyle? What is your opinion?

    Elaborate……
    ……
    ……

Perceived Competence

12. Do you consider the gamification that Vitality uses to monitor your health difficult to understand?

    Explain……
    ……
    ……

13. How often do you achieve points/ rewards in Discovery vitality?

    ……
    ……
    ……

Perceived Relatedness

14. How do you feel when achieving rewards/points/badges in Discovery vitality? How do you use them?

Explain……
……
……

Satisfaction of basic psychological needs

15. Are you satisfied with the available gamification applications that vitality uses? How would you describe your experience?

……
……

Intrinsic motivation and self-determined extrinsic motivation

16. Would you still use Discovery vitality in the long- run, approximately 5 years from now?

Explain……
……
……

17. Would you recommend others to join Discovery Vitality and become a member?

Why……
……
……