

# **Generation Y students' attitude towards and intention to use activity-tracking devices**

**C Muller**

 **orcid.org/0000-0002-2470-3902**

Thesis accepted in fulfilment of the requirements for the degree  
*Doctor of Philosophy in Marketing Management*  
at the North-West University

Promoter: Prof N de Klerk

Co-promoter: Prof AL Bevan-Dye

Graduation: April 2019

Student number: 23488042

## DECLARATION

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I, Chantel Muller, declare that:

**“Generation Y students’ attitude towards and intention to use activity-tracking devices”**

is my own work and that all the sources I have used or quoted have been indicated and acknowledged by means of complete references and that this thesis has not previously been submitted by me at any other university.

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Chantel Muller

November 2018

Vanderbijlpark

## LETTER FROM THE LANGUAGE EDITOR

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Ms Linda Scott  
English language editing  
SATI membership number: 1002595  
Tel: 083 654 4156  
E-mail: lindascott1984@gmail.com

28 October 2018

To whom it may concern

This is to confirm that I, the undersigned, have language edited the thesis of

**C Muller**

for the degree

**Doctor of Philosophy: Marketing Management**

entitled:

*Generation Y students' attitude towards and intention to use activity-tracking devices*

The responsibility of implementing the recommended language changes rests with the author of the thesis.

Yours truly,



Linda Scott

## ACKNOWLEDGEMENTS

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With the submission of this thesis, I acknowledge with gratitude the assistance, encouragement and support of all the people involved in this study. In particular, I would like to thank the following individuals:

To God who blessed me with this undeserving opportunity.

To my parents, Rudolph and Jennifer Muller, who supported and encouraged me throughout the process.

To my dear friend, Liandi Janse van Vuuren, who supported and motivated me throughout; thank you for the valuable contributions to the recommendations formulated in this study.

To Dolf and Lettie Jordaan for the continuous support and encouragement.

To my promoter, Prof Natasha de Klerk, for her hard work, dedication and patience in assisting in the completion of this study.

To my co-promoter, Prof Ayesha Bevan-Dye, who encouraged me to start my research journey and for the assistance with the statistical aspects of this study.

To Linda Scott for her professionalism in the language editing of this study.

To all the students who participated in the piloting of the survey questionnaire.

To all the students who participated in the main survey questionnaire of the final study.

Chantel Muller

Vanderbijlpark

2018

## SUMMARY

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**KEYWORDS:** Wearable technology, wearable activity-tracking devices, technology acceptance model (TAM), theory of reasoned action (TRA), brand name, attitude, intention to use, Generation Y students, South Africa.

Wearable activity-tracking devices have revolutionised health and fitness monitoring over the past decade. The ten different types of wearable trackers as of 2018, have allowed consumers to have real-time data regarding their health. In addition, targeted improvements can be made based on their preferred types of activity, sports performance, heart-rate data, eating regimens as well as sleep quality and patterns. The continuous technological innovation paired with an increased consumer interest has allowed the wearable activity-tracking device market to evolve both globally and in South Africa. In 2017, a significant revenue was generated from this market of approximately R101.8bn and it is expected to reach approximately R114.5bn by 2020. However, despite the significant revenue generating and health-promoting opportunities of wearable activity trackers, adoption in South Africa is trifling. In order to improve the market penetration and adoption rates of these devices in South Africa, it is important to gain an understanding of consumer behaviour as well as the factors that influence the adoption behaviour of these devices. Given the novelty of these technological devices and the lack of research on the topic, previous technology adoption theories and models can be used as a foundation in this understanding. As such, the TAM in conjunction with the TRA, with the addition of the perceived importance of devices' brand name, was employed to establish a model of the factors that influence consumers' adoption behaviour of activity-tracking devices in the South African context.

The primary objective of this study was to propose and empirically test a model that combined the TRA and the TAM to measure the extent to which perceived ease of use, perceived usefulness, subjective norm, with the addition of the perceived importance of brand name, influence Generation Y students' attitude towards and intention to use wearable activity-tracking devices within the South African context. A model was established, which suggests that perceived ease of use has a direct positive influence on perceived usefulness and these two factors each have a direct positive influence on attitude towards activity-tracking devices. Therefore, with the exception of the direct positive influence between perceived usefulness and intention to use, the TAM has been validated and explains Generation Y students' probable adoption behaviour of wearable activity-tracking devices. Similarly, the TRA has been established and explains Generation Y students' adoption behaviour of probable activity tracker adoption in that the model suggests that subjective norm and attitude have a direct positive influence on intention to use. Furthermore, the model established in this study suggests that the perceived importance of device

brand name has a direct positive influence on Generation Y students' intention to use activity-tracking devices.

The sampling frame for this study comprised the 26 public registered HEI campuses in South Africa given the nature of the Generation Y cohort, more so the significant future spending potential of those individuals obtaining tertiary qualifications, namely students. From the 26 institutions, three institutions – one traditional, one university of technology and one comprehensive university – in the Gauteng province were selected based on a non-probability judgement sampling method. Lecturers working at each of the three institutions were contacted telephonically to request permission for the questionnaires to be distributed to their students during a scheduled class period. Once permission had been obtained, the questionnaires were hand-delivered to the participating academic staff and distributed by the researcher with the assistance of a trained fieldworker, during a scheduled class period. A convenience sample of 600 full-time Generation Y students, 200 per institution, was taken in 2017. Of the 600 questionnaires distributed, 480 were usable for statistical analysis. The collected data were analysed by specific statistical analysis in order to achieve the empirical objectives set in this study, namely exploratory principal components analysis, internal consistency reliability analysis, descriptive statistical analysis, correlation analysis, multicollinearity diagnostics and structural equation modelling.

The findings of this study indicate that South African Generation Y students have an overwhelmingly positive attitude towards and intention to use wearable activity-tracking devices. Furthermore, Generation Y students perceive these devices as relatively easy to use to measure their activity levels and find these devices useful to their lives in general. A device's brand name has substantial importance when it comes to the acquisition of these devices, as Generation Y students perceive that a device with a reputable brand name has less risk of leading to disappointment. However, these devices are not yet perceived as a subjective norm, which may be due to the unacquainted perceived cost and perceived value of these devices due to their novelty in the South African consumer market.

This study contributes to filling the gaps in the literature pertaining to Generation Y students' attitude towards and intention to use activity-tracking devices in the South African context; that is the extent to which the factors, namely perceived ease of use, perceived usefulness, perceived importance of brand name and subjective norm influence Generation Y students' attitude towards and intention to use activity-tracking devices. By understanding these factors, product manufacturers, South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, policy makers towards sustained healthy living for all South African citizens and universities, can develop appropriate marketing strategies to create awareness as well as endorse the use of activity trackers amongst the target population. By

increasing the adoption rates of activity trackers in South Africa, it is possible to achieve a healthier standard of living through the reduction of non-communicable diseases, as well as promoting a more active nation. Further, this increased adoption can generate a significantly larger income for the country, subsequently advancing the local economy. This study is pioneering research in South Africa and provides the foundation for future research of a similar nature – leading to an increased body of knowledge regarding the adoption behaviour of activity trackers in South Africa. The findings of this study contribute to the literature on and the development of a profile of South African Generation Y students' consumer behaviour, which is in keeping with the objectives of a larger research project at the North-West University (Vaal Triangle Campus), namely ProGenY (profiling the consumer behaviour of Generation Y in South Africa).

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# CHAPTER 1

## INTRODUCTION AND BACKGROUND TO THE STUDY

---

### 1.1 INTRODUCTION

The wearable device industry, comprising wearable consumer technology segments, for instance, portable wireless speakers, Bluetooth headphones – known as hearables –, wearable activity-tracking based watches and bands, smart clothing and ear-wear, is growing rapidly on a global scale (International Data Corporation, 2017; Richter, 2015). The Worldwide Quarterly Wearable Device Tracker report (International Data Corporation, 2016) indicate that 19.7 million wearable devices were sold worldwide in the first quarter of 2016. This is a 67.2 percent increase from the 11.8 million units sold during the first quarter of 2015, which indicates a significant interest in this industry. The shipment of wearable devices continued its upward trajectory where 115.4 million units were shipped in 2017 (Ubrani *et al.*, 2018), which significantly increased from the 104.3 million units shipped in 2016 (Llamas *et al.*, 2017). The increased interest in this global industry is denoted by the increasing number of users, where there will be an estimated 344.56 and 370.78 million users in the wearable segment in 2019 and 2020 respectively (Statista, 2018a). Within the global wearable device industry, wearable technology such as wearable activity-tracking devices is of particular interest given their significant revenue-generating opportunities.

Electronic computers that are incorporated into clothing items or accessories, which can be worn on the human body are referred to as “wearable technology”, “wearable devices” and “wearables” (Michael *et al.*, 2014), such as smart-watches, wristbands, headsets (Violino, 2016), fitness trackers, sport watches, head-mounted displays, smart clothing, smart jewellery as well as implantable devices (Sung, 2015). Among these emerging consumer technology devices, wearable activity-tracking devices have the highest anticipated household future purchase intent (Sarason-Kahn, 2016) and are considered a prosperous market (Dolan, 2014).

The continuous technological innovation paired with an increased consumer interest has allowed the wearable activity-tracking device market to evolve both globally and in South Africa. In 2017, the global market penetration rate of wearable activity trackers was 5.59 percent, where an approximate revenue of US\$7 643 million or R101 806 092 000 was generated and is expected to reach US\$8 592 million or R114 450 768 000 in 2020 (Muller *et al.*, 2018:85; Statista, 2018a). These estimates were based on the average exchange rate for South Africa in 2017 of US\$1/R13.32 (Nedbank, 2018). The South African wearable activity-tracking device market, with a recorded penetration rate of 3.81 percent in 2017 and anticipated to increase to 4.83 percent in 2020, classifies among the global leading economies (Statista, 2018b). In order to grasp the significance of the latter statement, of the 56 521 900 South African citizens, as recorded mid-

year in 2017 (Statistics South Africa, 2017), an additional 576 523 individuals will acquire a wearable activity tracker within the next three years. This translates to an increase of R644 688 000 in revenues after the three-year period, which is an approximate surplus of R69 million from the US\$43.2 million or R575 424 000 generated in 2017 (Muller *et al.*, 2018:85; Statista, 2018b).

An activity-tracking device, also referred to as an activity tracker or fitness tracker, in its broad sense, is any device or application capable of monitoring and tracking fitness-related metrics for instance distance walked or run, calories burnt (Kingston, 2015) and in some cases heart rate (Rettner, 2014) and quality of sleep (Haslam, 2016). Therefore, activity-tracking devices are defined as all devices that comprise sensing technology capable of tracking the user's movement in real time. These devices may be attached to clothing, wrist- or ankle-based, as well as applications on smartphones capable of providing real-time feedback.

Activity trackers comprise particular characteristics (Hong, 2015:94). Some of these devices, but not all, use accelerometers, altimeters and algorithms to track the number of steps taken and calories burnt by the user (Beckham, 2012). In addition, activity-tracking devices comprise basic features including measuring distance travelled, measuring the number of steps taken, the device's style, which could be an ankle-band, armband, wristband or application-based, as well as the elementary tracking of walking or running (Hong, 2015:94). In contrast to earlier models, such as the first generation devices that were only programmed to record limited metrics, such as steps taken and distance travelled, models that are more recent offer the user more benefits than the basic tracking features. Many newer models enable the user to also manually enter the food they consumed during the day directly onto the device or application (Caddy, 2016) and have posture reminder or inactivity alert (Bumgardner, 2017), all of which can be shared with friends through social media channels (Pressman, 2017). Other, more advanced models offer additional features such as measuring the user's sleep patterns, are either splashproof or waterproof, have a visual interface and synchronising capabilities (that allows the user to transfer device data to other devices, social media or to a smartphone application). Some models have an integrated GPS system for superior tracking and some have colourful, interchangeable bands (Duffy & Colon, 2016; Murray, 2013). Fritz *et al.* (2014:488) suggest that activity-tracking devices are often limited in the activity that can be detected and tracked, which subsequently leads to the need for integrating data from multiple sources in order to obtain a broader perspective on the consumers' daily activity, health and fitness metrics. Therefore, the devices that require more effort from the consumer to operate and track activity levels are less likely to be successfully adopted.

While activity-tracking devices are, to the majority of consumers, still classed as new technology despite being in the growth stage of the product lifecycle (Cornell University, 2017), some brands have reached the maturity phase (Spangenberg, 2018; Wood, 2015). However, these products are not adopted readily by the majority of consumers predominantly due to several limiting factors,

such as being expensive, producing inaccurate results, loss of interest on the consumers' part (Livingston, 2017) and fear of the device not measuring or performing as expected (Taylor, 2015). This, in turn, will have a negative impact on consumers' attitude towards and their behavioural intention to use such devices (Davis, 1989; Wang *et al.*, 2008:416), which have been proven a significant predictor of device adoption (Ajzen, 1991). The latter concept, behavioural intention to use, is referred to as "the degree of the psychological condition of an individual's mind to use specific services and systems" (Davis, 1989). Ajzen (1991) argues that behavioural intention reflects how hard an individual is willing to try, as well as the degree to which the person is motivated to perform a certain behaviour. Behavioural intention alongside consumer attitude are the most immediate predictors of behaviour (Ajzen, 1991), which according to the Consumer Health Informatics Research resource (2016), is the variable that most health communication interventions aim to influence.

Several proposed factors influence consumers' intention to use new technology products such as activity-tracking devices (Choi *et al.*, 2016:782; Kim & Shin, 2015:534; Park *et al.*, 2016:721; Yang *et al.*, 2016:258). As a foundation, Davis (1989) proposed the technology acceptance model (TAM), a framework for understanding the likelihood that individuals will adopt a new technology. Within this model, two key factors of technology acceptance emerge, namely perceived usefulness and perceived ease of use (Davis *et al.*, 1989). Perceived usefulness is the subjective probability and likelihood that using the technology will improve the way consumers complete a given task (Jahangir & Begum, 2008:33), for instance tracking daily activity. Davis (1989) describes perceived ease of use as "the degree to which consumers believe that using a particular system would be free of effort."

Similarly, according to the theory of reasoned action (TRA) formulated by Fishbein and Ajzen (1975), valuable indicators of probable technology adoption, attitude and behavioural intention, in addition to subjective norm are significant determinants of behavioural intention and actual behaviour regarding technology (Davis *et al.*, 1989; Karahanna *et al.*, 1999; Liker & Sindi, 1997; Nysveen *et al.*, 2005). Subjective norm is described as the perceived social pressure to adopt or not to adopt new technology (Nor & Pearson, 2008:43), whereas attitude toward new technology is defined as consumers' overall emotional response to using a system (Venkatesh, 2003:455). The aforementioned factors merely form the foundation of factors that determine consumers' intention to use activity-tracking devices. Research pertaining to wearable device and smart-watch adoption revealed another important determinant of new device adoption, namely brand name (Yang *et al.*, 2016:262).

Brand name, as a social indicator, is widely acknowledged as a key motivating factor in consumer preference (Hillenbrand *et al.*, 2013; Lannon & Cooper, 1983). Furthermore, brand name is a foremost extrinsic signal used by consumers to evaluate products when faced with uncertainty

about them (Dawar & Parker, 1994; Richardson *et al.*, 1994). Stuart (1993) opines that consumers continuously buy branded products, not for the purpose of fulfilling misguided or directed habits, but more accurately because a brand name affords them with two vital attributes, namely product information and consumer protection. Additionally, a product's brand name has previously been proven a significant cue for customer perceptions of product quality (Dawar & Parker, 1994; Dodds *et al.*, 1991; Grewal *et al.*, 1998) and is used to fulfil consumers' need for uniqueness (Nguyen, 2018; Tian & Bearden., 2001:50). Brand name bestows credibility to perceived product efficiency as well as provides consumers with a surety of quality (Nielsen Global, 2015). According to the Global New Product Innovation Survey (Nielsen Global, 2015), 59 percent of global consumers not only prefer purchasing familiar brands, but 21 percent purchase a new product as a result of brand preference, 17 percent of which pertains to developing markets. The wearable activity-tracking device segment, as a developing market, is dominated by the youth, with 33.7 percent of this market comprised of individuals aged between 18 and 24 years (Statista, 2018c), who form part of the Generation Y cohort.

The Generation Y cohort is defined by Markert (2004:21) as individuals born between 1986 and 2005; the first generation to grow up during a period where computers, mobile phones, electronic devices and the internet have been integral elements of everyday life, which led to its members thriving on technology and its innovations. Furthermore, with these members using laptops, mobile phones and various other technological gadgets, they constantly have information at their fingertips, allowing them to learn, acquire information at remarkably rapid speeds, perform their jobs exceedingly and lead intense social lives (Kane, 2012; Schlitzkus *et al.*, 2010:108; Schwalbe, 2009:59,60; Sheahan, 2005:59,60). As such, it is not surprising that 48 percent of global wearable-device users are between the ages of 18 and 34 (Marr, 2016).

In South Africa, individuals within the Generation Y cohort comprised more or less 36.2 percent of the country's total population of 56.5 million, as per the mid-year statistics recorded in 2017 (Statistics South Africa, 2017). The significant extent of the Gen Y cohort brands them as an important segment for South African marketers and retailers. Given the majority of global wearable-device users being members of this cohort and considering that those members pursuing tertiary education have a high future income potential and trendsetting potential (Bevan-Dye & Surujlal, 2011:49), an opportunity to appeal to the student portion of the Generation Y cohort has developed. As such, it is important to investigate Generation Y students' attitudes toward and intention to use activity-tracking devices.

## **1.2 PROBLEM STATEMENT**

There are various benefits of using activity-tracking devices. Using these devices could motivate or assist consumers in making durable changes, such as walking more often, taking the stairs, or

standing while working instead of sitting down for extensive periods (Fritz *et al.*, 2014:491). Other benefits of such devices allow the user to have a better understanding of overall health, measuring progress towards goals, where the device shows the user what to do in order to reach the intended daily goal, as well as allowing more advanced users to train more effectively (Livingston, 2017). Moreover, users, in addition to being more active, have the added advantage of sharing the data with friends, where a competitive instinct drives increased performance and results in an ego boost, particularly when the device constantly praises the user for reaching daily goals (Livingston, 2017; Nield, 2017). While Godman (2015) found no causal relationship between device use, health and behavioural effects, Fritz *et al.* (2014:491) advocate that using activity-tracking or monitoring devices aids in changes in health and well-being, as well as modifying the individual's routine. Therefore, activity-tracking devices can be credited with motivating these behavioural changes.

In addition to the health benefits of activity trackers, there is also a significant revenue-generating opportunity for South Africa (Muller *et al.*, 2018:85). Considering the global revenue of R101.8 billion generated in 2017 for the wearable activity-tracking device market (Statista, 2018a), South Africa merely generated 0.006 percent of this revenue (Muller *et al.*, 2018:85). As such, there are significant opportunities for improvement to enhance the adoption rate of wearable activity-tracking devices amongst South African consumers, which, in turn, would lead to an exceptional increase in revenue for the country.

Wrist-based activity-tracking devices, considered novel technology, were introduced within the global consumer market close to a decade ago, the first of which debuted in 2009 (Beckham, 2012). Owing to the unfamiliarity and novelty of these devices, the introduction of wrist-based activity trackers initiated interest amongst researchers since that period. For this reason, research pertaining to wearable activity-tracking devices, in general, is fairly well recorded in the literature, particularly focusing on the features of activity trackers (Hong, 2015), a comparison of different wearable fitness devices (Kaniththika *et al.*, 2016) and the health-empowering capabilities of activity trackers (Nelson *et al.*, 2016). According to the literature, numerous studies have been conducted internationally pertaining to the adoption of new technology, wearable fitness device and activity-tracking device accuracy and reliability, as well as the acceptance of and intention to use wearable devices (Byun *et al.*, 2016; Chin *et al.*, 2008; Davis, 1989; Fritz *et al.*, 2016; Kim & Shin, 2015; Leininger *et al.*, 2016; Takacs *et al.*, 2014; Wang *et al.*, 2008; Yang *et al.*, 2016). However, research pertaining to wearable activity-tracking devices is limited, more so are studies focused on the Generation Y student cohort. An extensive search of the literature unveiled merely a few studies focused on the student population; one study pertaining to the features of activity trackers as Internet of Things (IoT) wearable devices and another study that focused on enhancing physical activity and reducing obesity by means of employing activity trackers, both

using international students as the target population. Hong (2015) explored Korean university students' perception of several device features, whereby participants had to indicate the level of importance of each feature, ranging from steps taken to sleep patterns. However, the main intention of this study was to ascertain the level of importance of different activity tracker features and was limited in only uncovering the potential need of activity trackers amongst the target population and not the underlying motives for adopting such devices. In the second study, Shin *et al.* (2016) aimed at uncovering the design and baseline characteristics of male Korean university students with the intention of enhancing their physical activity and subsequently reducing their obesity rates. However, this study measured body-related metrics of the participants and suggested incentives to improve their physical activity. The factors that influence the use of these devices are not clear.

Physical inactivity is the fourth leading cause of mortality, where wearable activity trackers are increasingly referred to as playing a major role in improving physical activity levels (Amalia, 2016). Therefore, the effect of using an activity-tracking device is of great importance to both individuals and society at large (Nelson *et al.*, 2016). However, despite the global interest in activity-tracking devices, many South Africans are still unfamiliar with these devices and little effort is being made to present comprehensive support in measuring consumers' attitudes toward an intention to use such devices, especially of trendsetting Generation Y students. Therefore, a deficiency of published research is identified in this regard and a definite lack of empirical investigation on this topic in South Africa established.

Understanding consumer behaviour, as well as the consumer decision-making process will aid in uncovering the specific factors that influence Generation Y students to either use activity-tracking devices or not. Consumer behaviour is defined as the decision-making actions that consumers display when looking for, obtaining, using, assessing as well as disposing of products and services expected to fulfil specific needs (Schiffman *et al.*, 2012:2). These needs, with regard to using activity-tracking devices amongst the student population, may be to live a healthier, more active lifestyle or to gain popularity within social groups (Yang *et al.*, 2016:262). The consumers' decision-making process comprises various factors that play a persuading role in determining the choices consumers eventually make when trying to satisfy these needs (Schiffman *et al.*, 2010:37). Therefore, it is paramount to understand consumer behaviour as well as the consumer decision-making process to extend the understanding of all possible internal and external factors that shape Generation Y students' intention to use activity-tracking devices.

Through a better comprehension of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices, South African product developers, local businesses, marketers, possibly medical professionals, policy makers towards sustained healthy living for all South African citizens, avid athletes and the general consumer population with an

acute interest in adapting both their and the lifestyles of other individuals will be better equipped to appeal to new- and existing Generation Y consumers to use activity-tracking devices, as well as use these devices sustainably. Owing to this study being a first of its class in South Africa, and, therefore, pioneer research, developing and empirically testing a model of activity-tracking device adoption is pivotal.

The underlying model adopts the TAM (Davis *et al.*, 1989) and the TRA model (Fishbein & Ajzen, 1975) as a foundation. Throughout history, both these theories of technology adoption have proven pivotal in determining new technology adoption amongst various users (Davis *et al.*, 1989; Karahanna *et al.*, 1999; Kim & Shin, 2015; Legris *et al.*, 2003; Liker & Sindi, 1997; Lunney *et al.*, 2016; Mathieson, 1991; Nysveen *et al.*, 2005; Wu *et al.*, 2005). However, given the importance of a product's brand name in consumers' purchase decision, these theories were extended to include the perceived importance of brand name as a measure of new device adoption. Based on these studies it was established that all factors were significant determinants of users' intention to use wearable devices, of which activity-tracking devices form part. Therefore, this proposed model is deemed suitable to adopt and apply to determine Generation Y students' attitude towards and intention to use activity-tracking devices.

### **1.3 OBJECTIVES OF THE STUDY**

The following objectives have been formulated for the study:

#### **1.3.1 Primary objective**

This study's primary objective was to propose and empirically test a model of factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices within the South African context. This study focused on wearable activity-tracking devices specifically.

#### **1.3.2 Theoretical objectives**

In order to achieve the primary objective, the ensuing theoretical objectives were formulated for the study:

- Outline the essential principles of consumer behaviour and the factors that influence the consumer decision-making process.
- Conduct a literature review regarding the various multi-attribute attitude models.
- Review the literature regarding users' attitude towards new technological products.
- Conduct a literature review regarding activity-tracking devices, specifically wearable devices; the types of devices, characteristics and benefits.
- Outline fundamental technology adoption theories and models.



- Conduct a literature review regarding the Generation Y cohort, the attributes of its members and the effect technology has had in this generation, both globally and in South Africa.
- Conduct a review of the literature pertaining to the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices.

### **1.3.3 Empirical objectives**

In accordance with the primary objective of the study, the following empirical objectives were formulated:

- Determine Generation Y students' attitude towards activity-tracking devices.
- Determine Generation Y students' perceived ease of use concerning activity-tracking devices.
- Determine Generation Y students' perceived usefulness concerning activity-tracking devices.
- Determine Generation Y students' perceived importance of brand name concerning activity-tracking devices.
- Determine Generation Y students' subjective norm concerning activity-tracking devices.
- Determine Generation Y students' intention to use activity-tracking devices.
- Determine if Generation Y students' attitude towards activity-tracking devices and consequent behavioural intentions is a six-factor model.
- Empirically test a proposed model of the extent to which perceived ease of use, perceived usefulness, perceived importance of brand name and subjective norm influence Generation Y students' attitudes and intention to use activity-tracking devices.

Based on the empirical objectives, several hypotheses were formulated.

## **1.4 HYPOTHESES**

For the purpose of achieving the empirical objectives set in this study, eight hypotheses were devised. The eight hypotheses specified underneath were devised in Chapter 5, based on the literature review in Chapters 2 and 3.

H<sub>0</sub>1: The factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices is not a six-factor structure comprising attitudes towards activity-tracking devices, perceived ease of use, perceived usefulness, perceived importance of brand name, subjective norm and intention to use activity-tracking devices.

- H<sub>a1</sub>: The factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices is a six-factor structure comprising attitudes towards activity-tracking devices, perceived ease of use, perceived usefulness, perceived importance of brand name, subjective norm and intention to use activity-tracking devices.
- H<sub>o2</sub>: Perceived ease of use (+) does not have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- H<sub>a2</sub>: Perceived ease of use (+) does have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- H<sub>o3</sub>: Perceived ease of use (+) does not have a significant direct influence on Generation Y students' perceived usefulness concerning activity-tracking devices.
- H<sub>a3</sub>: Perceived ease of use (+) does have a significant direct influence on Generation Y students' perceived usefulness concerning activity-tracking devices.
- H<sub>o4</sub>: Perceived usefulness (+) does not have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- H<sub>a4</sub>: Perceived usefulness (+) does have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- H<sub>o5</sub>: Perceived usefulness (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a5</sub>: Perceived usefulness (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>o6</sub>: Perceived importance of brand name (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a6</sub>: Perceived importance of brand name (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>o7</sub>: Subjective norm (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a7</sub>: Subjective norm (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.

H<sub>0</sub>8: Attitude (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.

H<sub>a</sub>8: Attitude (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.

The following section delineates the research design and methodology employed in the study.

## **1.5 RESEARCH DESIGN AND METHODOLOGY**

The study included a literature review as well as an empirical study, where quantitative research, following the survey method, was applied for the empirical section of the study. Owing to the study focusing on predicting behavioural intent, a positivist method was implemented in the study. The study followed a descriptive research design with a single cross-sectional sample.

### **1.5.1 Literature review**

A review of South African and international literature was conducted in order to underpin the empirical study. Secondary data sources that incorporated the internet, textbooks, business journal articles, academic journal articles and online academic databases were used.

### **1.5.2 Empirical study**

The empirical section of this study comprised the subsequent methodology components:

#### **1.5.2.1 Target population**

This study's target population included all male and female full-time undergraduate Generation Y students, aged between 18 and 24. These participants were registered at South African public higher education institutions (HEIs) during 2017. The target population was defined as follows:

- Element: Generation Y full-time undergraduate students aged between 18 and 24 years
- Sampling unit: South African registered public HEIs
- Extent: Gauteng, South Africa
- Time: 2017

#### **1.5.2.2 Sampling frame**

This study's sampling frame comprised the 26 registered South African public HEIs, which are segregated into 11 traditional universities, nine comprehensive universities and six universities of technology (Business Tech, 2015). From the initial sampling frame, a non-probability judgement

sample of three HEI campuses situated in the Gauteng province, was selected, one traditional university, one comprehensive university and one university of technology. According to the Statistics on Post-School Education and Training in South Africa report of 2014 (Department of Higher Education and Training, 2016:25-26) the Gauteng province accounted for the largest proportion of student enrolment in both Public, Technical and Vocational Education and Training (TVET) colleges and private colleges as compared to other provinces. Furthermore, out of all nine provinces in the country, Gauteng comprised 25.8 percent of the above-mentioned total student population. As such, the Gauteng province was deemed a suitable sample frame for this study.

#### **1.5.2.3 Sample method**

One sample was selected conveniently from the sampling frame to conduct this study. A single cross-sectional non-probability convenience sample of Generation Y students, aged between 18 and 24, was selected. Permission for students to participate in this study was obtained from all relevant academic staff members at each of the HEIs before collecting the data. Once permission was given, the researcher, with the assistance of a trained fieldworker, distributed the self-administered questionnaires during a scheduled class period. Upon completion, the questionnaires were returned immediately to the researcher. Participants were informed that the participation in this study was on a voluntary basis and that the information they provided would be kept confidential.

#### **1.5.2.4 Sample size**

The sample size of 600 full-time undergraduate Generation Y students was chosen for this study. Given that research relating to activity-tracking device adoption is limited, the sample size is based on recent studies pertaining to the adoption of new technology and health-related wearable devices, such as Choi *et al.* (2016:781) (sample size of 562), Ooi and Tan (2016:37) (sample size of 459) and Gao *et al.* (2016:1704) (sample size of 462). The sample size of 600 Generation Y students was apportioned equivalently between the three HEIs, allowing a sample size of 200 students per HEI campus.

#### **1.5.2.5 Measuring instrument and data collection method**

A structured self-administered questionnaire was used to gather the necessary data for this study. The measuring instrument comprised current scales employed in formerly published research to determine the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices. The scales from Kim and Shin (2015), Nor and Pearson (2008), Yang *et al.* (2016), Lee (2009) and Venkatesh *et al.* (2003) were adapted and applied for the empirical section of this study.

The participants were requested to complete a survey questionnaire comprising three sections. The first section (Section A) gathered the participants' demographical information, where the second section (Section B) collected the participants' background information pertaining to activity-tracking devices in order to determine their basic knowledge and interest. The third section (Section C) comprised the items regarding the factors influencing Generation Y students' attitude towards and intention to use activity-tracking devices. This scale measured the participants' perceptions and attitudes towards activity-tracking devices, comprising six dimensions, measuring attitude (four items), perceived ease of use (three items), perceived usefulness (five items), perceived importance of brand name (three items), subjective norm (three items) and intention to use (three items).

The participants' perceptions and attitudes were measured on a six-point Likert scale, ranging from strongly disagree (1) to strongly agree (6). A cover letter was embedded in the questionnaire that explained the nature and purpose of this study, requested participation and provided applicable contact information of the researcher.

The reliability of the final questionnaire was determined by piloting the questionnaire on a convenience sample of 50 participants registered on a South African HEI campus. This campus was excluded from the main sample. The results of the pilot test were then coded and tabulated and the results deliberated when adopting the questionnaire to be used in the main study.

To gather the data required for this study, academic staff members at each of the three HEIs that form part of the sample frame were contacted telephonically to request permission to dispense the questionnaires during a scheduled class period. The participating lecturers were provided with an ethics clearance certificate acquired from the Ethics Committee of the Faculty of Economic Sciences and Information Technology at the North-West University (Vaal Triangle Campus). Once permission was granted, the questionnaires were hand-delivered to the relevant lecturers and with the aid of a proficient fieldworker, distributed amongst the students during a scheduled class. All participants were advised that the questionnaire was to be completed voluntarily. The researcher and fieldworker, immediately upon completion, collected the completed questionnaires.

### **1.5.3 Statistical analysis**

The captured data were analysed using the statistical package IBM SPSS Statistics and AMOS Version 25.0. The following statistical methods were used on the empirical data sets:

- Frequency analysis
- Factor analysis; principal components analysis
- Reliability and validity analysis

- Descriptive statistical analysis
- Correlation analysis
- Multicollinearity diagnostics
- Structural equation modelling

## **1.6 ETHICAL CONSIDERATIONS**

This research study conforms to the ethical standards required by academic research. The necessary permission to execute the study was obtained from all participating academic staff members and higher education institutions involved. The identities and interest of the participants were protected at all times. All of the information provided by participants were guaranteed to be kept confidential. Moreover, participation in the survey was voluntary and no individual participant or institution was compelled to participate. Prior to the main data collection, the questionnaire, collectively with the study's proposal, were submitted to the Ethics Committee of the Faculty of Economic Sciences and Information Technology of the North-West University (NWU) (Vaal Triangle Campus). The committee accepted the questionnaire and the following ethical clearance number was issued: ECONIT-2017-033.

## **1.7 DEMARCATION OF THE STUDY**

This specific research study pertains to Generation Y students between the ages of 18 and 24 years, who were registered at South African public HEI campuses in 2017. For the purpose of this study, three HEIs within the Gauteng province of South Africa were selected; one traditional university, one university of technology and one comprehensive university.

## **1.8 CONTRIBUTIONS OF THE STUDY**

This study is a first of its class in South Africa and, therefore, is pioneer research. The findings obtained from this study will fill the current gaps that exist in apprehending the factors that influence South African Generation Y students' attitude towards and intention to use activity-tracking devices. This study adds value to existing studies of activity-tracking devices as well as to the current literature on Generation Y consumers' intention to use such devices, which is largely under-researched in South Africa. In addition, the findings of this study will promote the literature on and the development of a profile of South African Generation Y students' consumer behaviour, which is in keeping with the objectives of a larger research project at the NWU's Vaal Triangle Campus. This project is titled ProGenY and focuses on profiling the consumer behaviour of Generation Y in South Africa.

The results of this study have significant implications for product manufacturers, South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, policy-makers towards sustained healthy living for all South African citizens, universities, avid athletes and the general consumer population in their effort to appeal to new- and existing consumers to use activity-tracking devices, as well as use these devices sustainably. The results of this study will enable businesses to import and developers to design and manufacture devices according to the target populations' needs and desires. Therefore, marketers will be able to focus on promoting the correct, appealing features to attract new users, as well as increase Generation Y consumers' intent to use these devices.

Additionally, this study has a subtle contribution pertaining to health. By creating awareness of these devices and their benefits, the user has the opportunity to live proactively. Furthermore, those individuals with existing medical schemes and speciality programmes, namely Discovery's Vitality Health™ programme and Momentum Health's Multiply wellness and rewards programme are able to reduce their healthcare costs due to their rewards system, therefore, resulting in increased cost savings to the user (Discovery, 2018; Multiply, 2018).

## **1.9 CHAPTER CLASSIFICATION**

This study comprises the following chapters:

### **Chapter 1: Introduction and background to the study**

Chapter 1 includes an introduction and background to this research study. The problem statement, the research objectives as well as the research methodology employed in this study, is outlined. This chapter concluded with the configuration and layout of the research study.

### **Chapter 2: Consumer behaviour and attitude**

Chapter 2 provides a detailed discussion on consumer behaviour and includes a consumer behaviour model. The consumer decision-making process, as well as the various factors that influence consumer decision making are discussed. In addition, multi-attribute attitude models are outlined and consumers' attitudes towards new technology reviewed in detail.

### **Chapter 3: Activity-tracking device adoption**

In this chapter, activity-tracking technology, as a concept, is discussed, including the definition of activity-tracking devices, the various types of devices as well as the features and benefits of these devices. Furthermore, this chapter provides a detailed description of the various technology acceptance models with specific reference to the TRA and the TAM. This discussion is followed by elucidating on the Generation Y cohort as well as the impact that technology has had on this

generation, both globally and in South Africa. The factors that possibly influence Generation Y students' attitude towards and intention to use activity-tracking devices are discussed and a subsequent model proposed.

#### **Chapter 4: Research design and methodology**

Chapter 4 details the target population, sampling method, sample frame, sampling size and the measuring instrument and data collection method as well as the data analysis and statistical techniques used. It also includes a discussion of the questionnaire design, preparation, coding and distribution. Here the problems encountered as well as the response rate to the questionnaire are discussed.

#### **Chapter 5: Results and findings**

Chapter 5 conveys and presents the results attained from the empirical study. Moreover, the research findings are analysed, interpreted and assessed within this chapter.

#### **Chapter 6: Conclusion and recommendations**

A review of this research study is provided in Chapter 6, where the conclusions drawn from the study are presented. Based on the findings of this study several recommendations and suggestions for further research are made.

### **1.10 GENERAL**

- Annexures are sited at the back of the thesis.
- Tables and figures are placed on the relevant pages in the thesis.
- Where no source reference appears for figures and tables, it denotes own research.
- Referencing is based on the 2012 version of the NWU referencing guide: Harvard style.

### **1.11 CONCLUSION**

This chapter provided a framework for this study by providing the study's context and background. Moreover, this chapter provided a brief summary of the wearable activity-tracking market and its importance to the South African population and economy. Through this discussion, it is evident that the wearable activity tracker market has significant revenue generating opportunities. It was also revealed that the population could benefit both physically and financially by using activity-tracking devices, since using these devices may result in increased health, an active lifestyle as well as saving costs on healthcare services and insurance. However, despite these benefits, the adoption of wearable activity trackers in South Africa is trifling. Consequently, the research problem was identified and a need to investigate the factors that influence the adoption of these



devices emerged. The lack of research pertaining to the activity-tracking device market, more so the wearable devices resulted in this pioneering research. This chapter identified the youth, more specifically, Generation Y individuals as the individuals most likely to acquire a wearable activity tracker due to being technologically sophisticated as well as their increased future spending power. In keeping with the problem statement, one primary objective, seven theoretical and eight empirical objectives were formulated in this chapter. Subsequently, the research design and methodology followed to achieve these objectives were detailed. The ethical considerations and the demarcation of the study followed and an overview of the layout of this study, in the form of a chapter classification was provided.

Chapter 2 reviews the literature on consumer behaviour and attitude, with specific reference to the decision-making process, the factors that influence consumer decision-making and the various attitude theories and models. The chapter also details strategies used to change consumer attitude and concludes with a discussion of consumers' attitude towards new technology. With this literature review, the first three theoretical objectives are addressed.

## CHAPTER 2

### CONSUMER BEHAVIOUR AND ATTITUDE

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#### 2.1 INTRODUCTION

By understanding the behaviours consumers display, marketers and retailers can make more informed decisions, which could cultivate bottom-line revenues, reduce customer acquisition costs, as well as increase customer retention and profitability (Lake, 2009:1). According to Lake (2009:10), consumer behaviour denotes the study of individuals together with the activities that transpire to satisfy their recognised needs. Solomon (2017:28) concurs, stating that consumer behaviour is the study of the processes concerned when individual- or consumer groups select, purchase, utilise and dispose of products, services, concepts, or experiences in order to satisfy needs and desires. This satisfaction that consumers derive from satisfying particular needs stems from the ongoing methods used in the selection and utilisation of products or services when the benefits obtained from those methods meet or exceed consumers' expectations (Lake, 2009:10).

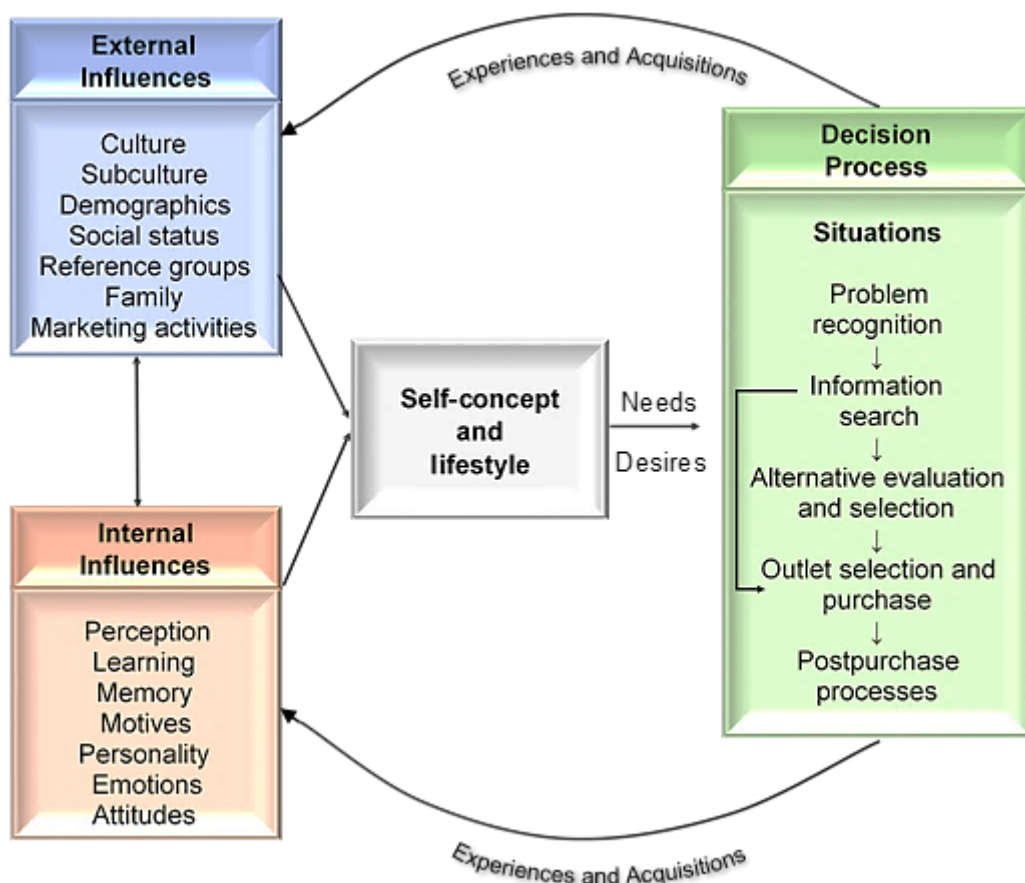
Peter and Olson (2010:4) maintain that the marketing concept is an appropriate philosophy for doing business where any organisation is advised to satisfy consumer needs to make a profit. The study of consumer behaviour serves in the understanding of consumer purchase patterns of products and services that fulfil the individuals' needs and desires, subsequently shaping a fraction of the foundation to the marketing concept (Joubert *et al.*, 2013:2). Hoyer *et al.* (2013:14) emphasise that understanding consumers' behaviour will contribute to marketers' comprehension of the products that consumers value greatly as well as consequently influence the formulation of marketing campaigns. For this reason, understanding consumer behaviour is a vital part of marketing management.

It is imperative to acknowledge, given the definition, that consumer behaviour is dynamic, involves interactions and involves exchanges (Peter & Olson, 2010:5). Therefore, consumer behaviour is an ongoing process (Solomon, 2017:29). Consumer behaviour is recurrently complex, unsystematic, nonconscious, organic and circular and is expressed, therefore, as a continuous process (Mothersbaugh & Hawkins, 2016:24). This process that leads to consumers ultimately deciding the best products and services to use to satisfy their ever occurring needs and desires, consisting of five distinguishable stages, is in turn affected by several influences, whether it be external or internal (Hawkins & Mothersbaugh, 2013:24).

This chapter reviews the literature regarding consumer behaviour and attitude and is presented in keeping with the theoretical objectives formulated in the first chapter. The main purpose of this study was to propose and empirically test a model of factors that influence Generation Y students'

attitude towards and intention to use activity-tracking devices within the South African context. However, in order to successfully propose such a model, it is imperative to understand consumer behaviour and attitude as it is the foundation of current and future decision-making (Solomon, 2017:30). In accordance with the first three theoretical objectives formulated in Chapter 1 (refer to Section 1.3.2), Chapter 2 provides a detailed overview pertaining to consumer behaviour and the consumer decision-making process, whereby a model of consumer behaviour is provided followed by an examination of the factors that affect the consumer decision process. Moreover, the various multi-attribute attitude models are detailed in addition to consumers' attitude towards new technology, which serve as an introduction to Chapter 3.

In order to facilitate a comprehension of consumer behaviour as well as the content of the succeeding sections, a model of consumer behaviour is presented. As such, Figure 2-1 illustrates consumer behaviour in a model anthropomorphised by ongoing and interrelated processes and influences.



**Figure 2-1 Model of consumer behaviour (Mothersbaugh & Hawkins, 2016:25)**

As depicted in the consumer behaviour model presented in Figure 2-1, several external as well as internal influences directly affect the individual's self-concept and lifestyle. The internal influences or factors that affect one's self-concept and lifestyle comprise psychological and

physical factors, namely perception, learning, memory, motives, personality, emotions and attitudes (Hawkins & Mothersbaugh, 2013:25). Conversely, the external influences comprise sociological and cultural factors such as culture, subculture, demographics, social status, reference groups, family influences and marketing activities. Self-concept refers to the image or attitude consumers harvest of themselves, where the individual's lifestyle depicts their overall way of life and both these concepts determine the types of needs and desires that will emerge. Joubert *et al.* (2013:94) concur, affirming that the consumers' self-concept and lifestyle generates needs and desires that largely dictate the decision to consume products and services.

As soon as a given need or desire emerges, the decision process is initiated. It should be emphasised that consumer behaviour and the decision-making process is ongoing and an extremely dynamic process. This being that the decision process together with the experiences and acquisitions formulated in this process also affect consumers' external and internal traits, which consequently affect their self-concept and lifestyle choices (Mothersbaugh & Hawkins, 2016:24). Given the dynamic nature of consumer behaviour and the decision process, which result in ever-changing needs and desires to satisfy (Schiffman & Kanuk, 2014:4), it is imperative to understand the consumer decision-making process. With this understanding, businesses can provide the appropriate products and services and marketers can promote these offerings to match the needs of consumers.

## **2.2 CONSUMER DECISION-MAKING PROCESS**

Parumasur and Roberts-Lombard (2013:250) define the consumer decision-making process, based on the model of consumer behaviour, as an intellectual process that consumers employ to establish the mental and physical activities necessary to alleviate tension caused by an unsatisfied need or want. Even though Joubert *et al.* (2013:124) suggest that the stages within the decision process are chronological as well as repetitive, Lombardo (2017) argues that the decision-making process is not linear, as consumers do not always follow the exact order of the process. This may be determined by the type of product, the purchasing stage the consumer is currently in and the individual's financial status. It is imperative to understand the decision-making process as it will enable the marketer to devise and align appropriate sales strategies (Johnston, 2016). The decision-making process, as part of the consumer behaviour model in Figure 2-1, comprises five stages, namely recognising a problem, searching for information, evaluation of alternatives, deciding to purchase or not, as well as conducting a post-purchase evaluation (Flekel, 2013; Johnston, 2016; Lombardo, 2017; Mothersbaugh & Hawkins, 2016:25). This section addresses these different stages of the consumer decision-making process along with the factors influencing consumers decision-making, namely external factors, self-concept and lifestyle as well as the internal influences.

## **2.2.1 Stages in the consumer decision-making process**

During certain situations, consumers are confronted with a difference between their actual state and desired state (Joubert *et al.*, 2013:126). This brings about the first stage in the consumer decision-making process, namely need recognition or problem recognition, where consumers compare their current need or benefit condition with what the individual would prefer it to be (Lombardo, 2017; Sirgy *et al.*, 2017). Consequently, the consumer will search for and process information about products and/or services that could offer likely solutions to the problem (Blackwell *et al.*, 2001:71). According to Johnston (2016), a purchase cannot ensue without the consumer recognising a need. Consumers may recognise a need as a result of internal stimuli, such as hunger, thirst, or lifestyle adaptations, or by means of external stimuli, such as marketing efforts including advertising or word-of-mouth communication. It is important to note that similar to problem recognition, an entirely satisfied or content consumer may recognise an opportunity. In this situation, the consumer does not perceive a problem, rather an opportunity, subsequently leading to the consumer comparing their actual state with a new desired state (Sirgy, 1987:53; Sirgy *et al.*, 2017). Dudovskiy (2013) points out that because there is no limit to consumers' needs; problem recognition is a repetitive psychological process. The marketer is able to create an imbalance between the consumer's actual and desired state by means of specialised promotion strategies, where consumers will recognise an unfulfilled need along with the product to solve the problem, which becomes a want or desire (Lombardo, 2017). With the presence of a need, want or desire, the consumer will aim to satisfy it by way of collecting the necessary information (Hawkins & Mothersbaugh, 2010:519-520).

The second stage in the decision-making process, namely information search, also referred to as the pre-purchase search phase (Schiffman & Kanuk, 2014:415), pertains to the process whereby consumers examine the environment for applicable information to make the best decision to satisfy a need (Solomon, 2017:340). Furthermore, consumers perform an internal search, from their long-term memory, to ascertain whether a possible satisfactory solution already exists, what the attributes of potential solutions are, as well as whether and what applicable methods to compare solutions exist (Hawkins & Mothersbaugh, 2010:520-521). Additionally, in order to avoid making a regrettable decision, consumers contemplate the possible risks involved in purchasing the product believed to fulfil their need, as early as the information search stage. This is periodically done by means of weighing the advantages and disadvantages of purchasing a specific product (Flekel, 2013). For instance, with new or unfamiliar technology, the consumer considers the possible risks involved with the purchase, such as mechanical failure or unsatisfactorily results. Typically, consumers are more likely to perform extensive research on prospective technological products, especially if such products are expensive, in order to make an informed decision. The role of the marketer is to provide adequate information pertaining to

said technological products in order to reassure the potential consumer of the merit of the purchase.

Once the consumer has gathered all relevant information, he or she moves into the third stage of the consumer decision-making process as depicted in Figure 2-1, namely evaluating each of the possible products or solutions and subsequently selecting the most suitable option. This stage is necessary to make the best conceivable decision that yields the best advantages at a minimum cost to the consumer (Cant *et al.*, 2006:197). Considered the most important stage in the consumer-decision process (Dudovskiy, 2013; Kanchan, 2017), the evaluation of alternatives allows the consumer to draw on the information gathered from the previous stage and make an informed decision based on a comparison of the various products or solutions available. This comparison may be based on product quality, attributes, size, brand, price, as well as those factors deemed important to the consumer (Dudovskiy, 2013; Flekel, 2013). This stage is heavily influenced and dependent upon consumers' attitude as well as their level of involvement with the product, service or offering. While consumers with a positive attitude and high involvement are more likely to evaluate more brands or models, consumers with a negative attitude and low involvement are more likely to assess only one or two brands (Johnston, 2016). Moreover, Schiffman and Kanuk (2014:418) suggest that consumers are inclined to use one of two types of information when assessing prospective alternatives. The first is a directory of brands or models from which the selection is to be made, also known as the evoked set and secondly, the criteria to be used to assess each brand or model – the inept set. In addition, a consumer's evoked set is differentiated from their inept set, where brands are excluded based on its inadequacy (Hawkins & Mothersbaugh, 2013:513) and their inert set, where consumers are indifferent towards certain brands due to their inability to provide the necessary benefits (Hoyer *et al.*, 2013:219). There are five key reasons that result in consumers purchasing an alternative brand or product as opposed to a product believed to better satisfy the intended need or problem. Certain brands are unknown to the general consumer market due to selective exposure to advertising media, where these brands may also be overlooked as they are not clearly positioned or assigned to a specific target market. Moreover, consumers may perceive certain brands as lacking extraordinary benefits, resulting in an indifference towards the brands and, ultimately, perceived as not being able to satisfy their needs as well as the purchased brand would. Brands or prospective products may also be deemed unacceptable based on their poor attributes or inappropriate positioning of their characteristics (Schiffman *et al.*, 2010:489; Schiffman & Kanuk, 2014:419). Therefore, it is imperative for marketers to design and apply promotional techniques to convey a relevant and favourable product or brand image in the consumers' minds.

During the penultimate stage of the consumer decision-making process, namely outlet selection and purchase, the consumer has searched for, evaluated all the possible alternatives, and now

makes the purchase (Dudovskiy, 2013; Joubert *et al.*, 2013:132). This stage of the process is concerned, therefore, with the actual purchase of the products or services, which comprise of selecting the preferred retail outlet to visit, in-store purchasing behaviour, purchasing patterns as well as the manner of paying for the transactions (Loudon & Della Bitta, 1993:538-569). However, the process of acquiring products has evolved over the last few decades. So much so that the evolving nature of the retail landscape has allowed consumers to be able to find and purchase products online, known as internet retailing and are no longer limited to in-store shopping, (Mothersbaugh & Hawkins, 2016:584). Moreover, in addition to the interchanging platforms that consumers use to make product purchases, namely in-store, online, or a combination thereof, they also make diverse kinds of purchases, namely trial purchases, repeat purchases and long-term commitment purchases (Schiffman *et al.*, 2012:83). According to Schiffman and Kanuk (2014:429), a trial purchase is the exploratory phase of purchase behaviour where the product typically is purchased for the first time and in small quantities. The purpose of a trial purchase is for the consumer to assess the product through direct usage since they are still unfamiliar with the product. Afterwards, when the products or service denote a satisfactory outcome in terms of meeting the consumers' approval, a repeat purchase is imminent, where the consumer buys the product more frequently and in larger quantities (Schiffman *et al.*, 2012:83). Jones (2014) suggests that in situations where consumers aspire to purchase durable goods where a trial purchase is not possible, such as technological devices and electrical appliances, they make long-term commitment purchases, be it voluntarily or enforced. Immediately after the purchase is made and the product used, it is inevitable for the consumer to decide if the correct decision was made or not (Jones, 2014). As such, the product or service is evaluated as part of the post-purchase evaluation processes.

As soon as the consumers have purchased the product of choice, post-purchase concerns of usage, disposition, as well as post-purchase assessment and satisfaction take effect (Mothersbaugh & Hawkins, 2016:621). The degree of satisfaction is measured against the consumers' expectation of the product. Schiffman *et al.* (2012:85) maintain that the degree of post-purchase assessment carried out by consumers depends on the importance of the product choice as well as the experience assimilated using the product. Based on this notion, three possible outcomes resulting from a product assessment exists, namely the customer will experience a neutral feeling, dissatisfaction or satisfaction (Schiffman *et al.* (2010:498). First, the consumer experiences a neutral feeling when the actual performance of the product corresponds with expectations. Secondly, when the product performs below consumer expectations, a negative feeling and dissatisfaction arise. Conversely, when the product's performance exceeds the expectations, the consumer experiences a positive feeling of satisfaction (Cadotte *et al.*, 1987; Schiffman & Kanuk, 2014:429). This is a crucial stage for the business and marketing department given that this is where consumers decide to either purchase the product again, or change to

alternatives. If the product surpasses expectation or meets expectations, consumers are likely to purchase the product again. However, if the product performs below expectation, consumers will search for appropriate alternatives (Dudovskiy, 2013; Schiffman *et al.*, 2012:85).

Based on being either dissatisfied or completely satisfied with a given product or service, in most instances consumers publicise their positive or negative experience whether on the business' website, through reviews, word-of-mouth, but mostly so on social media networks (Johnston, 2016). Therefore, during the last stage of the consumer decision process, businesses should make it a point to focus on customer satisfaction, regardless of the product outcome. If the customer is dissatisfied, the business should use their feedback to solve the problem and use positive feedback in order to increase the business' credibility (Smith, 2017). According to Flekel (2013), one excellent consumer experience can lead to a brand loyal consumer, who may also become an endorser for the brand and the business. Yarnold (2015) advises businesses to establish long-term relationships with customers once the acquisition stage passed in order to get the most value for the business and provide the upmost value to the consumers by means of the product.

In view of consumer decision-making, cognitive psychology models or theories imply that individual decisions are made based on certain sub-components, namely values, desires, opinions, information and evaluation. This results in consumers making different decisions in similar to exact situations (Infobytes, 2016). However, several factors influence the consumer decision-making process (Hawkins & Mothersbaugh, 2013:25). These factors are discussed in the succeeding section.

## **2.2.2 Factors influencing consumer decision-making**

Several factors that influence consumer decision-making are identified within the literature. As indicated in Figure 2-1, Mothersbaugh and Hawkins (2016:25) distinguish between external and internal influences, which contribute to consumers' self-concept and lifestyle and ultimately influence the consumer decision-making process. A discussion of the external factors that affect consumers' decision-making, namely cultural factors, social factors, organisational factors as well as demographical factors, is described in the following section. Thereafter, the role of consumers' self-concept and lifestyle in the decision-making process is discussed, followed by the several internal influences that further consumer decision-making.

### **2.2.2.1 External influences**

According to Patidar (2014), the external factors that directly influence the consumer decision-making process can be classed as cultural factors and social factors. Cultural factors pertain to the influence of one's culture, sub-culture and social class standing in the community. The latter



category comprises family and reference group influences as well as the individual's role and status within society. However, other, imperative factors that change how consumers process and ultimately make decisions within certain scenarios include organisational factors (Blackwell *et al.* 2001:7) or marketing activities as well as demographical factors (Hawkins & Mothersbaugh, 2013:25). These factors are discussed in the subsequent sections.

Culture is a society's personality (Solomon, 2017:515) and is defined as the summation of learned beliefs, values and traditions that serve to direct the consumer behaviour of representatives within a specific society (Schiffman *et al.*, 2010:366). In consumer behaviour, culture refers to the values, ideas, as well as other symbols that help individuals interpret, communicate and identify as members of a particular society (Blackwell, 2001:85). Moreover, culture comprises communal components that postulate the standards for perceiving, trusting, assessing, communicating, as well as acting amongst the individuals who share a language, historical period and geographical location (Shavitt *et al.*, 2008:1103). Nonetheless, Stephens (2017:109) proposes that the culture contained within a nation will vary considerably with regard to consumer thoughts, feelings and behaviours. For this reason, different subcultures emerge.

A subculture refers to a distinctive group of individuals within a society that share communal cultural meanings regarding both cognitive and affective responses such as emotional reactions, values, beliefs and goals, as well as similar behavioural norms and environmental factors, namely living conditions, geographic location and important objects (Peter & Olson, 2010:310). Subcultures are, therefore, smaller segments within a large, complex society (Schiffman & Kanuk, 2014:328) and constructed according to characteristics such as age, religion, language, ethnic group, geographic regions (Parumasur & Roberts-Lombard, 2013:78), aside from nationality, gender, occupation and social class standing (Schiffman *et al.*, 2010:393).

In addition to the direct influence of the consumers' culture or subculture, there is another important factor to consider within consumer decision-making, namely social class. The term is used to describe the general rank of individuals in a single society. Furthermore, consumers belonging to the same social class embody approximately equivalent social standing in the given community (Coleman, 1983; Solomon, 2017:455). As such, Parumasur and Roberts-Lombard (2013:99) define social class as a group of individuals who are approximately equal in reference to status and community-esteem and who also share similar behaviour patterns. Furthermore, Solomon *et al.* (2013:485) maintain that a consumer's social class standing within society is determined by the individual's income, family background and occupation. These individuals have nearly related occupations and are inclined to have analogous lifestyles because of their income levels as well as shared interests (Coleman, 1983; Solomon, 2017:455).

In addition to the cultural factors, several social factors serve as external influences affecting the consumer decision-making process (Hoyer *et al.*, 2013:299). Social factors or influences are applied by individuals including opinion leaders and specific groups of individuals, namely reference groups, family members and family structure. In addition to social group influences, the consumers' decision making also depends and is related to his or her social status or social class standing within a particular society (Mothersbaugh & Hawkins, 2016:25).

A reference group is a collection of individuals with whom the consumer equates themselves to guide and develop their own attitudes, knowledge and/or behaviours (Hoyer *et al.*, 2013:305). Peter and Olson (2010:310) maintain that a reference group may comprise of one or more individuals referenced by the consumer as a basis for comparison when forming affective and cognitive responses to the environment as well as executing behaviours. Furthermore, reference groups exert two different types of behaviours over consumers. First, they instil levels of aspiration, suggesting cues to the lifestyle and related purchasing behaviour the consumer ought to strive to accomplish. Secondly, in doing this, the physical products or services believed acceptable in achieving those aspirations, for example type of housing, clothes, or car, are defined by the reference group as it is deemed appropriate to use as a member belonging to the reference group (Sirgy *et al.*, 2017).

According to Blythe (2013:243), one's family is amongst the most influential drivers that affect the consumer decision-making process and certainly the most imperative reference group. Though family is a simple concept in society, it is not necessarily easy to define as every family differs in composition and structure, where individuals in the unit perform different roles (Cant *et al.*, 2006:212). However, Hoyer *et al.* (2013:356) define family as "a group of individuals living together who are related by marriage, blood, or adoption." The family household is the leading structure in which both cultural and sub-cultural values and behavioural guidelines are disseminated from generation to generation (Hawkins & Mothersbaugh, 2013:186-187). The family offers the opportunity for exposure to existing and trial products and conveys consumption values to its members (Deb, 2015). Moreover, the family household unit strongly influences the consumer's attitude and expertise, with specific reference to buying and consumption patterns (Mothersbaugh & Hawkins, 2016:185). Deb (2015) identifies four important structural variables that influence consumer purchase decisions, which marketers need to consider, namely the age of the parents in the household, or those considered in charge of household decisions, marital status, whether there are children present, as well as the employment status of the family or household.

Another, equally important, social factor to contemplate in consumer decision-making, is the social status of the individual, or the social class to which the individual belongs. Solomon (2017:455) maintains that social class is mostly applied to designate the overall rank of individuals

in a society, where those belonging to the same social class, share roughly the same social standing in the community. As such, social class is a status hierarchy by which groups and individuals are classified based on esteem and prestige (Peter & Olson, 2010:530) and who share parallel behaviour patterns (Hoyer *et al.*, 2013:364; Joubert *et al.*, 2013:5-6; Parumasur & Roberts-Lombard, 2013:99). Each social class group vary in terms of status, prosperity, level of education, possession, values, occupation, lifestyle, relationships and manner of speaking (Lake, 2009:126). Social class plays an important role in the purchasing, utilising and disposition behaviour of consumers (Hoyer *et al.*, 2013:369), as well as the types of products consumers purchase.

Therefore, it is evident that marketers need to consider the impact of the various social factors, including reference groups, family and social class on the consumer decision-making process, when formulating marketing strategies. This will assist both the business and the marketer to target the appropriate audience and formulate effective marketing strategies. Hence, there are several opportunities for businesses to influence the consumer decision-making process.

The main aspects of organisational influence concerning the consumer decision-making process pertain to marketing management by means of the marketing mix elements and the subsequent marketing efforts. The history of marketing management philosophies indicates various areas of focus ranging from the production orientation, which solely focused on the internal capabilities of the firm; the sales orientation, which used aggressive sales techniques to increase sales; the marketing orientation, where the concept of the social and economic justification for a business' existence as well as the satisfaction of consumer needs and wants originated and finally, the social marketing orientation philosophy, which extends on the foundation of the marketing orientation by focusing on the interest of the individual and society at large (Lamb *et al.*, 2013:4-6). Where marketing was once described as "all the techniques used to make consumers aware of a business, the products or services they offer and their competitive advantage, with limited focus on the consumer" (Joubert *et al.*, 2013:151), the focus has since transferred to an increased emphasis on creating value and building relationships with consumers (Lamb *et al.*, 2013:9). Burns and Bush (2014:32) concur, stating that in addition to manufacturing and selling what businesses believe customers want and need, they must be more than customer-oriented by collaborating with and learning from their customers and adapting to their varying needs. Belch and Belch (2015:7) state that for a business to appropriately create and build relationships with customers, they have to establish, communicate as well as deliver value to customers. Value is defined as the usefulness or benefit that an individual derives from the use of a product, where the acquisition of the products comes at a price paid by the consumer. Therefore, value ultimately refers to the net of the total customer value gained excluding the total cost paid by the customer (Bothma, 2017:8). From a business perspective, a successful marketing strategy is to create

value to the consumer that exceeds that of competitors, while remaining profitable (Hawkins & Mothersbaugh, 2013:10). This can be achieved by formulating and executing marketing efforts based on the marketing mix elements.

According to Sethna and Blythe (2016:11), marketing management is typically considered to pertain to the regulation of the marketing mix elements. Traditionally, there are 4 Ps in marketing, namely product, price, place and promotion, where services marketing comprises an additional 3 Ps, namely people, process and physical evidence. Given that this study investigates the adoption behaviour of a product, the four Ps will be discussed. Parumasur and Roberts-Lombard (2013:23) maintain that organisations utilise products to satisfy consumer needs, either tangible or intangible. As such, Bothma (2017:10) defines a product as “a bundle of physical, service and symbolic characteristics designed to deliver value to customers to satisfy their wants and needs.” The product element of the organisation’s marketing strategy is essentially the product or service being offered to consumers (Joubert *et al.*, 2013:153), for instance various types of technological devices, which comprise of the features, designs, brands, physical packaging as well as certain post-purchase benefits including warranties and return policies (Schiffman & Kanuk, 2014:7).

Additionally, consumers, from a rational decision-making point of view, purchase a product offering based on the perceived bundle of benefits to be acquired from the product, where a decision is made concerning essential benefits, desirable benefits, insignificant benefits as well as drawbacks of the product (Sethna & Blythe, 2016:11). The product features, designs, brand, packaging and warranties will determine the price of the specific product or product category as these aspects differ from one manufacturer to the next and ultimately influence consumer decision making. Blackwell *et al.* (2001:46) assert that price refers to the total bundle of costs sacrificed by consumers in exchange for a product or service and pertains to money or credit being spent, time, inconvenience as well as psychological risk. Hoyer *et al.* (2013:19) maintain that the price of the product significantly influences consumers’ procurement, use and disposition decisions. Moreover, marketers are concerned with how much consumers are willing to pay for products, how price sensitive the target market is as well as how willing consumers are to pay premium prices for personalised products (Du Plessis *et al.*, 2007:9). Tracy (2004) advises businesses to offer credit purchases to consumers as the firms will sell more products using this payment option. An extended method of payment will allow more price sensitive consumers to acquire premium products.

Another crucial aspect allowing more consumers to acquire specific products is the organisation’s distribution channels, commonly referred to as the place component in the marketing mix (Hanlon, 2018). A prerequisite for selling is that organisations have to distribute their products and/or services to where the target market can easily access and purchase it (Cant *et al.*, 2006:20). Distribution is mainly concerned about how products and services are distributed and sold to

consumers (Hoyer *et al.*, 2013:20) as well as finding ways to deliver the products to consumers (Bothma, 2017:6). Various other distribution channels can be used by businesses besides the confinement of a retail outlet, namely direct selling using sales personnel, telemarketing, catalogues or mail order, trade shows or exhibitions (Tracy, 2004) and the exceedingly growing online environment. Sethna and Blythe (2016:11) emphasise the importance of a convenient location for making purchases based on the notion that the easier marketers make it for customers to find the products, the more products will be sold. With the purpose of achieving the latter, some brands use targeted promotional strategies to illuminate their products from competitors so that consumers can easily locate their products.

The promotion strategies of a business are directly linked to business success (Tracy, 2004), which refer to the methods used to communicate the products' benefits to the intended target market (Parumasur & Roberts-Lombard, 2013:23). Organisations can use various forms of marketing communication in this effort, namely advertising, personal selling, sales promotions, public relations, sponsorships, direct marketing and publicity. Hoyer *et al.* (2013:18) state that consumer research can be useful when establishing advertising objectives. For instance, when consumers are either unaware of a certain brand or product or its characteristics, then strategies can be devised in order to educate consumers about all elements.

It is evident that the business philosophy and subsequent marketing efforts and strategies based on the four Ps, are crucial to a business' success. Therefore, each element should be carefully considered, appropriately developed and applied. Besides the organisational efforts to communicate with consumers to sell products and services, many offerings are determined by specific demographical characteristics, which should be considered by businesses.

Demographic characteristics describe any population concerning its size, structure and distribution, where size pertains to the sum of individuals present in the particular society (Mothersbaugh & Hawkins, 2016:63). Furthermore, structure defines the particular society with regards to age, income, level of education and occupation, where distribution pertains to the members' physical geographic location, be it rural, suburban or urban (Hawkins & Mothersbaugh, 2010:67). Demographic factors provide marketers with a distinctive possibility to segment the market with particular descriptive characteristics, such as age, race, gender, religion, occupation, life cycle and level of income (Lake, 2009:229). Cant *et al.* (2006:99) argue that age is the most important demographic characteristic that influences consumer behaviour since consumers' needs are interrelated with their age. According to Hoyer *et al.* (2013:330), it is common for marketers to target the age segment of consumers who are specifically entering the workplace and those establishing a household, to shape and sustain brand loyalty in this crucial phase. Race is referred to as the genetic heritage group with which an individual is born and is a variable useful

to marketers when establishing differing group needs and values (Parumasur & Roberts-Lombard, 2013:114).

Gender refers to a biological state of being male or female (Hoyer *et al.*, 2013:339) based on functional, physiological and psychological differences and is important to marketers as it influences the individual's values and preferences (Joubert *et al.*, 2013:37). Similarly, religion presents consumers with a structured belief and value system, which function as a code of conduct that guides behaviour (Hoyer *et al.*, 2013:347; Parumasur & Roberts-Lombard, 2013:113).

Lake (2009:229) maintains that the similarities amongst demographic characteristics render it problematic to distinguish the needs of each segment, therefore, limits the marketer to predict purchasing behaviour. Stephens (2017:119) concurs, stating that compared to the consumers' demographic identities, their lifestyle plays a more significant role in product or brand preference and subsequent purchase behaviour.

#### **2.2.2.2 Self-concept and lifestyle**

Apart from the aforementioned behavioural influencers, self-concept and lifestyle serve as motivators and determinants of actual patterns of behaviour. That is, where self-concept drives purchase behaviour to fulfil both the individual self as well as how others view the individual, lifestyle-dependent choices are determined by the consumers' activities, interests and opinions (Hoyer *et al.*, 2016:48, 401). According to Mothersbaugh & Hawkins, (2016:25), self-concept and lifestyle mediate the internal and external factors by determining consumer needs and wants, which ultimately initiates the decision-making process. For this reason, studying and understanding self-concept and consumers' lifestyles are crucial to prepare for the subsequent decisions they make.

Rosenberg (1979) defines self-concept as "the totality of the individual's thoughts and feelings having reference to himself as an object." Self-concept refers to the image or attitude consumers have of themselves (Joubert *et al.*, 2013:93) and is influenced by social relations that stem from reactions of others whose opinions are valued and respected (Blackwell *et al.*, 2001:399). Moreover, as a potential reason for differing behaviour, those individuals belonging to various groups take on various roles, therefore, are pressured to act as expected, subsequently conforming to learned roles. During the early 1890s, William James pioneered the notion that an individual has many "selves", namely the basic-self or actual-self, the ideal-self, the social-self and the ideal-social-self. The actual self-image relates to what a person truly believes he or she is, whereas the ideal self-image pertains to what the individual aspires to be (Schiffman & Kanuk, 2014:122). Furthermore, the social self-image refers to what the individual believes others think

of him as well as how others perceive him or her. According to James (1890), the ideal-social-self is vital to the explanation of human behaviour and is referred to as how the individual would like to appear or like to be perceived by significant others. According to Govers and Schoormans (2005), consumers essentially strive towards depicting themselves in relation to their brand choices, where they are more inclined to consider products with an image suitable to enhance their self-concept and opt to avoid products that fail to enhance their self-concept. From a marketing perspective, segmenting markets according to applicable consumer self-images and subsequently positioning products as representations of those self-images may prove beneficial to businesses. For this reason, the concept of self-image has various strategic marketing implications (Schiffman *et al.*, 2012:148).

In addition to self-concept, which closely relates to personality, an increased importance is placed on the evolving lifestyles of the modern consumer. That is, while personality is an easy, reliable and consistent basis for segmentation (Cant *et al.*, 2006:165), marketers' attention has shifted to the study of lifestyle given its dynamic nature. According to Parumasur and Roberts-Lombard (2013:208), the consumer's lifestyle expresses his or her personality, which determines the opinions they have, the interests they display, their needs, as well as the social activities in which they participate. Furthermore, a consumer's personality denotes certain personal characteristics that relate to how they spend their time and money. Lifestyle, on the other hand, denotes how consumers live their lives, including the products they purchase, how these products are used and disposed of, as well as their thoughts and feelings toward these products (Mothersbaugh & Hawkins, 2016:30). Therefore, consumers' lifestyle plays an important role in the product that they acquire. That is, according to Hoyer *et al.* (2016:401), a consumer's lifestyle is disguised in their daily activities, the interests that they display as well as their opinions on a variety of topics.

Of the several differing lifestyles identified in the literature, namely, amongst others, the activist, modern primitive, back-to-the-land, groupie, hippie, rural, simple (Orella, 2015), gurus-abound, systems-driven, spiritually-driven (Frumen, 2014), the fitness-focused or healthy lifestyle has garnered increased attention and emphasis by the modern consumer over the last 30 to 40 years. Null (2018) labels it as the health movement or health-conscious movement and characterises it as those consumers who are increasingly determined to take control of their health and prefer to consume healthier food alternatives. Gustafson (2017) adds that these individuals are likely to become more proactive in caring primarily about issues of nutrition, fitness, work-related stress and the environment. Interestingly, as opposed to older generations, the youth are more inclined to be proactive in changing their lifestyle patterns in favour of their well-being and are prepared to pay premium prices to attain health-related goals (Gustafson, 2017).

Research conducted by Euromonitor International (Euromonitor research, 2017), indicates that healthy lifestyle habits have become the norm given that concerns regarding obesity, food

sensitivity and the number of people affected by disease are increasing. More importantly, it was found that technology plays a vital role in consumer decision-making, where developments in technology allow for the increasing probability of longevity as well as provide consumers with the instrument to independently monitor and manage their individual well-being. Stephens (2017:112-114) documents the uppermost fitness trends of 2016, which include, in ascending order, the practice of yoga, exercise and weight loss, fitness programs for older individuals, functional fitness, personal training, strength training, high-intensity interval training, body weight training, where the foremost trend is the adoption of wearable technology, which include amongst other devices, fitness and health trackers. It is evident that a consumer's lifestyle has a remarkable influence on their behaviour and subsequent buying decisions (Hawkins & Mothersbaugh, 2013:427). By understanding consumer lifestyle and subsequent lifestyle choices, marketing practitioners are adept at targeting specific consumers successfully.

In order to understand how lifestyle decisions are made, it is important to review the various internal influences within the consumer decision-making process.

### **2.2.2.3 Internal influences**

In addition to the various external factors that influence the consumer decision process, there are specific factors from within the consumer that influences their purchase behaviour. Hawkins and Mothersbaugh (2013:25) maintain that internal influences are initiated by perception – the process characterised by receiving and assigning significance to stimuli and followed by learning, where alterations transpire in the content or structure within the consumers' long-term memory. Thereafter, motivation – synonymous to the reason for any behaviour –, personality, consumer emotions and consumer attitude ultimately determine the decisions that consumers make. Likewise, according to various authors, knowledge and consumer involvement are additional internal factors that influence the consumer decision process (Hoyer & MacInnis, 2013:105; Loudon & Della Bitta, 1993:346; Vainikka, 2015:15). This section aims to discuss the various internal factors that influence the consumer decision-making process, namely perception, learning, memory, involvement, motivation, emotion, personality as well as attitude. It should be noted that while these factors have an individual relationship with consumer decision-making, many of these factors have a combined effect when consumers are faced with making decisions.

Schiffman and Kanuk (2014:132) define perception as “the process by which an individual selects, organises and interprets stimuli into a meaningful and coherent picture of the world.” In addition, this process transpires because of the five senses, namely sight, smell, sound, taste and touch (Cant *et al.*, 2006:115). Joubert *et al.* (2013:56) maintain that consumers are incapable of submissively processing information that is presented by chance, therefore, information processing occurs selectively, subjectively as well as based on prior experience or the individual's



frame of reference. Given that consumers' perception is based on prior experience, it is subject to change with the addition of new experiences (Joubert *et al.*, 2010:56), a process that leads to learning.

Learning represents a relatively permanent change in the individual's behaviour because of accumulated experience over time (Solomon *et al.*, 2013:261). Consumers obtain the majority of their attitudes, values, preferences, behaviours and mannerisms, symbolic meanings and feelings through learning (Mothersbaugh & Hawkins, 2016:314). Peter and Olson (2010:57-58,221) differentiate between two types of learning, namely cognitive learning and vicarious learning. Cognitive learning ensues when consumers interpret information in the environment, for example from the mass media, including news coverage and advertising or from personal sources including family and friends and subsequently create new knowledge or meaning. Conversely, vicarious learning, also referred to as modelling, is a process by which consumers learn a behaviour when observing the behaviour of other individuals and the consequences of those observed behaviours. Castelino (2008) notes that consumers admire their role models as they possess desirable characteristics such as appearance, certain accomplishments, skills and/or their social standing. Examples of vicarious role models that influence consumers' decision making and consequent buying behaviour include favourite entertainers or favourite athletes (Martin & Bush, 2000) and celebrities (De Run *et al.*, 2010:70).

A factor that coincides with learning is memory in that memory is the persistence of learning over time, by means of consciously or unconsciously storing and retrieving information (Hoyer *et al.*, 2013:100). Moreover, cognitions or accumulated knowledge through learning are stored in the consumer's memory, which influence how incoming stimuli are interpreted and subsequently shape the foundation for attitudes, behavioural intention and brand choice (Loudon & Della Bitta, 1993:404). One objective of conducting marketing research is to increase consumers' knowledge to gain perspective and competitive advantage so that marketers can predict consumer needs and desires (Vainikka, 2015:37). Hoyer and MacInnis (2008:92) identify two extensive domains pertaining to consumers' prior knowledge, namely knowledge content and knowledge structure. Knowledge content pertains to the information consumers previously learned and stored in memory with reference to brands, companies, retailers, advertisements and product categories. Knowledge structure relates to how consumers organise acquired knowledge in their memory. The main purpose of advertising and selling is to provide relevant knowledge and information that consumers often require when making decisions, which stimulates their subsequent involvement.

Involvement refers to the degree to which individuals are attracted to, as well as defined by a product or brand (Sethna & Blythe, 2016:16). According to Mitchell (1979), involvement is indicative of a consumer's level of motivation to process information and details about products and services that will either solve their problems or reach a specific goal. Furthermore, Schiffman

and Kanuk (2014:238) maintain that the consumer's level of involvement plays an integral role in how much attention they pay to marketing or product messages as well as how sensibly these messages are decoded. Therefore, the design and content within persuasive communication applied by the organisations should consider consumers' involvement levels based on consumer needs and desires.

Consumers display different levels of involvement that range from low-involvement to high-involvement, where they will dedicate more attention to advertisements, wield more mental exertion to understand the advertisements, as well as direct more attention to product-associated information as their level of involvement increases (Celsi & Olson, 1988). Schiffman *et al.* (2012:216) continue, stating that when consumers purchase a product where minimal personal importance was attached to the decision, then a low-involvement purchase occurred. Conversely, complicated, search-based purchases are considered high-involvement purchases. Marketing campaigns with a social dimension repeatedly have the ability to drive even those consumers displaying low involvement into action (Schiffman & Kanuk, 2014:238). For this reason, cause-related marketing is a popular method to increase consumer involvement, therefore, should be implemented by marketing practitioners. Hoyer *et al.* (2013:47) assert that the ultimate outcome of motivation is that it induces a psychological state in a consumer, namely felt involvement, which in turn refers to the psychological experience of a motivated consumer. Moreover, felt involvement pertains to the self-reported arousal or interest in an offering, activity, or certain choices and can be enduring, situational, cognitive, or affective. Hence, the consumers' involvement may range from a temporary interest in the offering to a long-term interest in the offering to an interest in expending emotional energy and inducing deep feelings about an offering. Thus, consumer involvement has a direct connection to their motivation to engage in specific behaviours.

Motivation is described as the inner state of arousal that provides the drive necessary to achieve a goal (Hoyer *et al.*, 2013:45), as well as fulfil conscious and unconscious needs or desires (Bown-Wilson, 2017). Moreover, consumers are potentially motivated to partake in certain behaviours, make decisions or process information in the context of attaining, utilising and disposing of an offering (Hoyer *et al.*, 2013:45). Motivation, a decision-making determinant inherent within individuals, forms a fundamental reason that drives an individual to execute specific actions, to the extent that should motives behind consumers' action be recognised, it may become likely to forecast behaviour (Hanna & Wozniak, 2001:212). To this end, Mothersbaugh and Hawkins (2016:354) claim that motivation is the reason for an individual's behaviour. Given that motivation is described as the goal-driven force produced by a state of tension because of unfulfilled needs (Schiffman & Kanuk, 2014:74), it is important to discuss the types of human needs to understand motivation as a psychological force. Dr Abraham Maslow's hierarchy of needs (1943, 1954) has been prominent in motivational research. It comprises five ascending levels of needs, namely

physiological needs, safety and security needs, social needs, ego needs and self-actualisation needs, which arise as each level is satisfied (Joubert *et al.*, 2013:69; McLeod, 2017). However, Lake (2009:72) identifies two additional main motivators or needs that consumers experience and react to, namely the need for convenience and the need for fun. The need for convenience relates to saving time, effort and money, where less time is devoted to unfavourable objects and activities and more effort, time and money dedicated to favourable objects and activities. Fun-related needs, instead, are associated with leisure, relaxation and enjoyment needs, where such purchases lack practical purpose, but serve as a good source of fun and enjoyment (Lake, 2009:72; Stokes, 2018:31). In addition to the types of needs indicated, motives or needs can have a positive motivation, whereby individuals may feel a driving force towards an object or condition, or have a negative motivation, where they feel a driving force away from a certain object or condition (Lake, 2009:73; Schiffman & Kanuk, 2014:74). For instance, an individual may be provoked to start an exercise programme to avoid health problems, therefore, avoiding a negative outcome, or conversely, start exercising to obtain a more attractive appearance, therefore, motivated towards a positive outcome.

Furthermore, Sethna and Blythe (2016:175) classify motives into several categories, namely primary motives, secondary motives, rational motives, emotional motives, conscious motives and dormant motives. Where primary motives relate to fulfilling needs by means of purchasing a specific product class, namely a new car, secondary motives relate to brand preference. Moreover, rational motives, also referred to as utilitarian motives, are based on reasoning and comprise of a logical assessment of the individual's current situation, where alternatives are considered carefully and the option providing the most utility selected.

In a marketing context, making decisions based on rationale implies that the individual will purchase based on objective criteria such as size, weight or price (Schiffman & Kanuk, 2014:78). Alternatively, emotional motives relate to feelings about the product or brand (Sethna & Blythe, 2016:175) and pertain to consumers' self-concept as well as social and aesthetic desires (Hanna & Wozniak, 2001:217). Contrary to rational decisions, emotion-driven decision-making is based on personal criteria such as beauty, individuality, perceived pleasure, pride, fear, status and the possibility of fitting in or belonging (Hanna & Wozniak, 2001:217; Schiffman *et al.*, 2012:107). According to Weinberger (2014), human decision-making relating to purchase behaviour is also subject to conscious and unconscious processing or motives and does not occur only at the conscious level as previously assumed. Conscious motives are motives of which consumers are aware, whereas unconscious or dormant motives are below the conscious level, which are derived from the inconsistency between an individual's self-image and how this individual is perceived by others (Maciejovsky, 2012; Sethna & Blythe, 2016:175). Understanding the nature

of motivation and desire as components of consumer behaviour can assist the marketer with product positioning, sales as well as advertising (Lake, 2009:71).

In addition to motivation, Lake (2009:71) suggests that emotion too is a strengthening force within consumers that evokes certain behaviours and possesses the possibility to provide purpose and direction to such behaviours. As opposed to the belief that consumer decision stems from a rational analysis of available alternatives, it should be noted that emotions not only significantly influence, but may even determine consumer decisions (Murray, 2013). Emotions are strong, relatively uncontrollable feelings that affect consumers' behaviour (Mothersbaugh & Hawkins; 2016:354, 370). Moreover, while the behaviours displayed vary across and within one individual to the next, these behaviours are characteristically connected to different emotions (Yi & Baumgartner, 2004). Emotions can be positive or negative and have different implications concerning decision-making. For instance, feelings of hope, fear, regret, guilt or embarrassment affect the way consumers think, the decisions they make, what they remember as well as how they encounter a specific experience (Hoyer *et al.*, 2016:9). Since human emotions involve subjective feeling, each different emotion directs a different decision (Mothersbaugh & Hawkins; 2016:371). For example, either happiness, grief, joy, anger or fear elicit an avoidance or approach response, where consumers will either purchase a product or not, based on the emotion the product offering elicits.

Hawkins and Mothersbaugh (2010:378) maintain that all emotional encounters are frequently initiated by environmental events such as seeing an advertisement or consuming a need-satisfying product. Alternatively, emotions are also initiated by internal processes including the response to product imagery, which is frequently employed by advertisers to evoke specific emotional responses. Peter and Olson (2010:214) concur, stating that businesses use specific stimuli in promotional campaigns such as advertisements to generate emotions within consumers. These businesses are aware that stimuli that elicit stronger emotional responses are prone to get more acknowledgement from individual consumers than neutral stimuli. These marketing messages can elicit the emotions that drive word-of-mouth advertising (Stephens, 2017:117). Furthermore, as consumers' emotional attachment to a brand strengthens, the more they become connected to the brand and this leads to repeat purchases over time (Park & MacInnis, 2006). Consumers with an attachment to a brand are willing to pay premium prices for the brand and become brand loyal (Park *et al.*, 2009). Yim *et al.* (2008:742) agree, stating that a business that actively builds strong, positive emotional relationships with customers can increase both customer satisfaction and loyalty. Predictably, that is the reason that Park *et al.* (2010:4) uphold that an emotional attachment to a brand is a more compelling predictor of actual purchase behaviour than consumers' brand attitudes.

Another important internal factor relates to consumers' differing personalities, which makes satisfying consumer needs, on a large scale, challenging. Schiffman *et al.* (2012:126) define personality as "those inner psychological characteristics that both determine and reflect how a person responds to his or her environment." Moreover, personality pertains to the attributes, traits, features and behaviours that not only define individuals, but also makes one individual distinguishable and unique from others (Parumasur & Roberts-Lombard, 2013:204) and results in consistent reactions to environmental stimuli (Hoyer *et al.*, 2013:396). Individuals are either born with the inner characteristics that form their personality, or their personality is a result of the way they were raised (Hoyer *et al.*, 2016:396). Nonetheless, the concept of personality aids marketers in their understanding of why consumers behave differently in specific situations.

Solomon (2017:250) as well as Mothersbaugh and Hawkins (2016:367) identify five major components that form the foundation of personality, namely the individual's transparency to experience, scrupulousness, extroversion, amicability and neuroticism or instability. These elements relate to the degree to which a consumer is open to new approaches of doing things, the level of orderliness and structure preferred by the individual, how well the individual tolerates stimulation from others, their degree of compliancy, as well as how well they cope with stress. Based on these foundational elements, consumers subsequently choose products that fit in with their respective personalities. From a business viewpoint, certain inferences are made about personality based on the individual's preference of leisure activities, food preferences, cars and products purchased in general (Solomon, 2017:206). For this reason, there is an increased emphasis for businesses to develop a brand personality, which pertains to "a set of human characteristics that become associated with a brand" (Hawkins & Mothersbaugh, 2013:367). Brand personalities give rise to certain expectations regarding characteristics, performance and benefits, which can enhance long-term relationships between the consumer and the brand (Mothersbaugh & Hawkins, 2016:368). Given that consumers readily assign characteristics to brands, purchase products that fit their own personality, it is evident that businesses should focus on assigning characteristics to their brand that suit most consumers to facilitate optimal sales potential.

Thus far, it was determined that all abovementioned factors, including all external influences; cultural, social, organisational and demographic factors; self-concept and lifestyle, all internal factors; perception, learning, memory, involvement, motivation, emotion and personality, influence consumer decision making to some degree. However, the closest determinant of behavioural intention and actual consumer behaviour is attitude (Ajzen & Fishbein, 2005:208). Therefore, in order to understand how consumers make purchasing decisions, an in-depth discussion of attitude is vital.

Generally, there is a consensus amongst authors and researchers regarding the definition of attitude, which is “the learned tendency to respond to an object in a consistently favourable or unfavourable way” (Onkvisit & Shaw, 1994). From a consumer behaviour viewpoint, attitude relates to the consumers’ thoughts, feelings and actions towards an attitude object or aspect in the external environment, such as a product or brand (Lamb *et al.*, 2013:108; Mothersbaugh & Hawkins, 2016:384). Moreover, attitudes are not instructive, but learned and should not be regarded as synonymous with behaviour, but rather as a predisposition towards a specific behaviour. Attitudes are relatively stable, where the attitude towards a given object has both direction and intensity; that is, it can be positive or negative with a varying degree of intensity (Sethna & Blythe, 2016:304). Hoyer *et al.* (2013:128) affirm that attitude sculpts consumers’ decision process and subsequent behaviour when purchasing, using and disposing of a given product or service offering. Consumers’ attitude regarding purchase behaviour are formed as a direct consequence of past product experiences, acquired word-of-mouth information and mass-media advertising or other forms of direct marketing (Schiffman *et al.*, 2012:233).

The four main components that emphasise the importance of attitude comprise the cognitive, affective, conative and evaluative components (Business Dictionary, 2017). The cognitive component of attitude formation contributes to conscious beliefs, opinion and thoughts of the individual, whereas the affective component guides emotions and feelings (Hoyer *et al.*, 2013:128). The conative component determines the individual’s inclination toward action and the evaluative component establishes either a positive or a negative reaction to stimuli (Business Dictionary, 2017). Even though the attitudes displayed by consumers, as formed by the abovementioned components, are consistent in itself (Schiffman & Kanuk, 2014:195), it is situation dependent. In other words, attitudes transpire within and are shaped by a given situation (Foxall & Yani-de-Sentario, 2005:519). The situation refers to the occasions or incidents that at any given time, effect the relationship between attitude and subsequent behaviour. That is, in certain situations, consumers’ behaviours are inconsistent with their attitudes (Schiffman *et al.*, 2012:234).

It is evident that attitude plays a significant role in the consumer decision-making process. As previously indicated, attitude is the closest indicator of subsequent or predicted consumer behaviour, therefore, essential to understand (Khan, 2006:28). Several models of attitudes are proposed to understand the association between attitude and consumer behaviour.

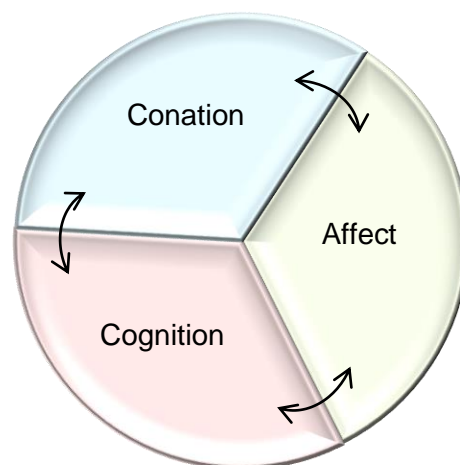
## **2.3 STRUCTURAL MODELS OF ATTITUDE FORMATION**

From the previous section, it can be reasoned that attitudes are an essential component to grasp in order to understand consumer behaviour. That is, consumers’ held attitudes play a significant part in their behavioural intention as well as purchase decisions. The motivation by the desire to

comprehend the relationship between attitude and consumer behaviour, has driven psychologists to compose models that encapsulate the underlying dimensions of an attitude (Schiffman & Kanuk, 2014:197). These attitude-behaviour models are employed to identify the distinct factors that influence consumers' assessment of various attitude objects and comprise of the tri-component attitude model, hierarchy of effects model and several multi-attribute attitude models. The following sections contain the discussion of each model.

### 2.3.1 Tri-component attitude model

Mothersbaugh and Hawkins (2016:384) maintain that an attitude is a persistent pattern of motivational, emotional, perceptual and cognitive processes with respect to a certain aspect of the environment and embodies three distinct components, namely cognitive, affective and behavioural components. Pandey and Soodan (2015) affirm that these three components constitute the fundamental framework as well as mutually epitomise factors that affect consumers' reaction towards the attitude object. The tri-component attitude model is displayed in Figure 2-2.



**Figure 2-2** Tri-component attitude model (Schiffman *et al.*, 2012:235)

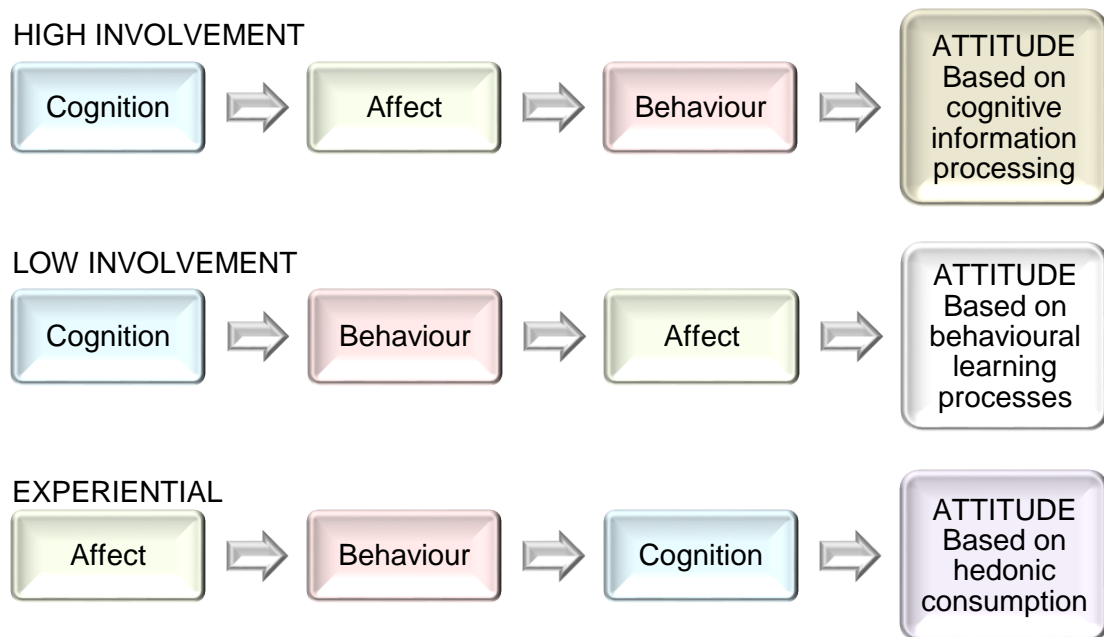
In relation to the tri-component model, the cognitive component of an attitude encapsulates the consumers' knowledge and perceptions regarding products (Management Innovations, 2008), where attitudes are shaped largely through facts rather than emotions or observations of behaviour (Long-Crowell, 2018). Conversely, instead of constructing attitudes through facts, the affective component is founded upon the emotional reaction consumers experience towards the attitude object (Sethna & Blythe, 2016:307).

The behavioural or conation component (Schiffman *et al.*, 2012:235), relates to the consumers' inclination to respond in a particular manner towards an object or activity (Mothersbaugh &

Hawkins, 2016:388). Sethna and Blythe (2016:307) assert that an attitude is considered stable when the components are balanced. Although all three components of an attitude are of significance, their relative importance will diverge depending on the consumers' level of motivation in relation to the attitude object (Solomon *et al.*, 2013:295). Consequently, the concept of a hierarchy of effects was developed to explain the comparative influence of the three components.

### 2.3.2 Hierarchy of effects

Distinguished by three unique paths, the hierarchy effect illustrates, by means of high involvement, low involvement and an experiential path, how different attitudes are formed. According to Solomon (2017:286), each hierarchy indicates that a fixed sequence of stages occurs in the process of attitude formation. The three fixed sequences and corresponding attitude are illustrated in Figure 2-3.



**Figure 2-3 Three hierarchies of effects (Solomon, 2017:287)**

The high involvement hierarchy, also referred to as the standard learning theory, pertains to consumers approaching a product decision similar to a problem-solving process (Arshdeep, 2012), where the attitude is formed based on cognitive information processing. This path is initiated by the consumer's beliefs (cognition) with reference to a product as knowledge accumulates regarding relevant attributes. Thereafter, these beliefs or cognitions are evaluated and certain feelings or emotions (affect) are formed about the product. These feelings or affects are taken into consideration and the consumer engages in a related behaviour, for instance purchasing a product that elicits positive emotion (Ray, 1973; Solomon, 2017:286). According to



several authors, the standard learning theory or high involvement hierarchy presumes that consumers are highly involved when making a purchase decision (Ray, 1973; Solomon *et al.*, 2006:141). However, Fennis and Stroebe (2010:30) highlight the critical drawback associated with the fixed sequence of processes, which presupposes a moderately high level of consumer involvement. This path suggests that once prototypical consumers are subjected to advertisements, it is perpetually considered relevant and spurs consumer interest and subsequently induces desire. Fennis and Stroebe (2010:30) argue that often, high levels of consumer involvement are the exception, not absolute. As such, the standard learning theory or high involvement hierarchy (think-feel-do) is questioned.

Contrary to the high involvement route, the low involvement hierarchy bases attitude formation on behavioural learning processes, as opposed to cognitive learning processes (Solomon, 2017:287). Attitude formation by means of a low involvement hierarchy of effects is characterised by a consumer that lacks convincing initial preference with relation to an attitude object or a brand, acts on limited knowledge and develops an assessment only after product purchase and usage (Arshdeep, 2012). Moreover, it is important to consider the possibility that consumers do not consider numerous decisions to amass a set of product beliefs vigilantly and then assess each alternative. Rather, the attitude is formed by means of behavioural learning, where favourable and unfavourable experiences serves to reinforce the consumer's initial choice (Solomon *et al.*, 2013:296).

According to the third hierarchy, namely the experiential hierarchy, attitudes are formed based on hedonic consumption. Babb (2013) defines hedonic consumption as "the multisensory, fantasy and emotional aspects of consumers' interactions with products." Therefore, products are used as a means of fulfilling desires and satisfy emotions. Solomon (2017:287) insists that the experiential viewpoint emphasises the notion that intangible product attributes, namely the package design, advertising, brand names, as well as the nature of the setting in which the specific experience occurs, can assist in the formation of consumer attitudes toward a brand. Consequently, emotional or hedonic consumption is progressively likely to be based on pleasurable experiences as a result from the actual use of the brand (Babb, 2013).

Given the complex nature of attitude formation, where simple response does not always provide sufficient information about why consumers foster specific attitudes towards products, services or brands, researchers have devised several multi-attribute attitude models in order to understand attitude formation.

### 2.3.3 Multi-attribute attitude models

Schiffman and Kanuk (2014:199) posit that multi-attribute attitude models interpret consumers' attitude concerning an attitude object, whether it is a product, service, cause or an issue, as a function of their perception and valuation of the significant features or beliefs held with reference to the attitude object. Since Holbrook and Hulbert developed these theories and models in 1975 (Holbrook and Hulbert, 1975), three determinants of attitude, with relation to multi-attribute attitude models, namely belief, evaluation and salience, were apparent. Fishbein (1967a:259) defined belief as "the perceived extent to which some concept or object is related to some other object, attribute, value, or goal, as measured by a subjective probability or perceived instrumentality scale." Evaluation was defined as "the perceived extent to which some concept or object is related to some other object, attribute, value, or goal, as measured by a series of bipolar adjectival scales heavily loaded on the evaluative dimension of the Semantic Differential" (Fishbein & Raven, 1967). The third determinant, salience, was defined as "the degree of importance of belief (determinant one) and its associated evaluation (determinant two) in determining the overall attitude toward the concept or object, as measured by a bipolar important-not important scale or by ranking of all objects, attributes, values, or goals" (Fishbein, 1967b). It was found that consumers' overall attitude might be predicted efficiently using beliefs and evaluations, with salience having a limited role in choosing suitable attributes (Holbrook & Hulbert, 1975).

A review of the literature reveals four different multi-attribute attitude models that direct the understanding of consumer attitudes, namely the attitude-towards-object model, the attitude-towards-behaviour model, the TRA and the theory of planned behaviour. The following sections briefly explain these different models.

Regarding the attitude-towards-object model, Fishbein (1963; 1967b) hypothesised that an individual's attitude toward any given object is a function of his or her beliefs with regard to the object as well as the evaluative properties of those beliefs. Essentially, the Fishbein model, named after its primary developer, suggests that attitudes can be predicted through beliefs and evaluation, where belief refers to the likelihood that the object has a specific attribute and evaluation is whether the individual perceives that attribute as attractive or repulsive (Sethna & Blythe, 2016:310). The attitude-towards-object model is particularly applicable when measuring attitudes towards a product, service or brand category (Fishbein, 1963; 1967). That is, the model proposes that when a consumer perceives a product, service, or brand as containing a satisfactory number of favourable attributes, they are likely to have an equally favourable attitude towards that particular product, service or brand and vice versa (Schiffman *et al.*, 2012:251-252; Schiffman & Kanuk, 2014:199). Hence, consumers typically retain a positive attitude towards a brand believed to have an adequate level of attributes and appraised as advantageous. Equally,

consumers retain a negative attitude regarding brands believed to contain an insufficient level of desired attributes or include an abundance of undesirable characteristics (Himansu, 2009).

Schiffman and Kanuk (2014:200) opine that compared to the attitude-toward-object model, the attitude-toward-behaviour model seems to parallel somewhat to a greater degree to actual behaviour. The latter model pertains to an individual's attitude towards behaving or acting with regards to an object, rather than the attitude held toward the object itself (Ajzen & Fishbein, 1980; Burnkrant *et al.*, 1991:28-29; Fishbein & Ajzen, 1975:62-63). For instance, having the knowledge of a consumer's attitude about the endeavour of purchasing a specific brand or product (consumer attitude towards the behaviour), with specific attributes in mind, uncovers more about the prospective likelihood of the final purchase decision than does merely realising the individual's attitude towards that particular brand or product (the attitude towards the object) (Schiffman & Kanuk., 2014:200). According to this model's logic, it is believed that a consumer might hold a positive attitude towards a specific brand or product, due to its favourable attributes, but a negative attitude concerning the likelihood of purchasing the favourable brand or product (Schiffman *et al.*, 2012:239). For this reason, the model's ability to predict consumer behaviour is increased (Svensson & Sjöberg, 2012:9). Furthermore, an attitude held towards a particular behaviour is a function of how strongly the individual believes that the action or behaviour will lead to a certain outcome, whether the outcome is favourable or unfavourable (Spencer, 2016).

Consumer researchers have applied the first two multi-attribute attitude models for many years. However, these models have revealed a major setback, namely in numerous instances knowledge of a consumer's attitude is an insufficient predictor of behaviour (Solomon, 2017:298). Moreover, the original Fishbein model merely measured the consumer's attitude towards a product, service or brand, where this measurement did not include the consumer's actual behaviour. Therefore, these models were reassessed and extended into the TRA. In summary, the TRA is referred to as a revised rendering of the Fishbein multi-attribute attitude theory, that consider variables such as social pressure as well as the attitude toward the act of purchasing a product, instead of isolating attitude towards the object itself (Solomon, 2017:585). According to Schiffman *et al.* (2012:240), the TRA model epitomises a thorough integration of the attitude components into a structure designed to lead to a better explanation as well as improved prediction of behaviour. Therefore, this model offers a clarification of how, when and why attitudes predict behaviour (Bagozzi *et al.*, 2000:97-106; Hoyer *et al.*, 2013:133). In addition, the TRA declares that consumers consciously estimate the consequences of alternative behaviours, where the behaviour leading to the most favourable outcome is chosen (Sethna & Blythe, 2016:314). The TRA, a well-known and established technology adoption theory and model, is discussed in detail under Section 3.3.2.

Provided that the TRA was limited in its ability to predict only behaviours under volitional control, Ajzen (1988, 1991) extended the theory in order to facilitate prediction of those behaviours individuals may not be able to perform willingly. According to the theory of planned behaviour (TPB), a well-established social-psychological model, the closest basis of an individual's behaviour is his/her intention to engage in the behaviour. Sequentially, behavioural intentions are predicted by the composition of three chief elements, namely attitudes, subjective norm and perceived behavioural control (Fielding *et al.*, 2008:318, 319). Van Zanten (2005:49-61) contends that the inclusion of the perceived behavioural control factor in the TPB model, allows for a better prediction of those behaviours perceived as not completely under the individual's control. The TPB has played a significant role in understanding a variety of behaviours, including health behaviours (Ajzen, 1988, 1991). This theory forms the basis for the understanding of the main topic in this study, which relates to individuals' attitude and intention to use activity-tracking devices, based on the influence of their significant others toward their decision of adopting such devices. Therefore, the theory of planned behaviour (TPB), a well-known technology adoption theory and model, is discussed in detail under Section 3.3.4.

## **2.4 STRATEGIES TOWARDS CHANGING CONSUMER ATTITUDE**

From a marketing perspective, the manufacturer or business that sells a particular product to be linked to consumers with a specific personality (refer to Section 2.2.2.3), who lives according to a specific lifestyle and strives to hold a specific self-concept or image (refer to Section 2.2.2.2), needs to be able to project the intended attitude toward this product in order to increase sales. It is evident that all consumers differ in opinion and attitude toward certain objects or stimuli. Therefore, there are several strategies aimed at changing consumers' attitudes in favour of a product or brand.

Similar to how attitudes are formed, it is also subject to change. These changes in attitude are learned, guided by personal experience and other sources of stimuli (Schiffman *et al.*, 2012:245), where personality determines the consumer's acceptance and speed with which their attitudes can be reformed (Lake, 2009:108). Himansu (2009) identifies various strategies to change consumer attitude, namely changing the functional utility of the product, associating the brand or product with a famous personality, changing the features of the product in order to be perceived differently by consumers, changing the belief consumers have of the product and changing consumers' perception of competing products. The first strategy coincides with transforming the basic motivational function within the consumer towards a brand, which is executed by endorsing specific customer needs by means of the functional approach (Shavitt, 1989:300-305). With this strategy, products are improved or changed in order for consumers to see added functionality,

thereby encouraging an attitude change (Himansu, 2009). Consistent with this approach, attitudes are arranged in relation to four functions, namely the utilitarian function, the ego-defensive function, the value-expressive function and the knowledge function (Solomon, 2017:293). Hoyer *et al.* (2013:458) maintain that in order to initiate change in consumers' attitude in favour of a product, they need to be aware of the products' utilitarian purpose, which relate to the foundations of reward and punishment. Owing to the majority of consumers striving to defend their self-image from feelings of doubt, therefore, labelled ego-defensive, it is best to replace uncertainty of a brand with assurance and self-confidence (Knight-Lapinski & Boster, 2001:314-324). According to Solomon (2017:293), knowing the attitudes consumers hold toward the brand, the marketing team will be adept in predicting their values, lifestyle and will be able to imitate these qualities in promotional efforts.

Himansu (2009) attests to the consumers' inquisitive nature, stating that they constantly, out of curiosity, seek knowledge and information regarding product and service offerings. This increased curiosity aids in the transformation of attitude towards these products and services. Hence, another strategy toward changing attitude pertains to the transformation of consumers' attitude towards products, services and brands by means of depicting their relationship to specific social groups, occurrences or causes (Schiffman *et al.*, 2012:247).

A strategy commonly used by brand managers, to change a consumer's attitude of a product or brand, is by altering the consumer's perception of the competitor's offerings (Onodugo, 2017). Owing to most consumers having a particular belief and perception about the competing products, marketers aim to change that view purposefully so that the brand is portrayed in a more positive light. It is important to note that this strategy does not refer to the competitors as inferior or use distasteful efforts toward competitors, but rather challenges the consumer to compare and test these brands and experience for themselves why they should purchase that particular brand over competitors' (Himansu, 2009). One such approach is to use comparative advertising, where specific product attributes are compared and the obvious advantage of purchasing the brand over competitors are made clear (Onodugo, 2017).

A final strategy to employ is to transform consumers' perceived importance or value of particular product attributes. Parallel to the topic in this study, is the uncovering of consumer attitude towards activity-tracking devices, a type of new technology. These devices have several features, benefits and attributes, as discussed in Chapter 3 (refer to Section 3.2.2 and 3.2.3). The basis of this strategy is to encourage consumers to attach an increased amount of importance to a particular attribute (Onodugo, 2017), such as the ability to monitor one's health-related metrics, thereby forming a positive attitude toward a particular brand.

In order to be able to suggest clear attitude-changing strategies with particular reference to new technological devices, a basis of consumer attitude in relation to new technology has to be established.

## **2.5 CONSUMERS' ATTITUDE TOWARDS NEW TECHNOLOGY**

Since the subject of this study is activity-tracking devices, it is paramount to understand consumers' attitude towards new technology to be able to make inferences based on predictive behaviours. Vidigal *et al.* (2015:833) maintain that consumers' attitude of new technology, in particular, will determine its ultimate success or failure in the marketplace. Venkatesh *et al.* (2003:455) define attitude toward using technology as "an individual's overall affective reaction to using a system." Technology refers to "science or knowledge put into practical use to solve problems or invent useful tools" (Your Dictionary, 2018). New technology pertains to "any set of productive techniques which offers a significant improvement over the established technology for a given process in a specific historical context" (Dictionary of Sociology, 1998).

Despite the fact that the use of new technology resulted in various changes in consumer behaviour, in particular the purchasing process (Kopaničová & Klepochová, 2016:65), research regarding attitude towards technology in general is limited (Edison & Geissler, 2003:137). Access to new technologies enable consumers to obtain an increased amount of information about products, services and manufacturers in terms of price, quality, availability, where to buy specific products as well as previous customer reviews – ultimately transforming consumer behaviour in general (Kopaničová & Klepochová, 2016:66).

As indicated in Section 2.2.2.2, compared to older generations, it is mostly the youth who show an interest in proactively changing their lifestyle patterns in favour of their well-being and are prepared to pay premium prices to attain health-related goals (Gustafson, 2017). Therefore, they are most likely to adopt an activity-tracking device to reach health-related goals. According to Rigby (2017), 54 percent of individuals were in favour of connecting their wearable activity-tracking device to their respected pharmacies in order to receive suggestions about products that might meet their specific health and wellness needs.

Attitudes regarding the adoption of technology and activity-tracking devices are detailed in Section 3.5.1.

## **2.6 CONCLUSION**

From this chapter, the importance and significance of studying and understanding consumer behaviour are evident. The understanding of consumer behaviour and consumer attitude is vital to any manufacturer, brand and business' success. That is, these entities will know, through

studying consumer behaviour, which need-satisfying products and services to produce as well as how to appeal to their target market by means of pointed marketing strategies. By assessing the various factors that influence the consumer decision-making process, as illustrated in Figure 2-1 and discussed in detail in this chapter, these entities are able to have focused marketing efforts. For example, depending on the product or service offering, a business will have a clear understanding of their potential customers based on their culture, social groups and standing in the community, demographic factors, their concept of self and lifestyle, perception, learning abilities, memory, level of involvement, motivation, emotions and personalities – all of which influence and determine brand choice. Most importantly, these entities need to consider consumers' attitude since it is the closest predictor of eventual behaviour.

To aid product manufacturers, South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, policy makers and brand managers in this understanding, several models of attitude formation were developed to better describe and understand how consumers develop and foster particular attitudes toward objects and stimuli. The understanding of consumer attitude toward technology and technology adoption is vital to businesses in the technology and health markets.

Chapter 3 highlights various models of technology adoption in order to facilitate a clear understanding of why consumers purchase technological devices and systems. From these models, with a clear emphasis on the TAM and the TRA, several factors are proposed to influence activity-tracking device adoption – specifically amongst students in the Generation Y cohort.

## **CHAPTER 3**

### **ACTIVITY-TRACKING DEVICE ADOPTION**

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#### **3.1 INTRODUCTION**

In Chapter 2, the first three theoretical objectives as outlined in Chapter 1 were discussed. Chapter 3 addresses the remaining theoretical objectives, four to seven. Accordingly, this chapter's purpose is to introduce activity-tracking technology and devices. Thereafter, the various technology adoption theories and models are discussed. Furthermore, this chapter comprises an examination of the Generation Y cohort, the traits of its members and the effect technology has had on this generation, both globally and in South Africa. Furthermore, this chapter examines the factors that influence users' attitude towards and the intention to use activity-tracking devices, which serves as a foundation to the empirical portion of this study. This chapter closes with an analysis of the proposed model of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices.

In order for product manufacturers, both international and South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, policy makers and brand managers to satisfy consumer needs by providing the best-suited products and services, based on their understanding of how people or organisations use these products and services, it is imperative to study consumer behaviour (Solomon, 2017:30). Over the past 25 years, a considerable amount of consumers and companies aimed to resolve primarily standard health and wellness conditions or, at least, discover first-hand approaches to them. The two major focus areas were health condition management and weight management, where the former comprised of consumers in need of food and beverages that could help with the treatment and/or prevention of specific conditions, such as diabetes (Demeritt, 2015).

The Global Health and Wellness Report (Nielsen, 2015:12) reflects the increasing health consciousness amongst members across several emerging markets worldwide. According to this report, 92 percent of the consumers in the Middle East/Africa region (Egypt and South Africa) are willing to pay premium prices for food and beverages comprising health benefits to some degree. Furthermore, 17 percent of consumers in the same region use commercial slimming programs, exceeding the global average of 11 percent. In addition, 68 percent change their current diet and 69 percent increased their physical activity as a means to lose weight. Given that consumers have become more health conscious over the last quarter of a century, the need to monitor activity levels as well as what one eats have significantly increased. As such, the need for methods or systems to monitor such behaviour has developed, which subsequently led to the development of advanced activity-tracking device technology.



According to Bassett (2012:1769), one of the earliest step-counters, known as a pedometer, was constructed in 1667. Since then, activity-tracking devices have become much more sophisticated. Worldwide, the wearable device industry, of which the activity-tracking device sector form part, generated revenue equalling R101.8 billion in 2017 and estimated to increase to R114.5 billion in 2020 (Statista, 2018a; Muller *et al.*, 2018:85). Despite the global interest in activity-tracking devices, many South Africans are still unfamiliar with these devices. Globally, 48 percent of users of wearables are aged between 18 to 34 years (Lamkin, 2016) of which Generation Y comprise the majority. Owing to the considerable amount of health conscious consumers, there is a need to create awareness of such devices along with their benefits, which requires clearly understanding the factors that influence consumers' intention to purchase and use such devices.

Hence, this chapter starts with a discussion pertaining to activity-tracking technology and devices, which further comprises a definition of activity-tracking devices, the types of devices, characteristics and features of activity-tracking devices, as well as the benefits of using these devices. Section 3.2 is in line with the fourth theoretical objective formulated in Chapter 1. The various technology adoption theories and models, the fifth theoretical objective, are discussed in Section 3.3, including, the innovation diffusion theory, the TRA, the TAM, the theory of planned behaviour, the decomposed theory of planned behaviour, the extended technology acceptance model, the unified theory of acceptance and use of technology as well as the extended unified theory of acceptance and use of technology. Section 3.4 details the target population of this study, namely Generation Y, which comprise its characteristics and technology usage globally and in South Africa, as indicated by the sixth theoretical objective. The seventh and final theoretical objective necessitates the discussion of the factors that influence Generation Y students' activity-tracking device adoption (refer to Section 3.5). These factors include attitude towards activity-tracking devices, perceived ease of use, perceived usefulness, subjective norm and the perceived importance of a device's brand name. The final topic of discussion pertains to the proposed model of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices, as discussed in Section 3.6.

In order to propose a model explaining Generation Y students' attitude and behavioural intention, the main topic of this study needs to be introduced and discussed to understand the importance of this investigation. Therefore, the following section comprises a discussion regarding activity-tracking technology and devices.

## **3.2 ACTIVITY-TRACKING TECHNOLOGY AND DEVICES**

Activity-tracking devices, commonly, referred to as activity trackers or fitness trackers, comprise technology capable of measuring the user's movement and health metrics and are available across various platforms, for instance an application on smartphones. However, the wearable

technology market is estimated to equal a net value of US\$7 643.1 million (R101.6 billion) and is estimated to increase to US\$8 592.4 million (R114.5 billion) in 2020 (Statista, 2018a; Muller *et al.*, 2018:85) as based on the average exchange rate for 2017 of US\$1/R13.32 (Nedbank, 2018). Furthermore, of the global wearable technology market, fitness, activity and sports trackers are estimated to increase from 61 million units in 2016 to 187 million units by 2020 in sales (Lamkin, 2016). As such, this study exclusively focused on wearable activity-tracking devices.

Within the following sections, wearable activity-tracking devices and technology (ATDs) are discussed in detail with regards to the types of devices available, characteristics and features of these devices as well as the benefits of using ATDs. The first section provides a definition of activity-tracking devices.

### **3.2.1 Activity-tracking devices defined**

There is currently, in 2018, an immense confusion amongst consumers as to the exact definition of an activity-tracking device. In addition, various consumers believe it to be synonymous to smart watches, which is a type of wearable industry on its own (International Data Corporation, 2016). Chang (2017) expresses that although both types of wearables share similar features, fitness trackers are focused around delivering more comprehensive workout data, where smart watches are well suited for users who want to be up to date with calls, emails and text messages without having to take out their phones. For this reason, smart watches are essentially an extension of the user's smartphone. Conversely, an activity-tracking device refers to any physical device or application on a smart device including mobile phones that is capable of tracking the user's movement and metrics on a real-time basis. According to Kingston (2015) and Techopedia (2018), these measurements are taken whilst being able to both wirelessly and physically connect to an IT device, with the objective of visually displaying the recorded information.

In accordance with the scope of this study, with the focus on wearable devices, an activity-tracking device is defined as any type of device that is attachable to the human body, including clothing items, capable of measuring the user's movement and fitness-related metrics, whilst simultaneously providing real-time feedback by means of a smart device. As indicated in Chapter 1, some of these devices utilise a combination of accelerometers, altimeters, sensors and algorithms to track the number of steps taken, distance travelled or calories burnt (Beckham, 2012). Others record different sport sessions, such as running or cycling (Hong, 2015:94) and measure the user's static or optical heart rate data (Rettner, 2014), patterns and quality of sleep (Haslam, 2016) as well as stress levels (Nield, 2017a). The characteristics that form the foundation of the various types of wearable activity trackers are detailed in the succeeding section.

### **3.2.2 Types and characteristics of activity-tracking devices**

There are various types of wearable activity trackers on the market, ranging from the basic activity trackers, such as a clip-on pedometer that measures steps- and distance travelled (Van Heerden, 2016) to Hexoskin™ Smart Shirts that monitor exact cardiac, respiratory, sleep and activity metrics (Draper, 2018). An extensive examination of the literature could not divulge a research study that has summarised the types of activity trackers that are available on the market at a specific point in time. As such, this study identifies and describes the various types of wearable activity-tracking devices as of 2018. As the types of devices are identified and described, the characteristics of each are highlighted. The advantages and disadvantages are also highlighted.

From an extensive search of the literature, various devices were identified, namely a basic clip-on pedometer, advanced clip-on pedometer (Van Heerden, 2016), a chest strap, an arm strap (Halse, 2018), a headband (Price, 2017), a fashion bracelet (Paredes, 2017), a fitness band with no interface (Crisp, 2016), a fitness band with an interface (Nield, 2017a), smart clothing (Mackenzie, 2015), a smart ring (Van Heerden, 2016), smart jewellery such as the Swarovski activity crystal (Stuart, 2016), headphones or earphones known as hearables (Dubey, 2017) smart sneakers (Eadicicco, 2016), smart insoles (Nguyen, 2016), a digital watch and an analogue watch, where a combination of the two is also available (Vazharov, 2018). These different types of wearable activity-tracking devices are shown in Table 3-1.

**Table 3-1: Types of wearable activity-tracking devices**

	
<p>A → Clip-on basic pedometer OZO Fitness SC2. Luff, C. <a href="https://www.verywellfit.com/best-pedometers-4159148">https://www.verywellfit.com/best-pedometers-4159148</a></p> <p>B → Chest strap Wahoo. Halse, K. <a href="http://heavy.com/tech/2015/04/best-bluetooth-heart-rate-monitor/">http://heavy.com/tech/2015/04/best-bluetooth-heart-rate-monitor/</a></p> <p>C → Arm strap Scosche Rhythm. Halse, K. <a href="http://heavy.com/tech/2015/04/best-bluetooth-heart-rate-monitor/">http://heavy.com/tech/2015/04/best-bluetooth-heart-rate-monitor/</a></p> <p>D → Headband Moov HR. Price, D <a href="http://www.techadvisor.co.uk/review/activity-trackers/moov-hr-sweat-review-3657460/">http://www.techadvisor.co.uk/review/activity-trackers/moov-hr-sweat-review-3657460/</a></p> <p>E → Necklace Swarovski Activity Crystal. Misfit website <a href="https://misfit.com/uk_en/products/sw-vio-set">https://misfit.com/uk_en/products/sw-vio-set</a></p> <p>F1 → Bracelet Jawbone Up3. Paredes, R <a href="https://wearablezone.com/device/jawbone-up3/">https://wearablezone.com/device/jawbone-up3/</a></p> <p>F2 → Band Fitbit Charge 2. Kim, A. <a href="https://www.si.com/edge/2016/09/23/fitbit-charge-hr-2-review-battery-life-performance">https://www.si.com/edge/2016/09/23/fitbit-charge-hr-2-review-battery-life-performance</a></p> <p>G → Smart clothes Athos. Mackenzie, N. <a href="http://www.espn.com/espnw/athletes-life/article/12309553/wearable-fitness-trackers">http://www.espn.com/espnw/athletes-life/article/12309553/wearable-fitness-trackers</a></p>	<p>H → Ring Motiv ring. McGarry, C. <a href="https://www.macworld.com/article/3154087/consumer-electronics/forget-the-wrist-motiv-ring-puts-a-fitness-tracker-on-your-finger.html">https://www.macworld.com/article/3154087/consumer-electronics/forget-the-wrist-motiv-ring-puts-a-fitness-tracker-on-your-finger.html</a></p> <p>I → Headphones Jabra sport pulse. Dubey, A. <a href="https://techreviewpro.com/top-best-wireless-bluetooth-headphones-for-running-8860/">https://techreviewpro.com/top-best-wireless-bluetooth-headphones-for-running-8860/</a></p> <p>J → Smart sneakers Under Armour Gemini 2 RE. Eadicicco, L. <a href="http://time.com/4166277/under-armor-smart-sneakers/">http://time.com/4166277/under-armor-smart-sneakers/</a></p> <p>K → Inner shoe soles Digitsole warm series. <a href="https://www.digitsole.com/">https://www.digitsole.com/</a></p> <p>L1 → Watch Analogue Nokia Steel HR Vazharov, S. <a href="https://www.bestproducts.com/fitness/electronics-gadgets/g675/wearable-fitness-trackers/">https://www.bestproducts.com/fitness/electronics-gadgets/g675/wearable-fitness-trackers/</a></p> <p>L2 → Watch Digital Garmin Fenix 5 Halse, K. <a href="http://heavy.com/tech/2015/04/best-bluetooth-heart-rate-monitor/">http://heavy.com/tech/2015/04/best-bluetooth-heart-rate-monitor/</a></p> <p>M → Interchangeable device Fitbit Flex 2 Easton, R. <a href="http://www.trustedreviews.com/reviews/fitbit-flex-2">http://www.trustedreviews.com/reviews/fitbit-flex-2</a></p>

As indicated in Table 3-1, there are various types of wearable activity trackers available on the market, each with its own purpose, usage, advantages and disadvantages. It should be noted that the descriptions of these devices refer to a broad spectrum of the device in question and not to a specific brand or product. The following sub-sections provide a description of the different types of wearable activity trackers illustrated in Table 3-1.

### **3.2.2.1      Clip-on pedometers**

The earlier version pedometer is a basic movement tracker with a digital display, a few buttons to adjust settings and move through the display options to view the time and personal progress (Refer to Exhibit A). According to Luff (2018), these devices are easy to configure and does not rely on any software downloads or smartphone connectivity and is ideal for consumers of all ages and level of technological expertise. Furthermore, some of the basic pedometers, also referred to as pocket pedometers, can count steps even if the device is clipped on in different positions, be it the user's pant pockets, belt, clipped to a lanyard or attached to their shoes (Bumgardner, 2018). Despite these basic pedometers being the most affordable tracker available (Luff, 2018), a major disadvantage is that the data resets automatically at midnight, where some store the data only for up to seven days (Van Heerden, 2016) and with no software, the user loses the data. However, Bumgardner (2018) indicates that recent models are capable of storing data for up to 30 days and 30 weeks of the user's walking totals. Another disadvantage of the basic trackers is the use of replaceable batteries and lacks the use of a long-term alternative such as rechargeable batteries.

The advanced clip-on pedometer allows the user to track not only the number of steps taken, distance travelled and the amount of calories burnt during the day (as with the basic pedometer), but also enables the individual to synchronise the statistics to a smart device or computer in order to share the data with friends and family members (Van Heerden, 2016). The advanced clip-on pedometer, boasts a leading-edge accelerometer that accurately measures all-day activity that the basic pedometers fail to do. Additionally, the calorie estimation is based on the personal profile of the individual and not the average consumer (Fitbit, 2016), which increases the user-to-user accuracy. Another clear advantage over the basic pedometers is that some of the advanced pedometers can be removed from the clip-on encasement and be worn on the wrist by using an appropriate replacement strap. There are two types of advance clip-on pedometers, one that was described and the type without a display. With the second type, the data are not visible on the device itself, but rather relies on the application installed on a smartphone to view statistics (Bumgardner, 2018). An advantage of the more recent versions is its water resistant rating and additional ability to monitor the user's sleep patterns (Braughall, 2014).

### **3.2.2.2 Chest strap HR-monitor**

The chest strap heart-rate (HR) monitor (refer to Exhibit B in Table 3-1) is essentially an elastic material-based strap containing an electrode strip and the module that uses electrical pulses (similar to that of an ECG machine) generated from the heart, in order to capture the user's heart rate data (Duffy, 2018; Stables, 2018) and is worn around the user's chest. The composition of the majority of the chest strap devices consist of two segments, namely the main module, which reads and transcribes the data that is captured from the second, replaceable part, namely the fabric strap with the electrodes embedded. Moreover, the data captured from the device is transferred to a smartphone, where the information is displayed on the applicable mobile application, at times allowing live transmission in order to see real-time feedback during a training session (Halse, 2018). From the literature, it is apparent that merely a limited number of chest straps on the market are able to connect to a multitude of training- and smart devices for improved performance, where many only connect brand-to-brand (Stables, 2018). A possible and logic explanation is due to software compatibility between the devices.

Duffy (2018) attests to the superior accuracy of chest strap HR-monitors in relation to optical sensors – used in other types of wearable devices, such as on the wrist. The author explains that a heart-rate measurement taken directly from the electric impulses from the heart is more accurate than a heart-rate measurement taken from the arm or wrist, given the rapid movement of limbs during training sessions. Halse (2018) concurs, stating that some of these devices, especially more recent versions, comprise improved electrodes, which promote accurate heart rate monitoring. According to Stables (2018), a chest strap is ideal to track training statistics when running, rowing, swimming, cycling or working out at the gym. In order to manage the wear and tear of training sessions, the devices are designed to be durable, waterproof and the strap is machine washable (Duffy, 2018; Halse, 2018).

### **3.2.2.3 Armband HR-monitor**

An armband HR-monitor (refer to Exhibit C in Table 3-1), similar to the chest strap, is predominantly used in conjunction with an additional optical sensor, such as on the wrist, as well as a variety of applications, in order to improve the health metrics being measured during the training session. However, the device can be used independently and includes capabilities ranging from measuring heart rate metrics, distance, calories and pace (Halse, 2018), running and indoor cycling (Rose, 2018), as well as high intensity interval training (HIIT) (Stables, 2018). Worn on the user's forearm (Stables, 2018), the majority of the armbands on the market utilise accelerometers and gyroscopes in order to detect where the user's body is during a specific time and space (Mackenzie, 2015). Based on these characteristics, this particular sensor can predict the specific movement the user is performing, namely a squat exercise or the type of swimming

style (freestyle, breaststroke, backstroke or butterfly) and is capable of recording the number of repetitions and pace of the exercise (Mackenzie, 2015). Furthermore, the heart-rate data generated by an armband device, despite being an optical sensor, compares to the accuracy generated by chest straps (Rose, 2018).

Contrary to the chest strap design, the armband does not consist of two distinct sections. Rather, the armband is designed with a casing attached to the electrode-embedded strap, from which a module can be removed. Some of the models on the market use replaceable batteries, where the more recent models use a rechargeable battery (Rose, 2018). In addition, the majority of these armbands are waterproof or sweat proof (Stables, 2018). While particular models do not have their own application to synchronise the data to, the majority of these devices are compatible with a variety of popular fitness applications, called third party applications, such as Strava, Wahoo Fitness, Runkeeper, Cyclemeter (Halse, 2018) as well as Endomondo (Muller *et al.*, 2018:84).

#### **3.2.2.4 Headband HR-monitor**

The headband, displayed in Table 3-1 (refer to Exhibit D), is an activity-tracking device that functions on the same principles as the chest strap HR-monitor, in that it comprises two parts; a coin-sized sensor device that transcribes the heart rate data captured from the user's temple as it is inserted into the headband, which is the second part and attached to the individual's head (Price, 2017). It is important to note that unlike the chest- and armbands that can sense a multitude of movements and motions, the headband HR-monitor is limited to measuring the user's heart-rate data only (Palladino, 2017). In 2018, there is only one such device on the market, as displayed in Table 3-1, Exhibit D. According to McGarry (2017), this particular device is capable of connecting to an application, which has a built-in vocal coach that assists and motivates the user while training. However, there are currently only five compatible workouts available. Moreover, given the limitations of the device, the user is required to use another device from the same brand in order to have a complete picture of a training session.

In order to start using the headband to measure heart rate data, it is a prerequisite to install the Move Fitness Coach App (Price, 2017) and instead of recording a specific training session, the application is programmed to coach and motivate the user to reach a specific goal, for example to work harder in order to reach a specific heart rate level. The sensor is rechargeable and waterproof and ideal for users who seek a more affordable, less permanent method of measuring heart rate data only or heart rate data in addition to a device without this functionality (Palladino, 2017).

### **3.2.2.5 Smart jewellery**

Smart jewellery has similar capabilities to sports bands, but is specifically designed to be a fashion item, which makes it a unique activity tracker. In this category, there is a broad spectrum of devices available, ranging from the devices with limited capability, to those with advanced capabilities but obscured by its design and comes in different shapes. Various types of smart jewellery are identified in the literature, namely the smart pendant (Luff, 2018; Maslakovic, 2018a), smart bracelets (Gokey, 2018), smart rings (example: refer to Exhibit H in Table 3-1), smart necklaces (example: refer to Exhibit E in Table 3-1), smart earrings (Gokey, 2014) and earring backings (Shafee, 2017), the Swarovski activity crystal (Stuart, 2016) as well as bangle trackers (Charara, 2018; Shafee, 2017).

The smart pendant, which takes the form of a golden leaf, is ideal for women as it tracks steps taken, distance travelled, calories burnt, sleep patterns, stress levels and the female user's menstrual cycle (Charara, 2018). Luff (2018) indicates that this pendant can be worn as a necklace, on the wrist or clipped to the user's pocket or hem. Smart bracelets comprise a variety of devices with the communal characteristic of being designed to disguise the device as a fitness tracker and appear to be a fashion accessory worn on the wrist. Some of the devices are crafted from rubber (Van Heerden, 2016), while others are made with the highest quality stainless steel (Charara, 2018). Furthermore, these devices measure the user's sleep cycles, distance travelled, steps walked and running, calories (Gokey, 2018), where some are waterproof and able to connect to a smart device, receive notifications and notify the user when being inactive for prolonged periods (Van Heerden, 2016). The few smart rings available on the market range from a sleek, titanium design to sterling silver and 18-karat gold rings, which encase the sensors and fit both male and female users (Sawh, 2018a; Shafee, 2017). These devices are capable of monitoring the user's steps, distance, daily active minutes and heart rate by means of the optical heart rate sensor (Sawh, 2018a). The device comprises a rechargeable battery that will last up to five days and is also waterproof (Charara, 2018). An upcoming smart jewellery device is the smart earring backing, which can be attached to the back of the user's earring of choice. This almost weightless device is one of the smallest activity trackers measuring the user's continuous heart-rate data, steps, distance and subsequent calories burnt (Shafee, 2017). The earring backing was innovated since the smart earrings on the market up until 2018 were smart earrings resembling a stud with a fixed design (Gokey, 2014), which limits the interchangeability of the device to suit the user's daily attire. The smart necklaces on the market, however limited, comprise a round tracker module or crystal that is placed in the necklace frame and worn around the user's neck. These devices are waterproof, made from different materials including aluminium and sterling silver and capable of measuring the user's sleep patterns, display the time using LED lights, tracking spots such as swimming, cycling, soccer, as well as noting the number of steps taken (Charara, 2018:



Shafee, 2018). Moreover, these devices work with a replaceable battery that lasts up to six months and can synchronise the recorded data to a smartphone application (Stuart, 2016). Lastly, the bangle tracker is still in its infancy with one device available, which is available in three styles, namely gold, silver and rose gold, embedded with a pearl, which contains the sensors. The device boasts fitness and sleep tracking capabilities, music control and limited smartphone notifications (Charara, 2018; Bazilian, 2016).

### **3.2.2.6 Sports or fitness bands**

Wrist-based fitness bands are currently dominating the wearable activity-tracking market due to the vast variety of bands that are available on the market. A major distinguishing factor of this device is whether it has a display (refer to Exhibit F2 in Table 3-1) or whether it is a device without a display (refer to Exhibit F1 and M in Table 3-1) that uses LED lights as an indication for certain information (Chang, 2017). Fitness bands have an array of capabilities and uses, for example, heart-rate monitoring on a static or continuous bases, calculating steps using the pedometer sensor, an exercise tracker that captures various sports profiles, as well as a stopwatch and timer (Bell, 2017). The devices with a display vary from the traditional black and white display to an ultra-detailed colour touchscreen (Vazharov, 2018). Conversely, the devices without a visual display use a combination of LED lights and vibrations to communicate specific data being captured or sensed (Van Heerden, 2016). In addition, there is a particular display-less device that lacks the presence of an optical heart rate sensor, but instead implements very sophisticated bio-impedance sensors, embedded onto the strap (Wilson, 2018) in order to capture the user's resting heart rate, as well as detailed sleep patterns, such as REM, light and deep sleep phases (Mackenzie, 2015).

Similar to the vast variety of fitness watches on the market, as indicated in Section 3.2.2.10, fitness bands encompass various capabilities, ranging from basic to advanced devices. The basic metrics measured include steps taken, distance travelled, calories expended (Halse, 2018), where more advanced metrics include determining the user's running impact, gym repetitions, swimming strokes, sleep patterns, as well as automatic exercise tracking (Peckham, 2018). Further advanced metrics are identified and include, measuring the user's continuous heart rate data (Bell, 2017), personal activity intelligence (PAI) where the device determines the amount of activity necessary to remain healthy (Halse, 2018), smart coaching abilities, sedentary reminder (Paredes, 2017), built-in GPS, as well as Bluetooth synchronising to a smartphone (Stables, 2018).

Furthermore, the majority of these devices have colourful interchangeable bands (Vazharov, 2018), rechargeable batteries (Halse, 2018) and a waterproof rating (Bell, 2017; Peckham, 2018) as well as basic notification alerts (Halse, 2018). While the majority of fitness bands can alter their

appearance by means of a different colour band, one particular tracker was specifically designed to be interchangeable (refer to Exhibit M in Table 3-1). This interchangeable tracker is designed and sold as a non-display sports band with similar capabilities than that of the majority of basic sports bands, but can be worn in various ways; as a necklace, as a sports band, as a bracelet as well as hidden in a fashionable bangle crafted from gold or stainless steel (Williams, 2018). This particular device boasts a heightened extent of customisability with the motto “fit for every you” (Fitbit, 2018). Therefore, the user is able to wear a fitness tracker to measure not only a variety of fitness-related metrics, but also have the device blend in with sports- and office attire. Despite the varying functionality and subsequent price of these devices, Packham (2018) notes that these devices have a shared commonality of facilitating any user to go from unhealthy to fit.

### **3.2.2.7 Smart clothing**

From biometric shirts, to smart bras and smart socks, there is a wealth of smart clothing on the market, of which the introduction of and development has rapidly increased in a short time span. According to research by Syduzzaman *et al.* (2015), smart clothing is classified under an umbrella term, namely smart textiles, which are defined as “textiles that can sense and react to environmental conditions or stimuli from mechanical, thermal, magnetic, chemical, electrical, or other sources”. Furthermore, smart textiles can be classified into three broad categories, namely passive smart textiles, ultra-smart textiles and active smart textiles, where smart clothing as wearable activity-tracking technology form part of the latter classification. Smart clothing, also referred to as e-textiles, comprises traditional fabric woven with conductive fibres in addition to electronic components, including biomedical sensors, microcontrollers, fibre optics and wearable antennas (Brown, 2018).

From the inception of smart clothing in 2015 (Sawh, 2018b), the possibility of the technology embedded in addition to the type of fabric used, it is possible that wearing these types of clothing-based devices may become the norm, replacing consumers’ wardrobes (Maslakovic, 2018b). Sustaining this notion is the vast variety of smart clothing available, which seem like ordinary clothing and is not only the future wardrobe, but may be the future of wearable technology since it is already available in more styles, colours and varieties than other wearables (Gokey, 2016). The types of clothing available in 2018, include yoga pants, shorts, shirts, sports bras, smart socks, smart sleeves (Sawh, 2018b) and smart shoes (Bell, 2017).

The component that transforms fabric into smart clothing that enables activity- and movement tracking is the sensors embedded in or attached to the clothing items. For instance, the yoga pants, although not an activity-tracker by definition, comprise integrated haptic vibrations located at the hips, knees and ankles that pulse to encourage the user to move and or hold positions correctly (Sawh, 2018b), therefore, acting as a personal trainer (Van Hooijdonk, 2018). There are

slightly more types of smart shorts available with varying capabilities, for instance, one version contains sensors, clipped to the shorts, that measures running metrics specifically, including bounce, cadence, braking, pelvic rotation and pelvic drop, which synchronises with a companion application (Langridge & Edwards, 2017; Sawh, 2018b). Another version of smart shorts is particularly designed for cyclists, duathletes and triathletes that measures combined muscle load with heart rate data including cadence, speed and distance while transmitting the data to an application in real-time. This is achieved by means of electromyographical (EMG) technology, which enables the measurement of electrical activity of the user's muscles (Bell, 2017). Similar to smart shorts, there is also a variety of different smart shirts available.

An example of a smart shirt is displayed in Table 3-1 (refer to Exhibit G) and comprise the shirt, embedded with multiple sensors in appropriate positions that transmit data via its sensors to a module that is attached to the shirt. This particular product provides the user with valuable insights on training intensity, recovery, fatigue levels, calories expended as well as quality of sleep and is able to connect to a Bluetooth compatible application or device (Draper, 2018). Another, more advanced smart shirt utilises EMG sensors, woven into the fabric (Sawh, 2018b) that recognises muscular activity and subsequently informs the user, which of his or her muscles are working, in what order, the intensity as well as muscle symmetry (Van Hooijdonk, 2018).

The sports bra, clearly intended for female users, measures the conventional fitness-related metrics including steps taken, distance travelled, calories expended, heart rate data as well as distinctive measurements such as breathing efficiency, fatigue levels and the effort dispersed by the user's body (Gokey, 2016). Some of the bras available are merely designed in such a manner so that the user can attach any compatible heart rate sensor (refer to Section 3.2.2.2) into the lining of the fabric for data to be transmitted effectively (Maslakovic, 2018b). Other versions of this type of activity-tracking device, has the heart rate sensor attached to the fabric lining on the bottom of the bra that utilises biometric sensors and artificial intelligence to keep track of not only training sessions, but also ultraviolet rays (Sawh, 2018b).

Smart socks do not necessarily have the main purpose of measuring and improving fitness-related activity, but rather capture specific data to prevent injury whilst being active or through normal use (Sawh, 2018b). However, there are advanced smart socks available that in conjunction with an anklet, which is the sensor, provides runners or athletes with specific information such as cadence, foot landing, the impact forces exerted when running, distance run as well as pace (Van Hooijdonk, 2018). These socks are crafted from antibacterial, anti-blistering and sweat-wicking material. According to Sawh (2018b), a compression sleeve is available that utilises electrocardiogram (ECG) technology to measure heart rate data, sleep patterns, workout intensity, where the module comprises the sensors that monitor body temperature, air quality as well as ultra-violet rays.

Smart shoes or smart sneakers (refer to Exhibit J in Table 3-1) comprise a few available models with varying capabilities. One such example includes a sneaker pair equipped with a computer chip that measures the user's distance travelled, stride length and pace (Eadicicco, 2016). According to Bell (2017), the fitness-tracking module is placed in the sole of the shoe, which comprise an accelerometer sensor that records running metrics as well as a Bluetooth chip to synchronise to an application. These specific shoes are able to tell the user whether his/her body is ready to run based on a pre-run jump test. Johnson (2018) describes another type of smart shoe that features a multi-sensored system positioned within the length of the midsole. This type of activity-tracking shoe can interpret whether the user is landing equally hard on both feet or not, whether the impact is focused around the user's heel area or toes as well as the usual running metrics such as stride length, distance, speed, contact time with the ground and cadence. Furthermore, these shoes provide the user with real-time recommendations regarding how to correct form, improve performance and how to prevent injury.

#### **3.2.2.8 Bluetooth headphones and earbuds**

In addition to providing entertainment whilst running (Dubey, 2017), some Bluetooth headphones are also capable of measuring fitness-related metrics. These devices are available in different designs, ranging from head- or earphones that are connected to one another by a wire (refer to Exhibit I in Table 3-1) or those resembling individual earbuds or pods (Borg, 2016). The majority of these devices with heart rate functionality use photoplethysmography to measure the user's pulse and subsequently take a photoplethysmogram (PPG) by shining a small light onto the user's skin, consequently measuring blood flow according to how the light reflects off the blood vessels (Palladino, 2016). Furthermore, these wireless in-ear devices eliminate the need for a chest strap or a wrist-based device and instead read data from the ear and send the data to a smartphone application, delivering spoken feedback as the user exercises. These in-ear devices also provide data such as heart rate, steps taken, distance travelled, duration of the exercise and calories expended (Stables, 2018).

#### **3.2.2.9 Smart insoles**

Nguyen (2016) maintains that insoles offer benefits that not only ensure that standing, walking and running are more comfortable, but also provide a solution for pain relief. Moreover, insoles serve as an ideal location to incorporate wearable technology in order to gain insightful data. Some insoles (refer to Exhibit K in Table 3-1) are the device itself, which can be charged and used (Nguyen, 2016), where with others, the sole contains the sensors transcribed by a rechargeable, removable module (Johnson, 2018). According to Van Hooijdonk (2018), these devices are easy to use and involve a few easy steps before use, namely charge the device, insert the soles to preferred shoes, pair with the mobile application then commence with exercise.

A particular model smart insoles has three different types of soles designed for a specific purpose. The first version is designed for cycling, intended to track the user's activity and pedalling technique, fatigue level, injury risk detection and has Bluetooth connectivity. The second version is crafted for runners and aimed at providing the user with a three dimensional view of their stride, injury risk and fatigue detection, history of his or her activities while being connected to a smart device. The last version is heated insoles where the user can determine and adjust these insoles to their preferred comfort temperature and can track their steps- and distance travelled as well as calories expended (Digitsole, 2017). Another insole on the market comprise several layers, namely the top layer, ground layer, dielectric layer, the sensor layer, in which the electronic module fits and the inlay, held together with the coin cell and cover. This particular version of smart insoles comprises 13 pressure sensors, third dimension acceleration sensors, which locate the forces acting on the user's feet and determines the direction and speed of movement respectively (Poor, 2014). Moreover, the insoles operate with a rechargeable battery and can synchronise to an application in order to visualise the data.

### **3.2.2.10 Fitness watches**

As indicated in Section 3.2.1, fitness trackers should not be confused with smart watches. Although both types of wearables share similar features, fitness trackers are focused around delivering more comprehensive workout data, where smart watches are well suited for users who want to be up to date with calls, emails and text messages, without having to take out their phones (Chang, 2017). The same principle holds for fitness watches especially. From the extensive range of fitness watches on the market, two distinctions can be drawn, a watch with a digital interface (refer to Exhibit L2 in Table 3-1) and a watch with the traditional analogue interface (refer to Exhibit L1 in Table 3-1). In addition, not all fitness watches have a built-in heart-rate monitor and is furthermore differentiated by a full-colour display as opposed to the customary black and white display (Vazharov, 2018).

Depending on the type and model fitness watch, each has a variety, but different sensors that track specific data. For example, when running or cycling, having a global positioning system (GPS) is crucial. As such, a line of fitness watches uses GPS connectivity, whether built-in or drawn from a smartphone, as well as a range of sensors to measure the user's speed, time, pace, distance travelled, heart rate data and number of calories expended (Van Heerden, 2016; Vazharov, 2018). Moreover, these devices, even those with basic functionality, track and map the user's routes, where more advanced models use heart-rate sensors and altimeters, pre-loaded maps and Bluetooth connectivity for live feedback (McGarry, 2018).

Not all fitness watches are focused on measuring running metrics exclusively, but allows the user to choose between a variety of sport or activity profiles, which can be tracked both in- and

outdoors (Halse, 2018). Watches that comprise advanced features, which are justifiably more expensive, allow the user to see an altitude profile with ascent and descent information as well as weather reports. Incredibly, the abovementioned functionality is embedded in a watch design ranging from a stylish, round, stainless steel watch frame (McGarry, 2018; Vazharov, 2018) to a soft and flexible silicone band that does not discolour easily (Van Heerden, 2016).

Instead of purchasing the more rugged and bulky style fitness watch, the user can opt for a more elegant, analogue style watch that resembles a traditional watch and fits fairer with formal and office attire. Despite looking like an ordinary watch, these devices have similar features than that found in fitness-based sport watches, for instance a heart rate monitor that measures continuous heart rate data, a rechargeable battery, Bluetooth connectivity, automatic activity detection (Stables, 2018), sleep patterns as well as a water-resistant rating of up to 50 meters (Vazharov, 2018).

From the abovementioned types of devices discussed, several advantages of using an activity-tracking device are apparent, whether it is a device with basic or advanced functionality or worn on the wrist, clipped to clothing or slipped into a shoe. As such, the following section delineates the benefits of using activity-tracking devices.

### **3.2.3 Benefits of using activity-tracking devices**

As per the description of the abovementioned activity trackers, some of the advantages were identified. However, the benefits of using such a device go beyond the scope of the devices' characteristics and features. A review of the literature revealed several additional benefits of activity-tracking device usage, including encouraging physical activity, encouraging healthy eating as well as holding the user accountable for meeting pre-set goals (Hadfield, 2014; Nick, 2018). According to the Health Fitness Revolution (2015), inactivity can lead to a wealth of health and personal complications, including unnecessary weight gain, onset of chronic and acute illnesses as well as lowered performance in school, work and everyday life, where constant activity can possibly prevent as well as reverse many of these occurrences. Based on this notion, the non-communicable diseases prevalent amongst members of the population, as discussed in Section 3.4.2, can perhaps be eradicated by implementing wearable activity-tracking technology (Keong, 2018). Donnachie and Hunt (2017) indicate the foremost valuable benefit of fitness trackers as motivation. That is, half of the individuals who initiate a fitness program are likely to abort all efforts within six months. Fitness trackers provide the necessary motivation and inner drive to sustain these efforts. Mercola (2016) concurs, stating that fitness trackers provide an alternative to keep an individual moving, increase motivation thorough feedback as well as improve fitness and lose weight.

Sleep has a foremost effect on an individual's overall health, specifically cognitive function, memory (Nick, 2018), metabolism, cravings, energy, mood and safety (Hadfield, 2014). Therefore, using a device with sleep monitoring capability, the user can discern whether his or her sleep patterns need to be adjusted. With an adequate night's rest, the user can reduce stress levels, improve memory and concentration, reduce depression and increase overall health (Desk, 2017). Furthermore, other than efficient sleep, heart rate is one of the most significant components in the human body. Given that the heart indicates the health of the entire body, it is vital to understand that a high resting heart rate is indicative of possible future cardiac complications, while a low resting heart rate is indicative of a healthy heart (Whyler, 2017). As such, Nick (2018) indicates that using a fitness tracker with heart rate functionality provides the user with insights into his or her level of exertion when executing a workout or task, where the condition of their cardiovascular system is clear. Hadfield (2014) attests to a key feature of an activity tracker, which is the ability for the user not only to set goals, but also achieve them. This benefit is linked to the motivational factor.

Several other benefits of using an activity-tracking device include, improved nutritional awareness and knowledge, the formation of healthy habits (Whyler, 2017), fostering a group dynamic (Donnachie & Hunt, 2017), the ability to formulate personalised goals, financial motivation, up-to-date weight loss, the ability to choose from a variety of devices that also have mass functionality (Health Fitness Revolution, 2015). Based on the characteristics and features described in Section 3.2.2, the benefits of using activity trackers are evident since the user can use the recorded data to enhance lifestyle behaviours such as increasing physical activity, for instance becoming more active, as well as adjusting individual diet- and sleep regimen (Maher *et al.*, 2017:1). Moreover, besides being more active, the user has the additional advantage of sharing the activity-related information with friends and family on social platforms, such as Endomondo, Strava, Facebook or WhatsApp (Muller *et al.*, 2018:84). When users share this data, a competitive instinct drives intensified performance that result in a heightened ego, predominantly when the tracker continuously praises the user for reaching goals on a daily basis (Livingston, 2017; Nield, 2017b).

A further advantage to South African consumers is that those members that subscribe to two specific existing medical schemes and speciality programmes, namely Discovery's Vitality Health™ programme and Momentum Health's Multiply wellness and rewards programme (Discovery, 2018; Multiply, 2018) are able to reduce their healthcare costs due to their rewards system, therefore, resulting in increased cost savings to the user.

As with any technological system or device, various technology adoption theories and models aim to explain the reasons behind consumers' adoption behaviour of these systems and devices. Given the variety of wearable activity-tracking devices on the market, in conjunction with the benefits of using these devices, this study aims to employ technology adoption theories and

models to understand the factors that influence the adoption thereof. As such, the following section investigates the various technology adoption theories and models.

### **3.3 TECHNOLOGY ADOPTION THEORIES AND MODELS**

Technological innovations are continuously evolving and used throughout society (Bice *et al.*, 2016:297). Over the last 30 years, various areas of research were determined to identify specific factors that affect the approval of information systems, through which many models and theoretical proposals were provided (Bigne-Alcaniz *et al.*, 2008:649). Even though the majority of these theories and models aim to explain behavioural intentions as well as highlight the importance of consumer attitude in understanding consumer behaviour (Maduku & Mpinganjira, 2012:174), Chuah *et al.* (2016:277) opine that with new and intricate technology, user-friendliness (ease of use) as well as utilitarian benefits (perceived usefulness) should become the core determinants of technology adoption. From a review of the literature, several theories and models regarding the adoption of information technology and information systems are identified, namely the innovation diffusion theory (IDT) by Rogers (1962; 1983), the TRA, developed by Fishbein and Ajzen (1975), the TAM, by Davis (1986), the theory of planned behaviour (TPB) as developed by Ajzen (1991). These foundational theories served as input for three additional theories and models, which include the decomposed theory of planned behaviour (DTPB) established by Taylor and Todd (1995a; 1995b), the extended technology acceptance model (TAM2 or ETAM) by Venkatesh and Davis (2000) and finally the unified theory of acceptance and use of technology (UTAUT) developed by Venkatesh *et al.* (2003). The most recent technology adoption theory and model is the extended unified theory of acceptance and use of technology (UTAUT2) developed by Venkatesh *et al.* (2012).

The abovementioned theories, with their coinciding models, are briefly discussed over the next sections. It should be noted that throughout these discussions of each theory, where reference is made to attitude, the definition and meaning thereof should be considered as explained in Section 2.2.2.3 (Chapter 2) and Section 3.5.1.

#### **3.3.1 Innovation diffusion theory (IDT)**

One of the earliest frameworks employed to understand consumers' acceptance of new products, drawn from an area of research, namely the diffusion of innovation, focuses on two closely associated processes known as the diffusion- and adoption processes (Schiffman *et al.*, 2012:403). The diffusion process, a macro process, pertains to the manner in which innovations spread or how it is integrated into a market. More specifically, diffusion relates to the process of how the acceptance of an innovation, namely new products, services or ideas, is communicated, by means of promotional strategies, to members of the target market in order to spread the

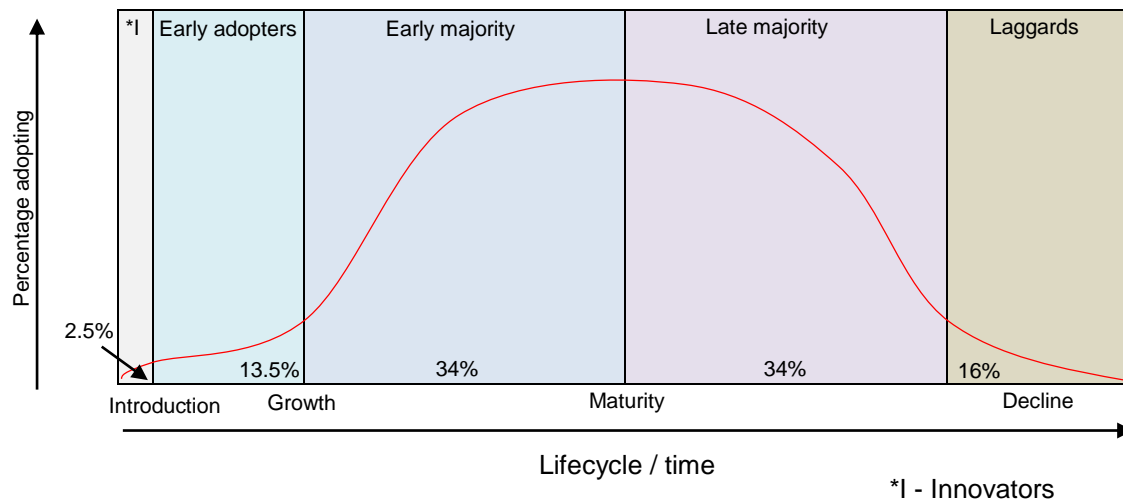


innovation over a period of time (Schiffman *et al.*, 2012:403). The adoption process, on the other hand, pertains to a micro process through which a consumer passes when deciding to either accept or reject an innovation (Schiffman *et al.*, 2010:450) and resembles the decision-making process (refer to Chapter 2, Section 2.2.1). Whilst taking into account the diffusion process of the innovation, the adoption process is initiated and consumers move through the stages of awareness, information search, evaluation of alternatives, trial use and finally adoption/rejection (Solomon *et al.*, 2013:583), where the relative significance of each stage differs according to the current knowledge of the innovation (Kaiser, 1985).

According to Rogers (1995), the IDT asserts that an individual's choice to adopt or reject an innovation is determined by five foremost innovation attributes, namely relative advantage, complexity, observability, compatibility as well as trialability. Relative advantage (perceived usefulness) relates to "the degree to which an innovation provides benefits, which supersede those of its precursor and may incorporate factors such as economic benefits, image enhancement, convenience and satisfaction" (Rogers, 1983) and should relate positively to attitude (Tayler & Todd, 1995a:141). Compatibility pertains to the degree to which the innovation suits the probable consumer's existing values, past experiences and needs of the individual, where complexity (ease of use) reflects the degree to which the particular innovation is perceived as challenging to understand, learn or use. Trialability pertains to the degree to which innovations are capable of being used on a limited basis (Schiffman *et al.*, 2012:406), which would allow the individual to experiment with the innovation's performance before committing to adopt (Brown *et al.*, 2003:383; Rogers, 1995). Observability or communicability refers to the ease with which the innovation's benefits or features can be observed, visualised or illustrated to potential users (Rogers, 1995; Schiffman *et al.*, 2012:407).

New inventions are not immediately accepted and used by all consumers; that is, only a small portion of the consumer population is driven to acquire these innovations as soon as they are available, while the majority of consumers prefer to wait before purchasing the same innovations (Blythe, 2005:145). Hence, the diffusion process dictates that innovations take time to filter through the target market. Based on this realisation, Rogers (1962) classified consumer behaviour based on their probable adoption of innovations. First, innovators are characterised as those individuals most likely to be the first to acquire the latest product as it becomes available, despite the possibility of inefficiencies (Moore, 1991). The second category, early adopters, describes those individuals who are amongst the first to own the latest innovations or products ahead of the average consumer and typically wait a while after the initial launch (Bothma, 2017:141; Rogers, 1962). The third category or early majority describes the individuals who would purchase a product after it has been excessively tried and tested, where the late majority category is characterised as apprehensive of innovations and prefer waiting until the majority of other

consumers own it before deciding to adopt (Rogers, 1962). The latter two categories highlight a need to collect relevant information of the innovation, evaluate it and deliberate carefully before making the decision, where social influence and peer pressure play an important role toward later adoption (Bothma, 2017:141). The final category, namely laggards, refers to individuals who only adopt new products based on absolute necessity. The diffusion of innovation theory is illustrated in Figure 3-1.



**Figure 3-1: Diffusion of innovation consumer adoption categories (Solomon *et al.*, 2013:585; Hoyer *et al.*, 2013:422)**

As evident from Figure 3-1 and reiterated by (Solomon *et al.*, 2013:585), innovators account for 2.5 percent of the consumer population that initially adopts new innovation, early adopters 13.5 percent, where early- and late majority is represented by the greater part of consumers (68%) and laggards account for 16 percent of adopters.

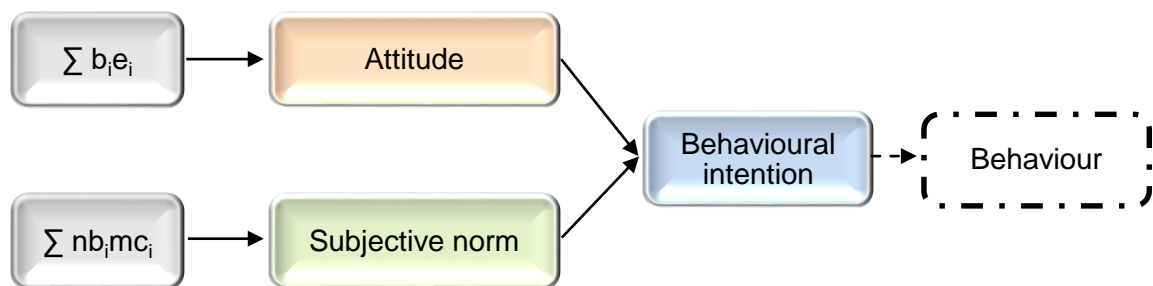
The intricate nature of innovation acceptance by means of the simultaneous diffusion- and adoption processes is evident and noted over a wide range of research areas, including information technology (Agarwal, 2000; Bradford & Florin, 2003; Bradley & Stewart, 2003; Brown *et al.*, 2003; Gerrard & Cunningham, 2003; Moore & Benbasat, 1991; Roy & Ghose, 2006; Wu, 2005; Wu & Wang, 2005), general consumer behaviour (Hirschman, 1980) and the adoption of various new products (Hoeffler, 2003; Jeong *et al.*, 2017; Kim & Sim, 2012).

### 3.3.2 Theory of reasoned action (TRA)

As indicated in Chapter 2, Section 2.3.3, the TRA refers to a revised version of the Fishbein multi-attribute attitude theory (Fishbein, 1963; 1967b), that consider variables such as social pressure as well as the attitude toward the act of purchasing a product, instead of an isolating attitude towards the object itself (Solomon, 2017:585). Moreover, this model characterises a thorough

incorporation of the attitude elements into a structure intended to explain behaviour better. Consequently, this model explains how, when and why attitudes forecast behaviour (Bagozzi *et al.*, 2000:97-106; Hoyer *et al.*, 2013:133).

The TRA, developed by Fishbein and Ajzen (1975), is one of the earliest theories to explain the adoption of technology (Nor & Pearson, 2008:32) by means of specific influencing factors. Figure 3-2 illustrates the TRA.



**Figure 3-2 Theory of reasoned action (TRA) (Taylor & Todd, 1995a:138)**

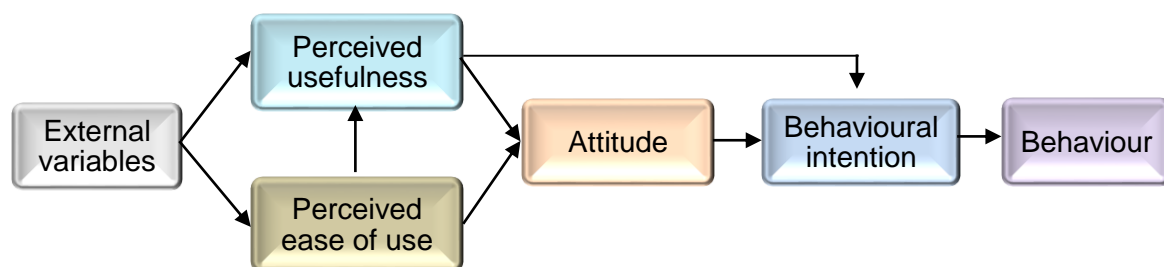
According to Ajzen and Fishbein (2005:174), the bases of specific human behaviours are guided mainly by means of a reasoned action approach that is based on the assumption that human behaviour stems rationally from their beliefs, attitudes as well as intentions. It is evident from Figure 3-2, as reiterated by Taylor and Todd (1995a:139), that actual behaviour is a direct function of behavioural intention. Behavioural intention, in sequence, is governed by the sum total of attitude toward the behaviour and subjective norm (Fishbein & Ajzen, 1975:302). Attitudes are formed by means of the individual's beliefs and evaluations ( $\sum b_i e_i$ ) (Davis *et al.*, 1989:984; Taylor & Todd, 1995a:138), where beliefs ( $b_i$ ) are defined as "the individual's subjective probability that performing the target behaviour will result in consequence (i)" and evaluations ( $e_i$ ) as "an implicit evaluative response to the consequence (i)" (Fishbein & Ajzen 1975:29). Additionally, the TRA assumes that one's subjective norm is governed by his or her normative beliefs ( $nb_i$ ), which stem from the individual's perceived expectations of specific reference groups or individuals including friends and family as well as their motivation to comply ( $mci$ ) to these expectations (Fishbein & Ajzen, 1975:302). Thus, subjective norm is the sum total of normative beliefs and motivation to comply ( $\sum nb_i mc_i$ ) and described as social pressures to perform a particular behaviour (Fishbein & Ajzen, 1975:302).

Owing to the nature of the TRA, namely its applicability to virtually any human behaviour across different situations (Ajzen & Fishbein 1980:4), it has been employed to a wide range of fields,

including computer and information technology (Davis *et al.*, 1989; Karahanna *et al.*, 1999; Liker & Sindi, 1997), as well as mobile chat and online tax service adoption (Nysveen *et al.*, 2005; Wu & Chen, 2005). Other research that utilised the TRA include the adoption of smart phones and paid mobile internet (Hsiao, 2013), internet banking adoption (Lee, 2009), 3G internet service use (Garg & Garg, 2013) as well as alcohol use and misuse (Codd & Cohen, 2003; Marcoux & Shope, 1997). In addition, the TRA has been successfully implemented in the wearable technology field, with a specific focus on smart watch adoption (Hsiao & Chen, 2018).

### 3.3.3 Technology acceptance model (TAM)

The TAM was adapted from the TRA (refer to Section 3.3.2) as proposed by Davis (1986) and is especially relevant for studying the acceptance of new technology (Toft *et al.*, 2014:393). This particular theory is employed in order to establish the influence of two separate salient internal belief systems, namely perceived usefulness (PU) and perceived ease of use (PEOU) on consumers' attitude and behavioural intention towards the acquisition and usage of new technologies (Davis, 1989). To reiterate, as introduced in Chapter 1, Section 1.1, perceived usefulness (synonymous to relative advantage in the IDT) is the subjective probability and likelihood that using the technology of interest will improve the way consumers complete a given task (Jahangir & Begum, 2008:33), for instance tracking daily activity. Davis (1989:320) describes perceived ease of use, which is synonymous to complexity in the IDT (refer to Section 3.3.1), as the degree to which consumers believe that using and understanding a particular system would be free of effort. Hence, if the technology of interest is perceived as easier to use in relation to older or more complex systems, the more likely users will accept it. Similarly, the more useful the technology of interest seems to be to the user, the more accepting they become of it. Moreover, the perceived ease of use also increases the perceived usefulness of the particular technology (Davis, 1989) and with systems that are more complex may have a more significant impact on intentions (Davis *et al.*, 1989:999). The TAM is illustrated in Figure 3-3.



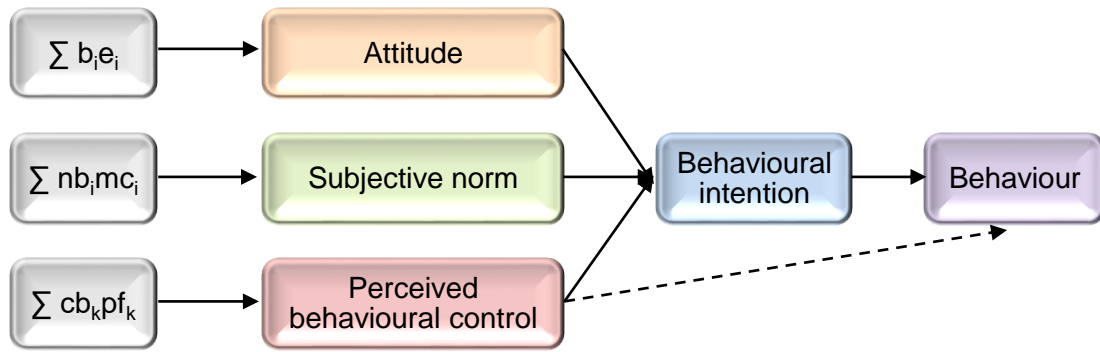
**Figure 3-3 Technology acceptance model (TAM) (Davis *et al.*, 1989:985)**

In accordance with the TAM, perceived usefulness and perceived ease of use is determined by various external variables (Davis *et al.*, 1989:984) including, amongst others, system design attributes, user attributes such as individual cognitive style and personality variables, task or operative attributes, the nature of the implementation procedure and political determinants (Fishbein & Ajzen, 1975). In turn, perceived ease of use contributes to perceived usefulness, which directly influences system use (Davis, 1989:319) as well as behavioural intention, over and above attitude (Davis *et al.*, 1989:987). Therefore, behavioural intention is established by the individual's attitude and perceived usefulness. Furthermore, attitude is jointly determined by perceived usefulness and ease of use, where attitude consequently determines behavioural intention and subsequent behaviour or usage of the technology (Davis *et al.*, 1989).

Chin *et al.* (2008:689-690) argue that the acceptance of new technology is predicted through the interpretation of users' PU and PEOU of the new system. Furthermore, the insights gained from applying the TAM could support both practitioners in the field as well as researchers in understanding and diagnosing potential errors with the new technology, which might let it seem difficult to use and not as useful and thereafter design suitable solutions in order to increase the acceptance potential (Chin *et al.*, 2008:690). Owing to the consistent predictions resulting from the implementation of the TAM across different populations and types of software (Lee *et al.*, 2003), the theory has been employed in various research studies (Arunkumar, 2008; Bigne-Alcaniz *et al.*, 2008; Blut *et al.*, 2016; Bruner & Kumar, 2005; Chae, 2009; Chin *et al.*, 2008; Choi & Kim, 2016; Chun *et al.*, 2012; Hsu & Lu, 2004; Kim & Shin, 2015; Koenig-Lewis *et al.*, 2015; Kwee-Meier *et al.*, 2016; Lee, 2009; Legris *et al.*, 2003; Luarn & Lin, 2005; Lunney *et al.*, 2016; Mathieson, 1991; Nikou & Economides, 2017; Rauniar *et al.*, 2014; Ros *et al.*, 2015; Toft *et al.*, 2014; Walker & Johnson, 2005; Yang *et al.*, 2005).

### **3.3.4 Theory of planned behaviour (TPB)**

Ajzen's (1991) theory of planned behaviour (TPB) stems from the TRA (as discussed in Section 3.3.2). That is, owing to the limitation apparent from the original model, the lack of dealing with behaviours over which the individual has deficient volitional control, has led to the inclusion of another factor, known as the identifying factor unique to the TPB, namely perceived behavioural control (Ajzen, 1991:181). This additional factor is illustrated in Figure 3-4.



**Figure 3-4 Theory of planned behaviour (TPB) (Taylor & Todd, 1995a:139)**

Perceived behavioural control (PBC) refers to an individual's perception of performing a certain behaviour is within his or her control (Conner *et al.*, 1999:1676). Control reflects on a continuum of the ease of executing behaviours from one end, for example the individual brushing his or her teeth, to, at the other end, performing a behaviour that demands resources, opportunity and possibly a skillset, such as losing weight (Conner *et al.*, 1999:1677). Similar to the formation of attitude and subjective norm (refer to Section 3.3.2), perceived behavioural control ( $\sum cb_k pf_k$ ) is formed by means of the sum total of control beliefs ( $cb_k$ ) and perceived facilitation ( $pf_k$ ) (Taylor & Todd, 1995b:150).

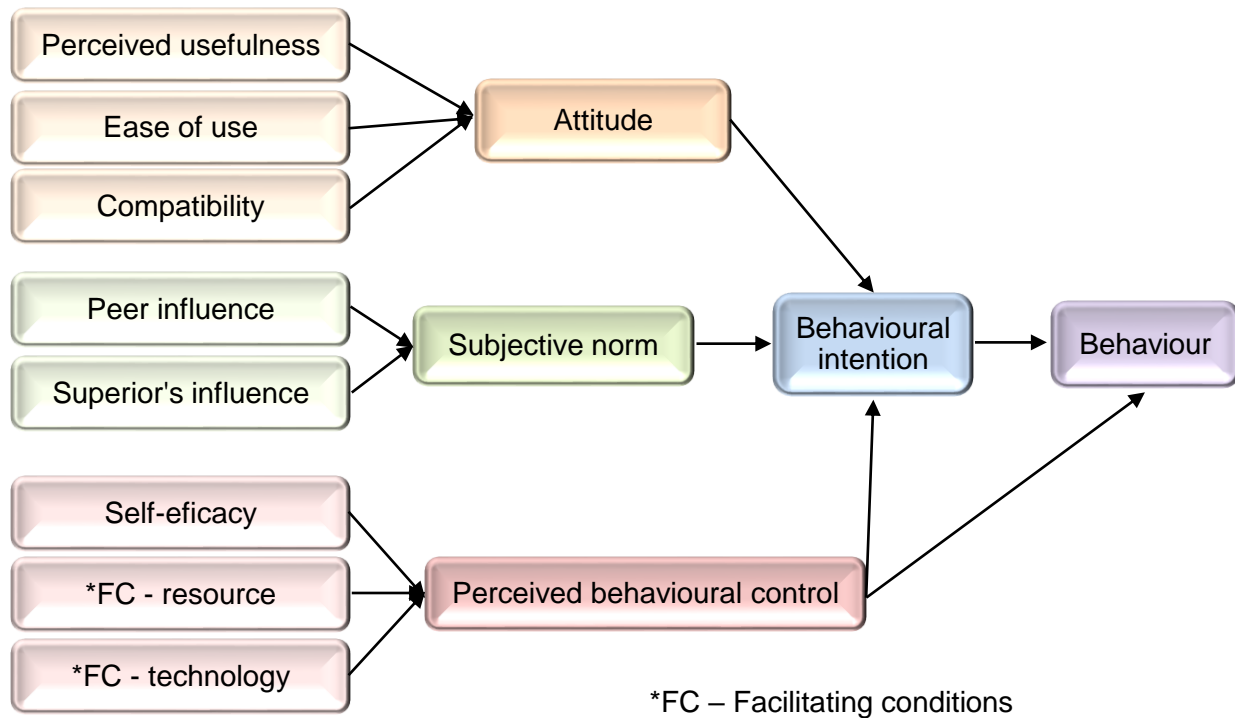
According to the theory, control beliefs denote the individual's belief of their ability to use information technology and perceived facilitation reflects whether the individual believes a skill level is important in determining technology usage. Moreover, PBC also symbolises facilitating conditions, namely beliefs regarding the resources and opportunities, including time, money and specialised resources, necessary to perform a certain behaviour (Taylor & Todd, 1995a:139) as well as self-efficacy or the individual's self-confidence in their ability to perform the behaviour (Ajzen, 1991:184). In accordance with the TPB, PBC is theorised to be an additional indicator of behavioural intention and behaviour (Venkatesh, 2003:429) and behavioural intention is determined by the individual's attitude toward the behaviour, subjective norm and perceived behavioural control (Taylor & Todd, 1995b:149). The TPB has been applied to understand a variety of behaviours, including health behaviours (Ajzen, 1988, 1991; Conner & Sparks, 1996), environmental studies (Fielding *et al.*, 2008), alcohol consumption (Conner *et al.*, 1999) and information technology usage (Gao & Bai, 2014; Lee, 2009; Mathieson, 1991; Morris & Venkatesh, 2005; Nor & Pearson, 2008; Pavlou & Fygenson, 2006; Wu & Chen, 2005).

### 3.3.5 Decomposed theory of planned behaviour (DTPB)

The decomposed theory of planned behaviour (DTPB), as evident in Figure 3-5, combines elements of the TPB (refer to Section 3.3.4) with elements present in the innovation diffusion

theory (refer to Section 3.3.1). From the innovation of diffusion process, five characteristics of an innovation that determine adoption were identified, three of which include relative advantage, complexity and compatibility. The DTPB proposes that attitude, subjective norm and perceived behavioural control will influence behavioural intention (Nor & Pearson, 2008:33-34). However, the purpose of decomposing these factors, namely the attitudinal, normative and perceived control beliefs into multi-dimensional constructs, was to better comprehend the associations between the belief structures, as well as the antecedents of intention and behaviour (Taylor & Todd, 1995a:140). Hence, attitude is decomposed into perceived usefulness, also known as relative advantage, ease of use, synonymous to complexity and compatibility. The theory suggests that the innovations' perceived usefulness, ease of use and degree of compatibility will determine the individual's attitude toward the innovation; where ease of use will negatively influence attitude as it increases. Similarly, subjective norm, as the normative belief structure, is decomposed into peer- and superior influences, which relates to the likely divergence of opinion amongst reference groups such as peers, superiors and subordinates (Taylor & Todd, 1995b:152). Further research decomposed subjective norm into three components, namely family, friends and peers, who are proposed to affect subjective norm positively (Nor & Pearson, 2008:43). Self-efficacy or perceived ability to use the innovation and facilitating conditions comprising availability of time, money and technology needed to use the innovation are the resulting elements of decomposing perceived behavioural control (Taylor & Todd, 1995a:144).

The apparent advantage of the DTPB over previous theories, for instance providing an enhanced comprehension of the associations between the belief structures in addition to its applicability across numerous research settings, the theory has been employed as a research framework extensively (Bhattacharjee, 2000; Chau & Hu, 2001; Lau, 2002; Nor & Pearson, 2008; Pavlou & Fygenson, 2006; Pedersen, 2005; Shih & Fang, 2004; Tan & Teo, 2000; Taylor & Todd, 1995b).



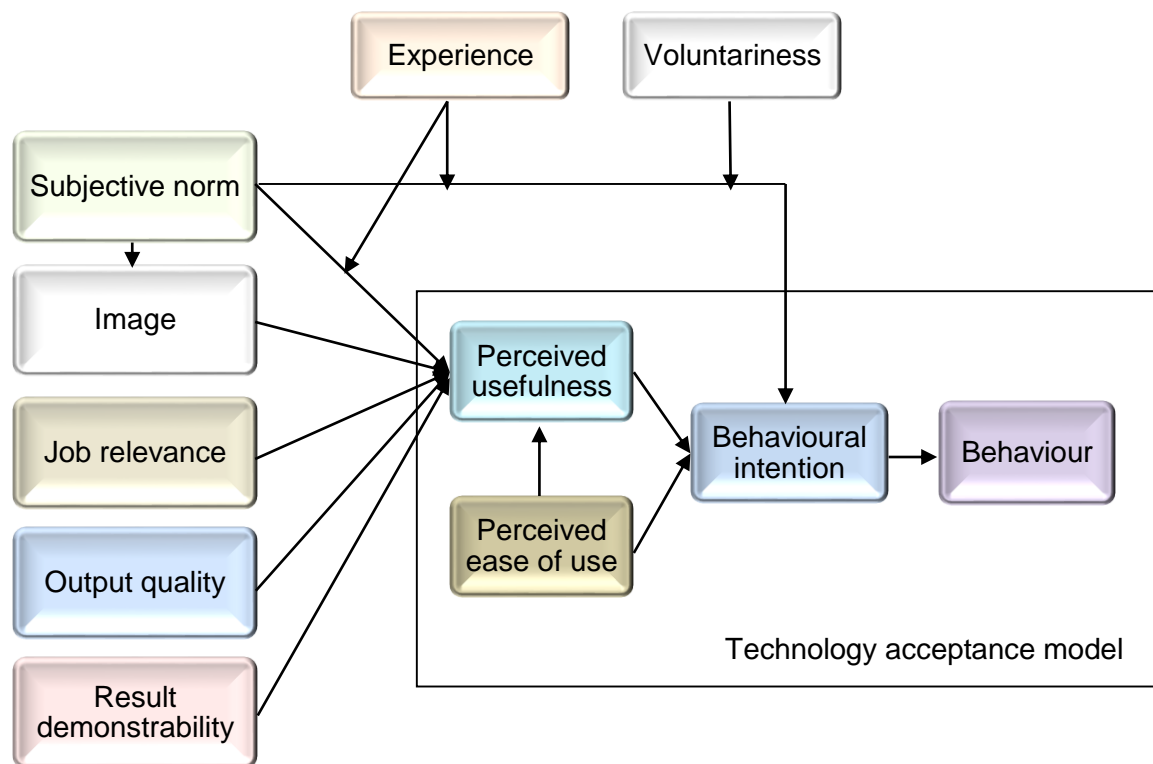
**Figure 3-5 Decomposed theory of planned behaviour (DTPB) (Taylor & Todd, 1995a:138)**

Similar to decomposing the theory of planned behaviour, the original TAM, as proposed by Davis (1989), was extended and this process is discussed in the succeeding section.

### 3.3.6 Extended technology acceptance model (TAM2/ETAM)

Upon conceiving the TAM2 in the year 2000, its predecessor (TAM) has become well established as an influential, authoritative and prudent model for forecasting user acceptance of technology since its introduction then 10 years before. However, in order to increase its explanatory power (Legris *et al.*, 2003:197), the TAM was extended to the TAM2 with the incorporation of social influence processes, namely subjective norm, voluntariness and image, as well as cognitive instrumental processes, which comprise job relevance, output quality, result demonstrability and perceived ease of use (Venkatesh & Davis, 2000:187). The additional constructs are evident from Figure 3-6.





**Figure 3-6 Proposed TAM2 – extension of the technology acceptance model (Venkatesh & Davis, 2000:188)**

Subjective norm, as described in Section 3.3.2, maintains its direct proposed influence on behavioural intention (Fishbein & Ajzen, 1975) and as per the TAM2 proposed to directly influence perceived usefulness and image (Venkatesh & Davis, 2000:189). Moore and Benbasat (1991:195) define image as "the degree to which the use of an innovation is perceived to enhance one's image or status in one's social system", which is proposed to influence consumers' perceived usefulness of the technology. Voluntariness, the first of the moderating factors, is defined as "the extent to which potential adopters perceive the adoption decision to be non-mandatory" (Moore & Benbasat, 1991:195) and is proposed to moderate the effect that subjective norm has on behavioural intention (Venkatesh & Davis, 2000:188). The second moderating factor, experience, is referred to the subsequent experience gained from the actual use of the technology and is proposed to moderate the effect between subjective norm and behavioural intention as well as the effect between subjective norm and perceived usefulness (Venkatesh & Davis, 2000:190).

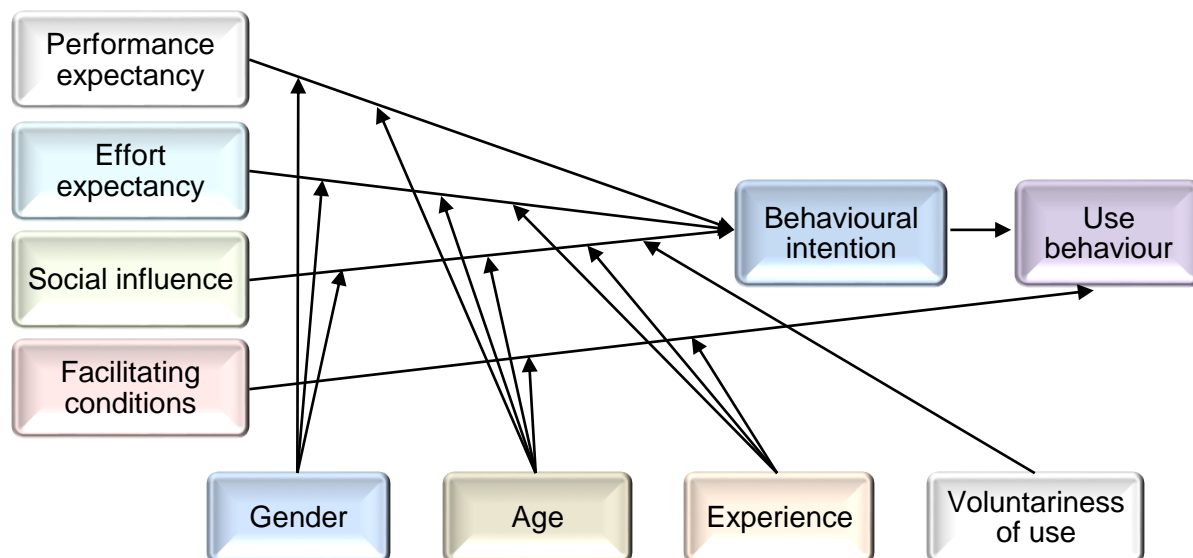
Job relevance is a function of the significance within the individual's job pertaining to the set of tasks the technological system is capable of assisting. Therefore, job relevance is defined as "an individual's perception regarding the degree to which the target system is applicable to his or her job" (Venkatesh & Davis, 2000:191). According to the nature of the job relevance factor, a positive

relationship towards perceived usefulness is imminent. Similarly, a positive relationship between quality output and perceived usefulness is proposed due to individuals considering how well the particular system performs the intended tasks, therefore, increasing the usefulness of the technology (Venkatesh & Davis, 2000:191-192). Result demonstrability is defined as “the tangibility of the results of using the innovation” (Moore & Benbasat, 1991:203) and will proposedly directly influence perceived usefulness. The original TAM, as the basis of the extension of the TAM2, carries the same implementation and meaning.

Previous research extended the TAM by integrating other variables, including flow experience (Hsu & Lu, 2004), perceived risk, perceived enjoyment, personal innovativeness, satisfaction and price sensitivity (Natarajan *et al.*, 2017), trust, enjoyment, task-related factors and self-efficacy (Wentzel *et al.*, 2013), cost and compatibility (Wu & Wang, 2005). The TAM2, as proposed by Venkatesh and Davis (2000) has been implemented in several research studies (Ismail & Masinge, 2012; Lee, 2009; Luarn & Lin, 2005; Masinge, 2010; Ozag & Duguma, 2004; Wu & Wang, 2005; Wu *et al.*, 2008).

### **3.3.7 Unified theory of acceptance and use of technology (UTAUT)**

Venkatesh *et al.* (2003:428-432) reviewed eight information technology theories and models of individual acceptance, including the TRA, the TAM, the motivation model (MM), the TPB, a combined version of the TAM and TPB (C-TAM-TPB), the model of PC utilisation (MPCU), the IDT, as well as the social cognitive theory (SCT), from which the unified theory of acceptance and use of technology (UTAUT) was proposed. The proposed UTAUT is illustrated in Figure 3-7.



**Figure 3-7 Research model – unified theory of acceptance and use of technology (UTAUT) (Venkatesh *et al.*, 2003:447)**

According to the UTAUT, three factors will have a probable direct influence on user acceptance and behavioural intention, namely performance expectancy, effort expectancy and social influence, where it is also proposed that attitude toward using technology, self-efficacy and anxiety will not have any influence on behaviour (Venkatesh *et al.*, 2003:446-447) – as proposed by various previous models. Furthermore, behavioural intentions and facilitating conditions are predicted to determine usage behaviour of technology (Venkatesh *et al.*, 2012:159). Moreover, the UTAUT implies that individual differences such as age, gender, experience and voluntariness of use, moderate the various relationships within the model (Venkatesh *et al.*, 2012:159).

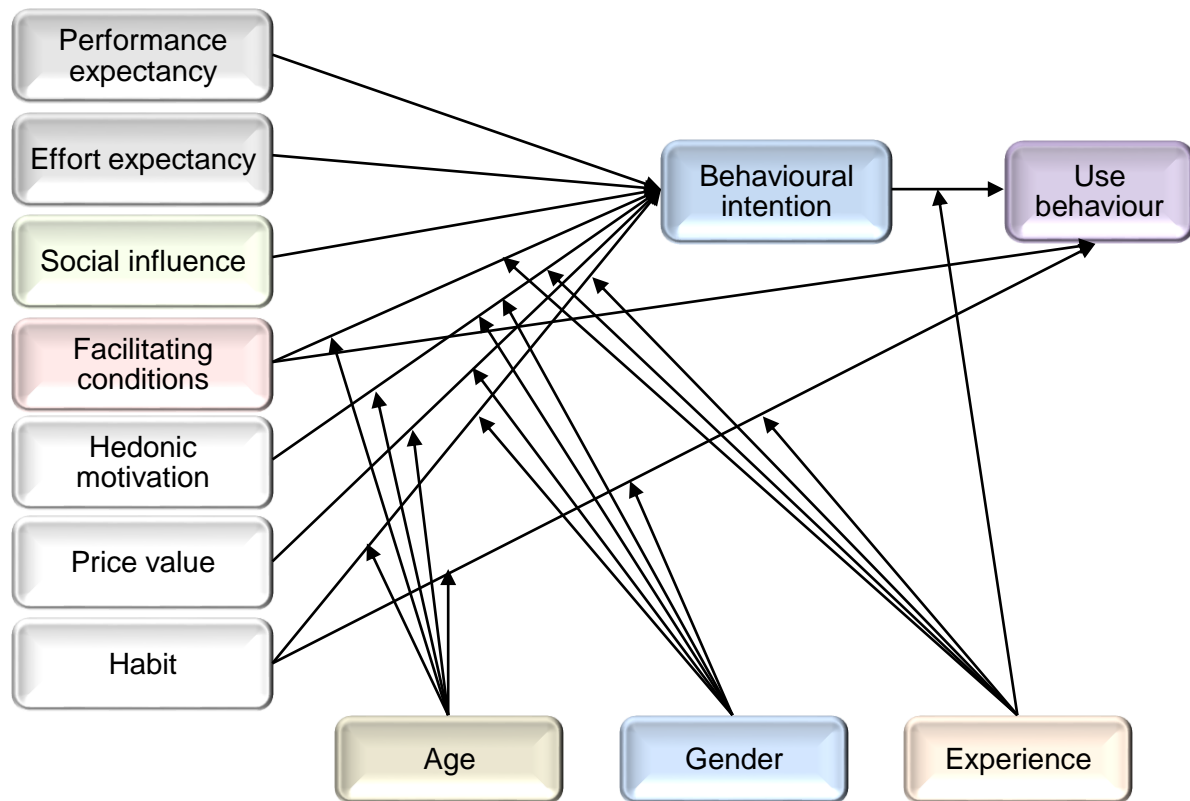
Venkatesh *et al.* (2003:447,450) define performance expectancy (synonymous to perceived usefulness in the TAM and relative advantage in the IDT) “as the degree to which an individual believes that using the system will help him or her to attain gains in job performance”. Effort expectancy (synonymous to perceived ease of use in the TAM and IDT) is defined as “the degree of ease associated with the use of the system.” Social influence, synonymous to subjective norm in the TRA, TPB, TAM2 and image in the IDT refers to the degree to which the individual perceives that significant others, including family, peers and friends, believe they should use a specific technology system or device, where facilitating conditions pertain to the individual’s perception that the resources and support is available to perform the particular behaviour (Brown & Venkatesh, 2005; Venkatesh *et al.*, 2012:159). The performance expectancy factor is proposed to be the most influential in predicting behavioural intentions and is moderated by gender and age (Venkatesh *et al.*, 2003:447, 449). The effort expectancy factor, specifically in the workplace, allows employees to evaluate time and effort when shaping views regarding the overall effort

associated with the acceptance and utilisation of the technology of interest (Venkatesh *et al.*, 2012:160-161) and its influential relationship toward BI is moderated by gender age and experience. According to Venkatesh *et al.* (2003:452), the influence of social influence on BI is proposed to be moderated by gender, age, experience and voluntariness. Facilitating conditions, which is equal to perceived behavioural control in the TPB and DTPB and compatibility in the IDT, has a direct proposed influence on usage behaviour and is moderated by age and experience.

Owing to the high explanatory power of this theory (Venkatesh *et al.*, 2003:426), it has since been implemented in various studies in order to explain technology adoption and usage (AbuShanab & Pearson, 2007; Baptista & Oliveira, 2015; Blut *et al.*, 2016; Martins *et al.*, 2014; Oshlyansky *et al.*, 2007; Šumak *et al.*, 2017; Venkatesh & Zhang, 2010; Venkatesh *et al.*, 2012; Wang & Shih, 2009; Wu *et al.*, 2016).

### **3.3.8 Extended unified theory of acceptance and use of technology (UTAUT2)**

From the original UTAUT, Venkatesh *et al.* (2012), an extended version was proposed, namely the extended unified theory of acceptance and use of technology (UTAUT2). According to Wong *et al.* (2014), the UTAUT2 is the most inclusive of all technology acceptance models when trying to explain consumers' technology acceptance and usage. That is, instead of the four factors of the original UTAUT, the UTAUT2 has seven factors that influence consumers' intention to adopt new technology (Gao *et al.*, 2015:1707). These factors, as evident in Figure 3-8, include performance expectancy, effort expectancy, social influence and facilitating conditions (from the UTAUT in Section 3.3.7), as well as the three additional factors, namely hedonic motivation, price value and habit (Venkatesh *et al.*, 2012:160).



**Figure 3-8 Research model – extended unified theory of acceptance and use of technology (UTAUT2) (Venkatesh *et al.*, 2012:160)**

It should be noted that even if the initial four factors remain, the definitions and meaning thereof were adapted from Brown and Venkatesh (2005) and Venkatesh *et al.* (2003) in the extended model. For instance, performance expectancy is defined as “the degree to which using a technology will provide benefits to consumers in performing certain activities” and effort expectancy as “the degree of ease associated with consumers’ use of technology”. Social influence, conversely, is defined as the degree to which consumers perceive that significant reference groups including friends, peers and family believe the individual should use the technology of interest and facilitating conditions refer to “consumers’ perceptions of the resources and support available to perform a behaviour” (Venkatesh *et al.*, 2012:159). The first of the three additional elements, namely hedonic motivation, is defined as “the fun or pleasure derived from using a technology” and is regarded as having an important role in determining the acceptance and usage of technology (Brown & Venkatesh, 2005). Price value is defined as “cognitive trade-off between the perceived benefits of the applications and the monetary cost for using them” (Dodds *et al.*, 1991:308) and habit is derived from Limayem *et al.* (2007:705) and defined as “the extent to which people tend to perform behaviours automatically because of learning.”

In the original UTAUT, there were four moderators, of which three remain in the extended model, namely age, gender and experience. Voluntariness of use was removed based on the author’s

argument that most consumer behaviours are voluntary, thus resulting in no variance in the voluntariness factor when applied to research (Venkatesh *et al.*, 2012:159). Instead, an additional link was added between facilitating conditions and behavioural intention (absent from UTAUT) and is moderated by age, gender and experience. The various proposed relationships are evident from Figure 3-8; all seven factors have a direct influence on behavioural intention, where behavioural intention, facilitating conditions and habit have a direct influence on usage behaviour. Furthermore, the relationship between facilitating conditions, habit as well as hedonic motivation and behavioural intention is moderated by age, gender and experience. Price value is only moderated by age and gender, where the relationship between habit and usage behaviour is moderated by age, gender and experience (Venkatesh *et al.*, 2012).

Despite the model's superior predictive ability (Venkatesh *et al.*, 2012:173), studies that have implemented this research model is currently limited (Koenig-Lewis *et al.*, 2015:541), especially concerning wearable technology. However, previous research (Arenas-Gaitán *et al.*, 2015; Gao *et al.*, 2015; Koenig-Lewis *et al.*, 2015; Morosan & DeFranco, 2016; Raman & Don, 2013; Wu *et al.*, 2016; Yang, 2013; Yuan *et al.*, 2015), can be used to draw inferences.

Table 3-2 provides a summary of previous studies in conjunction with the theories and models used to explain technology acceptance across the various fields of research.

**Table 3-2: Summary of previous research in conjunction with the respective theory and model of technology acceptance employed**

Theory/Model	Author(s)
IDT	Agarwal (2000); Bradford and Florin (2003); Bradley and Stewart (2003); Brown <i>et al.</i> (2003); Gerrard and Cunningham (2003); Hirschman (1980); Hoeffler (2003); Jeong <i>et al.</i> (2017); Kim and Sim (2012); Moore and Benbasat (1991); Roy and Ghose (2006); Wu (2005); Wu and Wang (2005)
TRA	Codd and Cohen (2003); Davis <i>et al.</i> (1989); Garg and Garg (2013); Hsiao (2013); Karahanna <i>et al.</i> (1999); Lee (2009); Liker and Sindi (1997); Marcoux and Shope (1997); Nysveen <i>et al.</i> (2005); Wu and Chen (2005)
TAM	Arunkumar (2008); Bigne-Alcaniz <i>et al.</i> (2008); Blut <i>et al.</i> (2016); Bruner and Kumar (2005); Chae (2009); Chin <i>et al.</i> (2008); Choi and Kim (2016); Chun <i>et al.</i> (2012); Hsu and Lu (2004); Kim and Shin (2015); Koenig-Lewis <i>et al.</i> (2015); Kwee-Meier <i>et al.</i> (2016); Lee (2009); Legris <i>et al.</i> (2003); Luarn and Lin (2005); Lunney <i>et al.</i> (2016); Mathieson (1991); Nikou and Economides (2017); Rauniar <i>et al.</i> (2014); Ros <i>et al.</i> (2015); Toft <i>et al.</i> (2014); Walker and Johnson (2005); Yang <i>et al.</i> (2005)

**Table 3-2: Summary of previous research in conjunction with the respective theory and model of technology acceptance employed (continued)**

Theory/Model	Author(s)
TPB	Ajzen (1988, 1991); Conner and Sparks (1996); Conner <i>et al.</i> (1999); Fielding <i>et al.</i> (2008); Gao and Bai (2014); Lee (2009); Mathieson (1991); Morris and Venkatesh (2005); Nor and Pearson (2008); Pavlou and Fygenson (2006); Wu and Chen (2005)
DTPB	Bhattacharjee (2000); Chau and Hu (2001); Lau (2002); Nor and Pearson (2008); Pavlou and Fygenson (2006); Pedersen (2005); Shih and Fang (2004); Tan and Teo (2000); Taylor and Todd (1995b)
TAM2	Ismail and Masinge (2012); Lee (2009); Luarn and Lin (2005); Masinge (2010); Ozag and Duguma (2004); Wu and Wang (2005); Wu <i>et al.</i> (2008)
UTAUT	AbuShanab and Pearson (2007); Baptista and Oliveira (2015); Blut <i>et al.</i> (2016); Martins <i>et al.</i> (2014); Oshlyansky <i>et al.</i> (2007); Šumak <i>et al.</i> (2017); Venkatesh and Zhang (2010); Venkatesh <i>et al.</i> (2012); Wang and Shih (2009); Wu <i>et al.</i> (2016)
UTAUT2	Arenas-Gaitán <i>et al.</i> (2015); Gao <i>et al.</i> (2015); Koenig-Lewis <i>et al.</i> (2015); Morosan and DeFranco (2016); Raman and Don (2013); Wu <i>et al.</i> (2016); Yang (2013); Yuan <i>et al.</i> (2015)

Owing to the novelty of wearable activity-tracking devices in South Africa, in conjunction with the limited research of the industry both nationally and internationally, the TRA and TAM was utilised with the addition of the perceived importance of brand name. These models were employed in order to provide the basis of as well as facilitate the pioneering research in the field of wearable activity trackers, per the objective of this study. Once a basis of wearable activity-tracking technology adoption has been established, further research that draws on more elaborate research models such as the TAM2/ETAM, UTAUT and UTAUT2, can be conducted.

Hence, this study aims to determine the attitudes and intentions of the Generation Y cohort, by exposing the influence and relationship between perceived usefulness and perceived ease of use (TAM), subjective norm and attitude (TRA) as well as the perceived importance of brand name (Yang *et al.*, 2016) and ultimately their behavioural intention of using activity-tracking devices. The Generation Y cohort as well as the factors that influence their behavioural intention towards the latter devices, is discussed in the succeeding sections.

### 3.4 THE GENERATION Y COHORT

Schewe and Meredith (2004:51) maintain that generational consciousness stems from established attitudes, values and the mind-sets of a given generation, which is derived from salient historical events as well as social trends these individuals were subjected to during their

formative years. A generational consciousness pertains to the communal attitudes, values and inclinations, such as usage-related preferences shown by an exemplary individual within a specific generation (Strauss & Howe, 1991:63). Owing to older generations being influenced by the same filtering circumstances that shape younger generations, stereotyping can occur easily. Therefore, Nicholas *et al.* (2011:30) state that it is vital not to stereotype any generational cohort when one conducts generational research. The purpose of a generational study is to discover and describe the degree to which an average member within one generational cohort differs from the average member in another (Twenge & Cambell, 2008:863).

The four generational cohorts identified from the literature include the Silent generation, the Baby Boomers, the Generation X as well as the Generation Y, known as today's youth (Bolton *et al.*, 2013:247). There are several inconsistencies to the exact terminology used to define a specific generation, primarily due to the lack of agreement regarding the exact start and end dates of a specific generation (Reeves & Oh, 2007:296). Several authors label members of the Generation Y cohort as those individuals born in the 1980s (Bolton *et al.*, 2013:246; Markert, 2004:21; Olson, 2014), where Constantine (2010:3) insists that the term "Generation Y" was merely devised during the early 1990s. That is, according to the latter author, a marketing trade magazine titled Advertising Age was the first to use the term Generation Y in an editorial in 1993 for the purpose of differentiating these members from those within the Generation X cohort. However, due to the mishmash of dates ascribed to generational cohorts, enormous confusion as to whom the Generation Y cohort includes specifically, ensued. Efforts to alleviate the confusion and provide a solution, sociologist John Markert (2004:21) draws upon his novel generational cohort classification scheme and divides generations into 20-year increments. These increments are subdivided into 10-year cohorts, which epitomise the first and second trend of each generation. Markert (2004:21) as well as Eastman and Lu (2012:94) classify the youth as Generation Y and, according to this scheme, define this cohort as "those individuals born between 1986 and 2005." Given the definition, in 2018, members of the Generation Y cohort comprised individuals aged between 13 and 32 years. According to various authors (Cudmore *et al.*, 2010:4; Schiffman *et al.*, 2012:355; Schlitzkus *et al.*, 2010:108), the members within the Generation Y cohort are also referred to as Echo boomers, Millennials and the Net generation. These members represent in excess of 50 percent of the world population (Harrington *et al.*, 2011:436).

The several traits that distinguish members of the Generation Y cohort from previous generations (Wolburg & Pokrywczynski, 2001:33) include, amongst others, a dynamic independence and autonomy (Williams *et al.*, 2010:9), being ambitious and completely self-reliant, fostering an inherent entrepreneurial ability together with being achievement oriented, individualistic as well as both socially- and culturally aware (Kane, 2012; Sheahan, 2005:59). In addition, members in this cohort are education- focused, confident as well as technologically innovative (Brier, 2004:16-



19), career-oriented (Wilson & Gerber, 2008:31) and highly motivated (Bevan-Dye *et al.*, 2012:5578; Bevan-Dye & Surujlal, 2011). These individuals are also characterised as passionate, demanding, strong-willed, optimistic, can easily adapt to change, encompass high levels of expectation and do not hesitate to voice their opinions and concerns (Cox *et al.*, 2008:4-7; Du Plessis *et al.*, 2007:2).

This study focused on a specific section within the Generation Y cohort, namely the university student segment, which according to several published research studies (Cui *et al.*, 2003; Fry, 2015; Kumar & Lim, 2008), is identified as those individuals enrolled at a higher education institution (HEI) aged between 18 and 24 years. From the approximate 70 percent of Generation Y members to complete a secondary education worldwide, 30 percent are projected to pursue tertiary education and 40 percent a post-secondary certification of some sort. Hence, it can be said that this generation is on its way to become the most formally qualified generation and subsequently represent a substantial and growing segment of the labour force today (Schlitzkus *et al.*, 2010:108; Sheahan, 2005:10). The demand for high skills and qualifications required to enter the labour market forces members in this cohort to conjure impressive resumes in a short time span (Wilson & Gerber, 2008:31), resulting in more than a third of the Generation Y cohort having to multi-task in terms of working while pursuing the necessary tertiary qualification. Consequently, it is unfathomable that these individuals enter the work environment without previously experiencing the use of technology and technological devices such as the internet and networked computers (Sheahan, 2005:10). Technology plays a vital role in the development and success of members within this generation. The following section, Generation Y and technology, highlights this role.

### **3.4.1 Generation Y and technology**

Owing to the digital revolution that transpired from the 1980s (Wunschel, 2018), members from the Generation Y cohort, unlike previous generations, were the first to be exposed to convergent technologies, the internet, mobile phones, numerous multimedia platforms, namely computer-generated social media platforms such as Facebook, Twitter and YouTube from birth (Schlitzkus *et al.*, 2010:108; Shaw & Fairhurst, 2008:366). It is evident that these individuals grew up in a period surrounded by the World Wide Web, with access to mobile phones and other electronic devices and some were fortunate enough with the luxury of a personal computer at home. As such, Kane (2012), Schwalbe (2009) and Sheahan (2005) note that these individuals obtain information at extraordinarily rapid speeds. The available technology paired with the characteristics of this cohort has led to Generation Y members flourishing on technology and its evolving innovations. The combination of using laptop PCs, mobile and electronic devices, the wide range of technological gadgets and the internet have allowed these individuals to lead social

lives, learn and subsequently achieve career objectives (Kane, 2012; Schlitzkus *et al.*, 2010:108; Schwalbe, 2009:59-60; Sheahan, 2005:59-60).

According to Mothersbaugh and Hawkins (2016:125), 83 percent of the members within the Generation Y cohort use social network sites, 66 percent send instant messages (IMs), where 95 percent have an online presence. Furthermore, these individuals reportedly spend an average of five hours per day in front of a computer (Sheahan, 2005:64). The author continues by stating that by the time the average individual enrolls for university, they would have sent and received approximately 200 000 text messages and electronic mails. It is evident, therefore, that instead of using the traditional face-to-face interaction, this cohort prefers to communicate by means of mobile phones and other mobile-type devices, where the internet is identified as the chief tool to perform an information search (Kane, 2012; Schwalbe, 2009:61).

It is apparent that this generation is not only viewed as the clued-up citizens of the global community (Kane, 2012; Schwalbe, 2009; Sheahan, 2005), but also the most tech- and internet-savvy generation to date and most importantly, set a trend in technology adoption (Ferguson, 2008). That is, since the inception of the digital and technologically-driven era, 90 percent of the members within the Generation Y cohort own a personal computer and 82 percent a mobile phone (Ferguson, 2008), where some own more than one mobile device (Fripp, 2014). The high technological adoption rates amongst these members may be accredited to them succeeding the previous generation and characterised as individuals with formidable aggregate spending (Cui *et al.*, 2003:310) as well as predicted to become the wealthiest and most influential generation yet.

In terms of reaching this cohort, traditional mass-marketing approaches, that proved effective with previous generations, no longer appeal to the Generation Y individuals (Mothersbaugh & Hawkins, 2016:125). Instead, marketers, across industries, including the wearable and activity-tracking segments, are faced with developing more innovative approaches to connect with, communicate to and deliver information pertaining to fitness- and health related solutions, of which activity-tracking devices form part. These innovative approaches are not only necessary to reach the cohort as a whole, previously perceived as a homogenous group, but also consider the heterogeneous nature of these individuals (Foscht *et al.*, 2009:224). Owing to these individuals' computer-oriented purchasing habits, where the implementation of digital media may result in an appealing image of a product and/or service offering (Malarchy, 2006), their purchase behaviour will prove significant in future (Wolburg & Pokrywczynski, 2001:35). For this reason, having a strong online and digital presence of the various activity-tracking devices, may encourage not only a positive image of the products, but also improve its adoption rate.

Research has shown that of the entire population, the wearable activity-tracking device segment, is dominated by the youth, with 33.7 percent of this market comprising of individuals aged

between 18 and 24 years (Statista, 2018c), who form part of the Generation Y cohort. Moreover, as indicated in Chapter 2 (refer to Section 2.2.2.2), it is the same youth who are more inclined to be proactive in changing their lifestyle patterns in favour of their well-being and are prepared to pay premium prices to reach health-related goals (Gustafson, 2017). According to the Global Health and Wellness Report (Nielsen, 2015:15), health attribute ratings are the highest amongst Millennials and indicate that as their acquisition power increases, manufacturers and retailers that specifically aim to understand as well as relate to the needs of these individuals, can enhance their chances of being successful.

### **3.4.2 Generation Y in South Africa**

As indicated in Chapter 1, the total South African population, as in 2017, totalled 56 521 900 individuals (Statistics South Africa, 2017), of which approximately 20 458 310 or 36.2 percent are members of the Generation Y cohort (Muller *et al.*, 2018:85). This figure is significantly large in relation to the country's total population. Various authors (Bevan-Dye *et al.*, 2012:5582; Du Plessis *et al.*, 2007:2; Puybaraud, 2010) indicate that the members within the Generation Y cohort were the first to be enrolled at multi-cultural schools, where they had the opportunity freely socialise with individuals that came from various backgrounds. On this basis, these members are viewed as culturally tolerant, open-minded, socially conscious and have the inclination to embrace diversity (Jordaan *et al.*, 2011:3). These individuals also relished increased career opportunities and wealth-generating prospects. Consequently, these individuals are attributed with a high future earning potential, high spending power as well as the subsequent increased social standing in the community (Schiffman *et al.*, 2012:355).

In addition, instead of reverting to information produced by mass media or relayed by sales personnel, these individuals are more inclined to value the information generated and opinions conjured from peers and referent groups such as friends and family members (Smith, 2012:86). The author affirms that the reason for the latter is due to members of this cohort frequently seeking peer opinion and their establishment of the worth of a particular product or service offering. The logic consequence is for marketers to adapt to their preference and influence the opinions leaders in the Generation Y community (Mothersbaugh & Hawkins, 2016:125).

In terms of the wearable technology industry, the wearable activity-tracking device market is dominated by the youth, where 33.7 percent comprise individuals between the ages of 18 and 24 years (Statista, 2018b). The South African Government has a vested interest in endorsing healthier lifestyle choices among this market segment, including getting the population more active, especially in terms of current and future healthcare costs implications in the country. The lifestyle-related non-communicable diseases (NCDs) in South Africa comprise cardiovascular diseases, diabetes, chronic respiratory conditions and cancer, which may be caused by certain

risk factors or a combination thereof, namely tobacco use, harmful use of alcohol, where the focus abounds to physical inactivity and unhealthy diets (Ministry of Health South Africa, 2013:16).

According to the Strategic Plan for the Prevention and Control of Non-Communicable Diseases 2013-17 (Ministry of Health South Africa, 2013:27,30), in order to attain a long and healthy life for all individuals, interventions that endorse the health of the population and prevent disease resulting from NCDs, is necessary. Several interventions focus around the populations' unhealthy diets and physical inactivity, such as reducing salt intake, increasing taxes on unhealthy food (those that contain excess fat and sugar), subsidising healthy food (fruit and vegetables), as well as suggesting physician counselling. However, the report fails to recognise the health benefits of using health-promoting technology such as activity-tracking and monitoring devices (as discussed in Section 3.2.3).

According to Hofman *et al.* (2015:740), "a health technology is any intervention that may be used to promote health, to prevent, diagnose or treat acute or chronic disease, or for rehabilitation and palliative care" and could assist the South African population not only to live healthier, but also reduce the number of NCDs and the subsequent death rates. One example includes wearable health-monitoring technology. However, as of yet, these devices are not intended to diagnose or treat any type of disease (Kaiser *et al.*, 2016), nor used for rehabilitation and palliative care purposes (Hofman *et al.*, 2015:740). Instead, using such a device creates awareness of current health statistics of the user and the data derived can be used to prevent further harm and improve current health.

Owing to the information in previous sections, the tech-savviness and spending power attributed to this generation, it can be said that members of this cohort have no difficulty acquiring such a device. However, almost a decade after the first release of such a device internationally (Beckham, 2012), the adoption rates are not as significant as expected. The adoption process may be attributed to the several technology-adopting theories discussed in Section 3.3, where several proposed factors hinder the acceptance of this new technology, namely a possible negative attitude towards the technology, failure to see the usefulness thereof, not being aware of having experienced using a device, or simply, consumers waiting for others to adopt and experience it first, before purchasing one themselves. Owing to the novelty of these devices, the factors that influence this generation's adoption behaviour is unclear. Hence, the following section explores and hypothesises the possible factors that contribute to Generation Y students' attitude towards and intention to use activity-tracking devices.

### **3.5 FACTORS INFLUENCING ACTIVITY-TRACKING DEVICE ADOPTION**

As discussed in Chapter 1 and detailed in Chapter 2, a better understanding of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices, international as well as South African product developers, local businesses, marketing practitioners, possibly medical professionals, policy makers towards sustained healthy living for all South African citizens, avid athletes and the general consumer population with an acute interest in adapting both their and the lifestyles of other individuals will be better equipped to appeal to new- and existing Generation Y consumers to use activity-tracking devices, as well as use these devices sustainably.

Owing to the novelty of these devices and the nature of this pioneering study in South Africa, this research builds upon previous research, however limited, of similar types of devices as well as technology adoption in general (refer to Section 3.3). A literature review indicates several probable factors that affect technology adoption. The first is the diffusion rate of the technology due to primarily awareness of its availability, benefits and use (IDT – Section 3.3.1), followed by consumers' attitude towards the technology paired with subjective norm (TRA – Section 3.3.2). Additionally, it was found that perceived usefulness and perceived ease of use affect consumer attitude and subsequent behavioural intention (TAM – Section 3.3.3), where the TPB (as discussed in Section 3.3.4) propose a combination of consumer attitude, subjective norm and perceived behavioural control. Moreover, perceived usefulness, ease of use, compatibility, attitude, peer influence, superior influence, subjective norm, self-efficacy, facilitating condition of technology and resources as well as perceived behavioural control was identified in the decomposed theory of planned behaviour (as discussed Section 3.3.5). Experience, voluntariness, subjective norm, image, job relevance, output quality and result demonstrability was identified in conjunction with the original TAM (TAM2/ETAM – Section 3.3.6), where performance expectancy, effort expectancy, social influence, facilitating conditions, gender, age, experience and voluntariness of use was identified in the UTAUT (refer to Section 3.3.7). Finally, the factors presented by the UTAUT2 (as discussed in Section 3.3.8) include performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit, age, gender and experience.

Studies of a similar nature proposed additional factors, including clothing involvement (Chae, 2009), vanity, the need for uniqueness, perceived self-expressiveness, perceived enjoyment, personal innovativeness in information technology (PIIT) (Choi & Kim, 2016), visibility, familiarity, fashion technology perception (Chuah *et al.*, 2016), perceived privacy risk, functional congruence, perceived vulnerability, perceived severity (Gao *et al.*, 2015), domain specific innovativeness,

aesthetics and novelty (Jeong *et al.*, 2017) attitude and device cost (Kim & Shin., 2015) as well as perceived value and brand name (Yang *et al.*, 2016).

From the pool of possible factors, this study aims to form a basis for wearable activity-tracking device adoption amongst Generation Y students. Hence, the subsequent section includes an examination of the foremost factors suggested to determine attitude towards and intention to use activity-tracking devices, namely attitude towards activity-tracking devices, perceived ease of use, perceived usefulness, subjective norm, as well as the perceived importance of brand name.

### **3.5.1 Attitude towards activity-tracking devices**

A historical, somewhat simplistic definition of attitude is “a settled opinion or way of thinking” that is followed by the behaviour that it reflects (Concise Oxford Dictionary, 1991:70). Attitude, according to the Business Dictionary (2017), is a predisposition or inclination to respond towards a certain notion, object, individual or situation, in an either positive or negative manner. Moreover, attitude effects a consumer’s course of action or behaviour, as well as how they respond to certain stimuli, such as rewards, incentives and challenges. In consumer behaviour, attitudes are referred to as a learned tendency to act either consistently favourable or unfavourable towards certain facets of the environment or an object (Joubert *et al.*, 2010:5). Attitude towards technology (refer to Section 2.5) is defined as a person’s overall affective or emotional reaction to the use of a particular system (Venkatesh, 2003:455). The interest of this study was to determine consumers’ attitude, whether it is positive or negative, towards an object, that is, a new technological range of devices, namely wearable activity-tracking devices. Therefore, this study will define attitude as an individual’s overall perception, positive or negative, towards the use of a wearable activity-tracking device. In this study, attitude was established by determining whether participants perceived using a wearable activity-tracking device as a good idea, whether they liked the idea of using such a device and whether they thought using a wearable activity-tracking device is beneficial.

Attitude, as a measure of technology acceptance, is present in various technology adoption theories, including the TRA (refer to Section 3.3.2) Davis’ TAM (refer to Section 3.3.3) and the theory of planned behaviour (refer to Section 3.3.4). Moreover, previous studies show that attitude had a significant influence on consumers’ intention to use or adopt smart watches (Choi & Kim, 2016:784; Kim & Shin, 2015:534; Wu *et al.*, 2016:388), wearable healthcare devices (Park *et al.*, 2016:726) and smart clothing, in which computer- and electronic technology is combined and integrated with fashion items (Chae, 2009:28-29). Despite the exclusion of attitudes as a measure of technology adoption in the (extended TAM) refer to Section 3.3.6, the findings of the abovementioned studies, particularly those related to technology and new technological devices,

necessitates the inclusion of attitudes as a measure of users' intention to use activity-tracking devices.

### **3.5.2 Perceived ease of use**

Perceived ease of use (PEOU), a key influencing factor in three technology adoption models (refer to Section 3.3), is defined as the "degree to which an individual perceives that using a specific system will be free of physical and mental effort" (Davis, 1989:320; Moore & Benbasat, 1991:197). According to Nor and Pearson (2008:42) it is expected that an innovation that is easy to use would probably inspire consumers to use the technology by developing a positive attitude about it. As such, this study defined perceived ease of use as the degree to which participants perceived the use of wearable activity-tracking devices to be relatively free of effort. Learning how to use wearable activity-tracking devices, remembering how to use these devices as well as the ability to use these devices to track one's daily activity, were determinants of how participants perceived wearable activity-tracking devices as easy to use. Davis (1989:319) claims that when all else is equal, a system that is perceived to be easier to use than an alternative, more complex system, is more likely to be accepted and adopted by consumers. Therefore, a wearable activity tracker that is perceived to be easier to learn and use will most likely be purchased.

The abovementioned statement is substantiated by numerous research studies with regard to technological systems or devices. Various studies confirm that perceived ease of use is a significant determinant of behavioural intention to use a system or device (Gao & Bai, 2014:222; Nikou & Economides, 2017:91; Taylor & Todd, 1995:149; Venkatesh, 2000:357; Wang *et al.*, 2014:2671) as well as perceived ease of use and attitude (Chuah, 2016:281; Kim & Shin, 2015:534; Park, 2016:726; Taylor & Todd, 1995:149; Wu *et al.*, 2016:388) with the exclusion of a more recent study (Choi & Kim, 2016:784), that found no relationship between perceived ease of use and consumer attitudes towards smart watches. Moreover, further research (Choi & Kim, 2016:784; Chuah, 2016:281; Chun *et al.*, 2012:476; Cyr *et al.*, 2006:957; Gao & Bai, 2014:222; Kim & Shin, 2015:534; Nikou & Economides, 2017:91; Taylor & Todd, 1995:149; Venkatesh, 2000:357) found that perceived ease of use is also a significant determinant of device or system perceived usefulness, which is directly related to usage behaviour (Davis, 1989:319). Therefore, this study theorised that individuals who perceive wearable activity-tracking devices as easy to use will perceive it to be more useful and subsequently have a positive attitude towards the use of such devices, resulting in a positive intention to use these devices. Therefore, perceived ease of use is seen as an important determinant of perceived usefulness of wearable activity-tracking devices as well as both attitudes toward and intention to use such devices.

### **3.5.3 Perceived usefulness**

The term useful describes an object that has the ability to be utilised for practical purposes or in several different ways (Oxford Dictionary, 2017). Given that activity-tracking devices comprise numerous different characteristics, uses and features (refer to Section 3.2.2); these devices should be perceived as highly useful. Perceived usefulness in terms of technology, as defined by Davis (1989:320), refers to the degree to which an individual believes that utilising a specific system would improve their job performance. The rudimentary purpose of using a wearable activity-tracking device is to become aware of sedentary behaviour as to become more active during the day, subsequently improving or increasing previous levels of physical activity or fitness levels as well as making lifestyle changes in order to lose weight (Mercola, 2016; Phillips, 2013). Therefore, this study defined perceived usefulness as the degree to which individuals believe that using a wearable activity-tracking device will improve and increase their quality and level of physical activity.

Davis (1989:334) asserts that perceived usefulness is a fervent indicator of user acceptance. As such, if a device is perceived to be highly useful, it is likely to be adopted. Furthermore, it is evident from Davis' TAM (as discussed in Section 3.3.3) that perceived usefulness would have a profound effect on individuals' attitude towards technological innovations. As a result, the individual who perceives a wearable activity-tracking device as highly useful should have a positive attitude towards these devices.

Numerous studies indicate that perceived usefulness had a significant influence on consumers' intention to use (Chuah, 2016:281; Chun *et al.*, 2012:476; Gao & Bai, 2014:222; Park *et al.*, 2016:272; Taylor & Todd, 1995:149) as well as attitude towards a device or form of technology (Choi & Kim, 2016:784; Chuah, 2016:281; Kim & Shin, 2015:534; Lunney *et al.*, 2016:118; Park *et al.*, 2016:272; Taylor & Todd, 1995:149). Accordingly, this study theorised that individuals who perceive wearable activity-tracking devices as useful will have a positive attitude towards the use of such devices, resulting in a positive intention to use these devices. Therefore, perceived usefulness use is considered an important determinant of both attitudes toward and intention to use wearable activity-tracking devices.

### **3.5.4 Perceived importance of brand name**

The name or title given to a specific product or service by the manufacturer or organisation is referred to as the brand name, which can be protected by a trademark (<sup>TM</sup>) (Nordquist, 2017). Richardson *et al.* (1994:29) maintain that brand name is a widely used extrinsic cue to surmise and/or sustain product quality perceptions, which may also exemplify comprehensive information about a product. Furthermore, brand name is a crucial determinant of the products' success in



the marketplace, especially if this product is new (Cooper, 1994:63). According to Grewal *et al.* (1998:336) in a situation where consumers have not yet had direct experience with a particular product, prior experience with known brand names offers them a certain degree of familiarity. A proper brand name is repeatedly fundamental to a new product's introductory marketing campaign (Keller *et al.*, 1998:48). Aaker (1991) advises that an effective brand name can increase awareness as well as produce a constructive image for a particular innovation. Owing to wearable activity-tracking devices, being a newly introduced product in the South African consumer market, it can be speculated, based on the previous statements that a well-known brand name is of particular importance to the adoption of these devices.

This study proposed and examined brand name as a key factor when choosing a wearable activity-tracking device. It was also suggested that brand name reflects the quality of a wearable activity-tracking device and that there is less risk of being disappointed when the individual buys a wearable activity-tracking device with a reliable brand name (Yang *et al.*, 2016:262).

Previous research indicates that brand name is a significant influential factor pertaining to perceived product quality (Dawar & Parker, 1994; Dodds *et al.*, 1991; Grewal *et al.*, 1998) and internal reference price (Grewal *et al.*, 1998), which in turn will affect consumers' perceived value and willingness to buy the product (Grewal *et al.*, 1998:335). The latter study found that among other variables, brand name exerts positive influence on purchase intent. For that reason, this study proposed that the perceived importance of brand name will influence Generation Y students' attitude towards and intention to use activity-tracking devices.

### **3.5.5 Subjective norm**

The considerations that contend with the probable approval or disapproval of a certain behaviour on account of friends, members of one's family, co-workers or peers, are typically termed normative beliefs and, in totality, are expected to result in perceived social pressure or subjective norm to partake or not partake in the behaviour (Ajzen, 1991:188; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; Hsu & Lin, 2016:44). As such, Fishbein and Ajzen (1975:302) define subjective norm as the individual's perception that most people important to them, be it friends, family or peers, thinks he or she should perform the particular behaviour. Kwee-Meier *et al.* (2016:397) opine that while subjective norm and image (refer to Section 3.5.5) are both social aspects, it is imperative to differentiate between the two constructs. Despite both constructs being entrenched in social influence and interrelated to some extent (Venkatesh & Davis, 2000:188), the two are theoretically distinct. That is, subjective norm, derived from the TRA and TPB, signifies direct or indirect normative influence applied by perceived significant individuals such as friends, family or peers on the person's intention to perform a particular behaviour (Fishbein & Ajzen, 1975:302; Norman & Smith, 1995:440). Conversely, social image, derived from the IDT, denotes

the respect and admiration that the individual anticipates to derive from significant others in relation to the performed behaviour (Lin & Bhattacharjee, 2010:167).

Subjective norm influences behavioural intention directly when the individual decides to perform a particular behaviour, despite this behaviour or its consequences not being favoured by important others such as friends, peers and family members. The particular behaviour is performed based on the individual's belief that one or more of these significant individuals think they should. Therefore, these individuals are adequately motivated to comply with those thought to be of significant importance (Blut *et al.*, 2016:400; Venkatesh & Davis, 2000:187). Given this notion, subjective norm demonstrates how these significant others effect an individual's motivation to engage in physical activity and live healthily and consequently adopt a wearable fitness technology device (Lunney *et al.*, 2016:115). Stephens (2012:8) opines that in a consumer context, the individual's attitude towards a particular brand plays an important role in his or her decision to purchase or not, but social norms, which include referent group approval, may either support or hinder their choice.

Various studies (Blut *et al.*, 2016; Gao & Bai 2014; Hsu & Lu, 2004; Lee, 2009; Nor & Pearson 2008; Pavlou & Fygenson, 2006; Taylor & Todd, 1995; Venkatesh & Davis, 2000) indicate that subjective norm as a significant determinant of behavioural intention as well as attitude (Blut *et al.*, 2016; Kim *et al.*, 2013; Pavlou & Fygenson, 2006). Despite a recent study finding subjective norm to be significantly related to wearable fitness technology usage (Lunney *et al.*, 2016), the influence of subjective norm is generally unknown with regards to wearable fitness technology, more specifically wearable activity-tracking devices, therefore, necessitating its inclusion in this study.

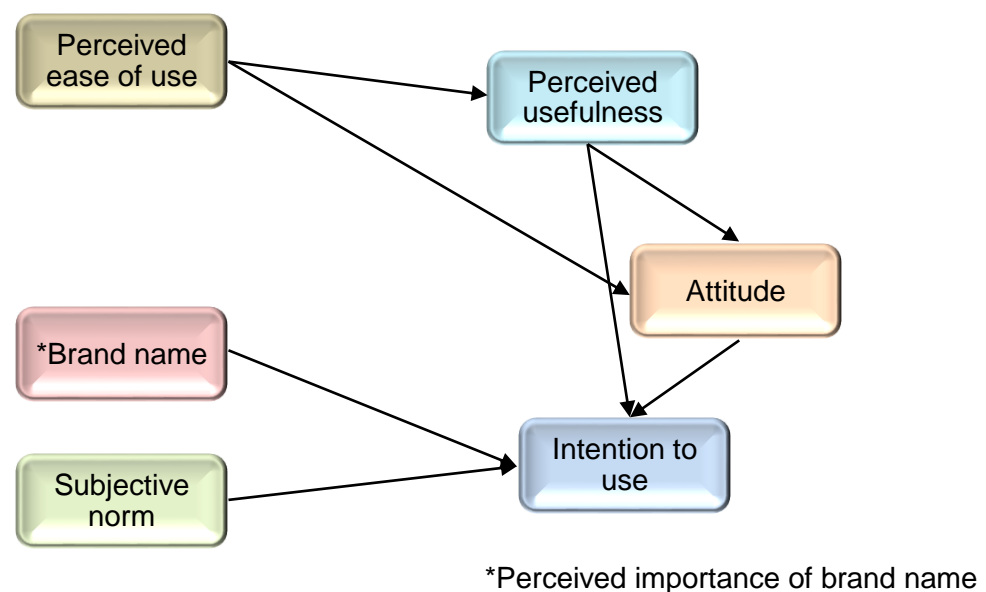
In this study, the influence of subjective norm was investigated based on the notion that participants believed that people who are important to them, whose opinions they value as well as those that influence their decisions, thought that they should use a wearable activity-tracking device (Lee, 2009:140), therefore, establishing a normative influence on their intention to use such devices.

### **3.6 PROPOSED MODEL OF FACTORS THAT INFLUENCE GENERATION Y STUDENTS' ATTITUDE TOWARDS AND INTENTION TO USE ACTIVITY-TRACKING DEVICES**

The literature review provided in Chapter 2, as well as the current chapter, revealed important insights and subsequently provided the theoretical and foundational background for uncovering the possible factors that influence Generation Y members' attitude towards and intention to use wearable activity-tracking devices. The primary objective of this section is to propose a testable

empirical model of the possible factors that influence Generation Y members' attitude towards and intention to use activity-tracking devices visually. This model is based on the existing theories, models and similar research studies, as revealed in the preceding literature review. The model is illustrated in Figure 3-9 and theorises that a number of foundational factors will influence the user's attitude towards and intention to use an activity-tracking device. As discussed in Section 3.3.8, this model is a combination of the foundational factors of the TRA and the TAM, with the addition of perceived importance of brand name (refer to Section 3.5.4).

This model, based on the preceding literature review, hypothesises that perceived ease of use and perceived usefulness will positively influence an individual's attitude towards ATDs, where perceived usefulness will also positively influence perceived ease of use. Moreover, perceived usefulness is also predicted to influence users' intention to use an ATD directly. Both subjective norm and perceived importance of brand name are hypothesised to determine behavioural intention to use ATDs directly. Lastly, this model predicts, as in countless research before, users' that attitude towards ATDs will directly determine their intention to use ATDs.



**Figure 3-9: Proposed model of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices**

In order to statistically establish and verify these relationships predicted in this research model, the model will be tested empirically and the findings reported on in Chapter 5.

### 3.7 CONCLUSION

This chapter comprised a literature review of wearable activity-tracking technology and devices, where these devices, as a product category, were defined, the various types both illustrated and

discussed based on use and characteristics. Moreover, the benefits of using such devices were highlighted. In order to enable the comprehension of the adoption of these devices, the various technology adoption theories and models were identified and the underlying theory examined. The target population of interest, namely the Generation Y cohort was introduced and examined in relation to a global perspective, in terms of their use of technology as well as in the South African context. The hypothesised factors that influence the target populations' attitude toward and intention to use activity-tracking devices were identified and discussed, before ultimately composing the proposed model to explain this phenomenon.

The research methodology utilised to empirically test the proposed model formulated in this study, which is to establish the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices, is detailed in the succeeding chapter. Chapter 4 details the sampling procedure, the research instrument as well as the statistical analysis methods used in this study. Thereafter, the findings emanating from the empirical testing of the proposed model, is reported on in Chapter 5.

## CHAPTER 4

### RESEARCH DESIGN AND METHODOLOGY

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#### 4.1 INTRODUCTION

Chapter 3 delineated a proposed model of factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices. Within this chapter, the research methodology that was pursued in empirically testing that model on Generation Y students in South Africa is described.

Hair *et al.* (2013:5) describe marketing research as a function that connects an organisation to its market by means of gathering information. Marketing research necessitates the application of scientific methods in searching for the authenticity regarding marketing phenomena (Zikmund & Babin, 2013:6). Therefore, marketing research is the process that conveys gathered information with the aim of identifying opportunities, solving marketing problems, generating and weighing marketing ideas, monitoring performance, as well as recognising the most efficient advertising media (Malhotra, 2015:28; Zikmund & Babin, 2010:5). Marketing research can be defined as the methodical gathering, examination and analysis of information regarding all marketing enigmas through acclaimed scientific approaches (Wiid & Diggines, 2010:5).

As indicated in Chapter 1, this study's primary objective was to propose and empirically test a model of factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices within the South African context. In keeping with the primary objective, the ensuing empirical objectives were devised (refer to Section 1.3.3) and investigated:

- Determine Generation Y students' attitude towards activity-tracking devices.
- Determine Generation Y students' perceived ease of use concerning activity-tracking devices.
- Determine Generation Y students' perceived usefulness concerning activity-tracking devices.
- Determine Generation Y students' perceived importance of brand name concerning activity-tracking devices.
- Determine Generation Y students' subjective norm concerning activity-tracking devices.
- Determine Generation Y students' intention to use activity-tracking devices.
- Determine if Generation Y students' attitude towards activity-tracking devices and consequent behavioural intentions is a six-factor model.

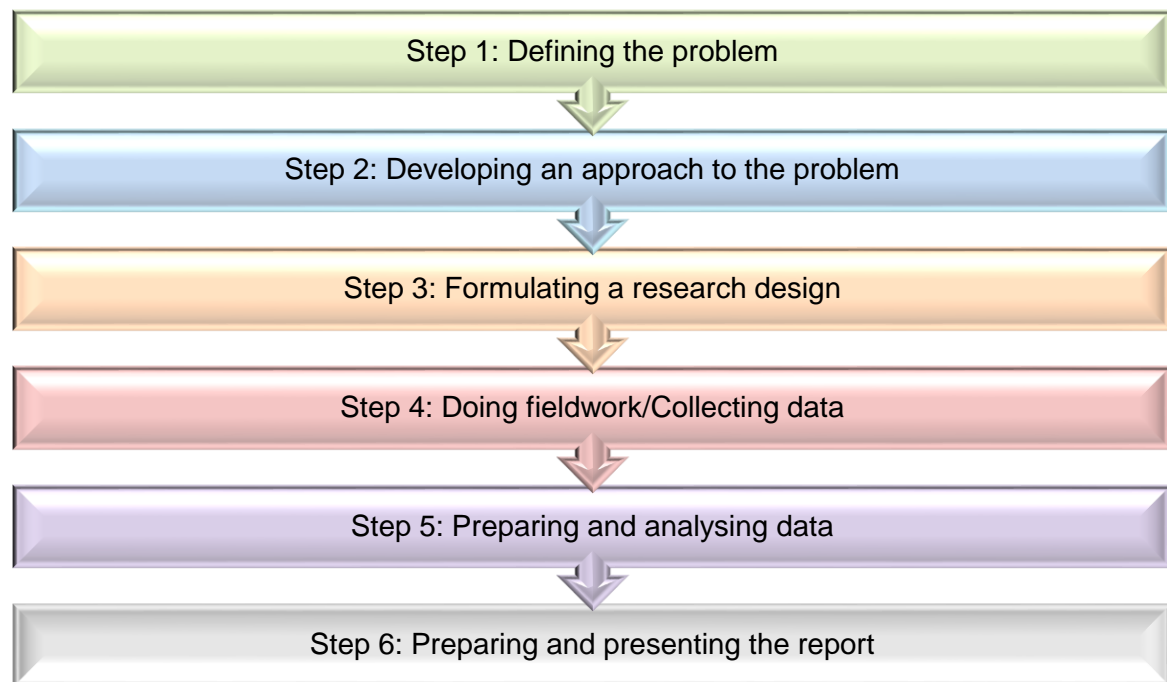
- Empirically test a proposed model of the extent to which perceived ease of use, perceived usefulness, perceived importance of brand name and subjective norm influence Generation Y students' attitudes and intention to use activity-tracking devices.

This chapter describes the research methodology employed for gathering and analysing the data for this study. Within this chapter, the marketing research process, research approach and research design applied in this study is reviewed, elaborating on the sampling procedure, data collection method, pre-testing and administration of the questionnaire and the preparation of the data. The statistical techniques and processes applied to analyse the data are described in this chapter. This chapter commences with providing a detailed discussion of the marketing research process (Section 4.2), which serves as a broad layout for this chapter and study.

## **4.2 MARKETING RESEARCH PROCESS**

Companies use marketing research in order to fulfil information needs and provide their management team with appropriate, accurate, trustworthy, legitimate and current information regarding a gap identified in the market. The information obtained will assist management in making sound marketing decisions in order to remain competitive (Malhotra, 2015:33). Fortunately, to be able to gather such valuable information, a process that provides the researcher with direction is available (Burns & Bush, 2014:68).

Zikmund and Babin (2010:50) affirm that every research effort will follow exactly the same ordered succession of activities, although the stages of the process overlap continuously. Whilst the exact steps of the marketing research process are debatable and various diagrammatic illustrations available (Shukla, 2008:19), Malhotra (2015:204) proposes an easy-to-follow approach to the marketing research process that consists of six steps, as portrayed in Figure 4-1.



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**Figure 4-1: Marketing research process (Malhotra, 2015:32)**

The six steps indicated in Figure 4-1 depict the succeeding tasks that the researcher should follow when undertaking a marketing research project. The steps comprise defining the problem, thereafter the researcher needs to develop an approach to the problem and then formulate the research design, which details the procedures to be followed when gathering the necessary data. Thereafter, fieldwork will commence and the appropriate data collected, followed by data preparation and analysis. Lastly, the findings revealed during the process will finally be prepared and the report presented (Malhotra, 2015:32-33).

The problem in this study was identified in Chapter 1 (refer to Section 1.2), which was the necessity to propose and empirically test a model of factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices within the South African context. As evident from the problem definition and subsequent objectives of the study, one primary objective, seven theoretical objectives and eight empirical objectives were devised (refer to Section 1.3).

The next segment comprises a discussion of the second step in the marketing research process, namely developing an approach to the problem.

### **4.3 RESEARCH APPROACH**

There are three components to consider when developing an approach to the problem, namely analytic framework and models that describe the problem, research questions or hypotheses that are formulated to investigate the issue, as well as a description of the information required to

solve the problem at hand (Malhotra, 2015:69). The analytical framework and research model of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices were introduced in Chapter 1 (refer to Section 1.2) and a detailed discussion provided in Chapter 3 (refer to Sections 3.5 and 3.6). From the objectives of the study along with the research model, several hypotheses were formulated (refer to Section 1.4 and 5.10). Ultimately, when developing the research approach, the researcher needs to specify the most appropriate type of information necessary to solve the research problem. Burns and Bush (2014:74) identify two types of information, namely secondary information, which comprise information that has been previously collected and readily available and primary information, which comprise information that is specifically gathered for the problem at hand.

Wiid and Diggins (2013:59) continue, stating that there are two basic research approaches to solve any research problem, namely a quantitative research approach and a qualitative research approach. A qualitative research approach is typically an amorphous method to collect data that comprises gathering, examining and explaining data, which allows the researcher to understand consumer attitudes and opinions by means of observations (Clow & James, 2014:41). The questions asked and observations made during a qualitative study are open-ended (Malhotra, 2015:246). Compared to qualitative research, a quantitative research approach is a structured data collection method and has a high degree of generalisability, meaning that the results obtained from a specific sample is said to imitate the results of the entire population (Hair *et al.*, 2010:78). Burns and Bush (2014:146) define quantitative research as research that comprise the dispensation of a series of arranged questions with predetermined response options to a considerable number of respondents. The information gathered and results obtained from quantitative research can be analysed using statistical procedures (Clow & James, 2014:41).

This study gathered data regarding Generation Y students' attitude towards and intention to use activity-tracking devices and is, therefore, primary data. Given the elevated generalisability prospects and the objective nature of this study, a quantitative research approach, employing the survey method was applied to gather the required data.

## **4.4 RESEARCH DESIGN**

The third step in the marketing research process, after defining the problem and developing an approach to the problem, is to formulate the research design, which according to Zikmund and Babin (2013:61) provides a co-ordinated framework or plan of action for the research to be undertaken. Therefore, the research design is a master plan that specifies both the methods and procedures for gathering and analysing the necessary information. An appropriate research design will ensure that the information obtained regarding the research problem is relevant and that the type of research design chosen will depend on the type of research (Smith & Albaum,



2010:21). Shukla (2008:29) argues that despite each research question being unique; most research objectives can be achieved through the employment of one of the three research designs types, namely exploratory, causal and descriptive.

#### **4.4.1 Exploratory research**

An exploratory research design is employed in situations where the problem needs to be defined more precisely, more applicable courses of action identified, or further insights gained before developing an appropriate approach to the research problem (Malhotra, 2015:85,86). Clow and James (2014:27) agree, stating that exploratory research comprises an initial examination of a problem or situation in order to ascertain the parameters to be examined further. In addition, exploratory research can be used to intensify the understanding of consumer motivations, attitudes and behaviour, which are not easily accessed by other research methods (Hair *et al.*, 2013:36). According to Zikmund and Babin (2010:118), the tools used during an exploratory research design produce more findings than other research designs and is, therefore, the most productive research design. However, exploratory research is not definite, but devised to be applied by executives to drive the development of future research projects or better comprehend a situation, rather than making decisions (Clow & James, 2014:27). Furthermore, Burns and Bush (2014:101) emphasise the unstructured and informal nature of exploratory research. This method does not specify formal objectives, a sample plan, or a questionnaire and often uses small, non-representative samples. The several methods of exploratory research consist of secondary research, literature reviews of already available information, focus groups, in-depth interviews, case studies and pilot studies (Clow & James, 2014:28; Hair *et al.*, 2010:36). Given that the findings obtained from exploratory research are tentative in nature, the insights gained should be verified by applying conclusive research (Malhotra, 2015:86).

#### **4.4.2 Causal research**

Causal research, a type of conclusive research, has the main objective of obtaining evidence pertaining to causal relationships (Malhotra, 2015:88). Zikmund and Babin (2010:47) state that causal research pursues the identification of cause-and-effect relationships in order to illustrate that one event essentially results in another to occur, therefore, allows causal inferences to be made. Thus, the purpose of causal research is to manipulate or exclude all potential causes of an effect excluding the one being investigated. According to Clow and James (2014:29), in order to establish causality, two conditions must be met, namely temporal sequence and concomitant variation. Temporal sequence pertains to timing difficulties and requires the cause to occur either before or at the same time as the effect, where concomitant variation requires the two items, predicted as present in the causal relationship, to transform concurrently and in the direction theorised. Causal research is highly suitable in situations that necessitate an understanding of

the reasons market phenomena occurring as they do (Shukla, 2008:46). The main method of obtaining results of casual research is by means of experimentation (Malhotra, 2015:88), including laboratory- and field experiments (Wiid & Diggines, 2010:57). Even though casual research designs provide researchers with an opportunity to measure and clarify causality amongst market factors (Hair *et al.*, 2010:36), this method of research can be a time-consuming process and often involve complex designs that can be expensive (Zikmund & Babin, 2010:47).

#### **4.4.3 Descriptive research**

The second type of conclusive research, namely descriptive research, is undertaken in order to answer the questions of who the customers are, what brands they buy and in what quantities, where they purchase certain brands, when consumers go shopping, as well as how they obtain product related information (Burns & Bush, 2014:103). Descriptive research designs, often being referred to as observational designs, provide information about groups and occurrences that are already present (Smith & Albaum, 2010:23). A descriptive research design is employed when the intention of the investigation is to compose predictions of the current market situation and consumer behaviour as well as to depict certain characteristics of a defined target population (Hair *et al.*, 2013:44; Shukla, 2008:39). These characteristics include consumer attitudes, intentions, preferences, purchase behaviours, demographics, beliefs and opinions (Bradley, 2013:508; Hair *et al.*, 2013:36). According to Zikmund and Babin (2010:50), descriptive research is frequently used to profile a market segment both demographically and psychographically. Burns and Bush (2014:103) identify two basic types of descriptive research, namely cross-sectional studies and longitudinal studies. In cross-sectional studies, the units from a given sample of the population are measured only once, where longitudinal studies require the repeated measure of the same sample units of the population over an extended period (Wiid & Diggines, 2010:56). The two main methods of a descriptive research design are surveys and observations (Malhotra, 2015:87). Clow and James (2014:28) assert that studies utilising a descriptive design collects quantitative data, therefore, enables the researcher to examine statistical and mathematical relationships. Compared to the unstructured and informal nature of exploratory research, descriptive research is highly structured and rigid (Silver *et al.*, 2013:71).

This study's main purpose was to gather data pertaining to Generation Y students' attitude towards and intention to use activity-tracking devices. Therefore, a descriptive research design, using a single cross-sectional approach, was selected as the most suitable research design for this study.

## **4.5 SAMPLING STRATEGY**

The sampling plan employed within a research study determines how the sampling decision, in relation the population, sample frame, sample unit, sample size, as well as the sampling method are applied (Malhotra, 2010:375). As such, the following sub-sections describe the sampling procedure applied to this study.

### **4.5.1 Defining the target population**

Clow and James (2014:226) assert that defining the target population is the first step in the sampling process. A target population denotes an entire collection of people or subjects to which a researcher is interested in generalising the inferences made as well as report specific research questions (Shiu *et al.*, 2009:63). Hair *et al.* (2013:137) add that a defined target population comprises a complete group of elements, either people or objects that the researcher identifies for investigation based on the objectives of the study. It is essential to select an appropriate target population to achieve the coveted results of a study and avoid ineffective and misleading research based on an imprecise definition of the target population. Given that the researcher cannot measure every element of the population, a single sample of the specific population is extracted as an alternative (Silver *et al.*, 2013:152-153; Berndt & Petzer, 2011:39). Selecting and defining the specific population is typically done in terms of the element, sampling unit, sample frame and time frame (Hair *et al.*, 2013:137).

This study's target population comprised all male and female Generation Y full-time undergraduate students between the ages of 18 and 24 years, enrolled at South African HEIs situated in the Gauteng province during 2017.

### **4.5.2 Sampling frame**

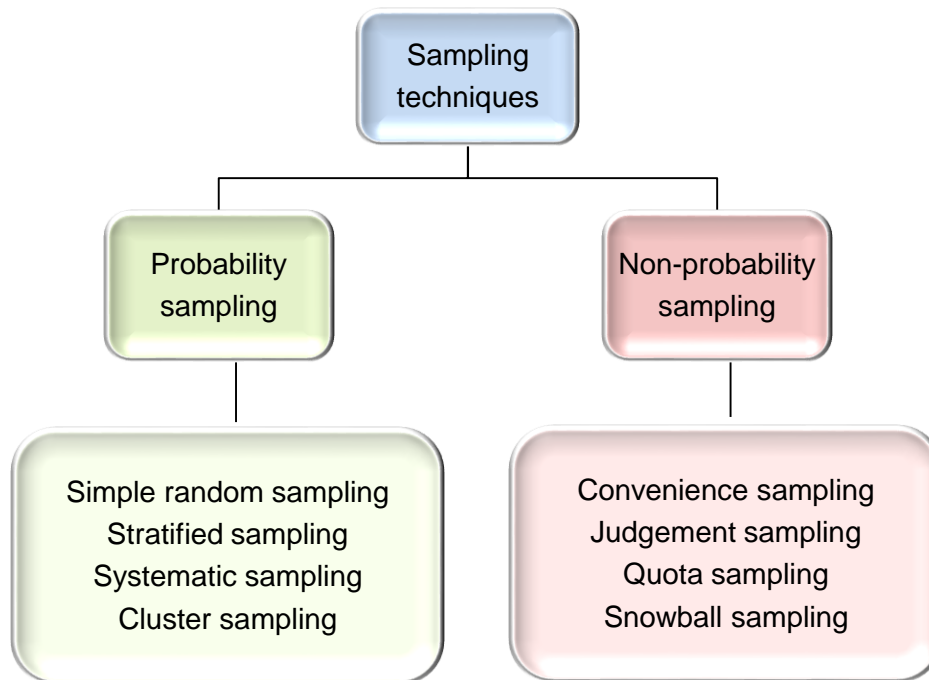
The sampling frame, referred to as a list containing all appropriate sampling units, is developed after the target population has been defined (Hair *et al.*, 2013:138). The sampling frame can be geographically divided by region, street level, institutions, households, individuals and other units (Bradley, 2013:155; Wiid & Diggines, 2010:194). Further examples of a sampling frame are telephone books, an association directory listing the firms in an industry, a mailing list acquired from commercial organisations, a list of registered voters, or a city directory (Bradley, 2013:155; Malhotra, 2015:272; Shukla, 2008:57). Bradley (2013:155) affirms that the sampling frame should imitate the entire population of interest in summary form.

This study's sampling frame comprised the 26 registered South African public HEIs, which are segregated into 11 traditional universities, nine comprehensive universities and six universities of

technology (Business Tech, 2015). From the initial sampling frame, a non-probability judgement sample of three HEI campuses located in the Gauteng province was selected. Of the three HEIs, one was a traditional university, one comprehensive university and one university of technology. According to the Statistics on Post-School Education and Training in South Africa report of 2014 (Department of Higher Education and Training, 2016:25-26) the Gauteng province accounted for the largest proportion of student enrolment in both Public Technical and Vocational Education and Training (TVET) colleges and private colleges compared to other provinces. Furthermore, out of all nine provinces in the country, Gauteng comprised 25.8 percent of the above-mentioned total student population. As such, the Gauteng province was deemed a suitable sample frame for this study.

### **4.5.3 Sampling method**

The process whereby the sample is selected, or the sampling method, can be done by employing probability or non-probability methods (Smith & Albaum, 2010:11). As stated by Bradley (2013:162), probability sampling is the procedure where each sample element contained within the population has a set probabilistic probability of being selected for the study with known probabilities of being included. Alternatively, non-probability sampling is based on the researcher's personal judgement rather than chance selection (Burns & Bush, 2014:242). With non-probability sampling methods, the likelihood of decide on sample elements into the sample are unknown (Malhotra, 2015:275). Figure 4-2 comprises a classification of the various probability and non-probability sampling techniques.



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**Figure 4-2: Classification of sampling techniques (Shukla, 2008:59; Wiid & Diggines, 2013:189)**

As evident in Figure 4-2, there are four different sampling techniques within each of the two main sampling methods, namely probability sampling and non-probability sampling. Using a probability sampling technique requires the researcher to select between a simple random sampling, stratified sampling, systematic sampling, or cluster sampling method when selecting the prospective elements to be included in the sample. Simple random sampling is the most recognised method used by researchers (Smith & Albaum, 2010:131). This method guarantees each member within the population in the particular sample frame with a known and equal probability of being included in the sample (Burns & Bush, 2014:243). A stratified sampling technique comprises a two-step process whereby the researcher is required to separate the population into subpopulations, otherwise known as strata, based on certain characteristics (Malhotra, 2015:282). From then on, sample elements are selected at random from each stratum (Zikmund & Babin, 2013:326). With systematic sampling, the researcher acquires a list of members present within the population and then picks a random initiation point for the first participant to be included in the sample. From the initial selection of the first sample element, a constant skip interval is applied to choose the subsequent members from the sample frame until a complete sample has been selected (Burns & Bush, 2014:243). Similar to stratified sampling, whereby the population is divided into strata, cluster sampling, results in the population being apportioned into uniformly exclusive clusters. From that, the researcher selects a random sample of clusters to be included in the study (Bradley, 2013:163; Shukla, 2008:61).

The process of using a non-probability sampling method to select the sample is based on the researcher's judgement (Clow & James, 2014:231). In convenience sampling, the first of four possible non-probability sampling methods, the researcher draws the sample from a segment of the population that is immediately accessible. Only individuals that are nearby at the same time and place as the researcher are included in the sample (Wiid & Diggines, 2010:200). A judgement sampling method is employed when individuals are included in the sample based on the researcher's credence that the candidates met the prerequisites of the study (Hair *et al.*, 2013:145). Instead, quota sampling necessitates a division of the population into subgroups based on relevant control characteristics such as age, gender, region and income (Malhotra, 2015:278). After the subgroups are established, the researcher selects the participants who meet the preferred characteristics as outlined by the study (Bradley, 2013:167). In snowball sampling, the researcher randomly selects a preliminary group of participants, after which, these individuals are required to identify other prospective participants contained within the target population of interest (Clow & James, 2014:234). Subsequent participants are included in the sample based on the referrals made by the initial group of participants (Malhotra, 2015:279).

Employing probability sampling techniques enables the researcher to generalise the findings of the research study (Berndt & Petzer, 2011:175), as well as judge the reliability and validity of the findings compared to the defined target population (Shukla, 2008:58). However, using non-probability sampling techniques are more convenient, quicker as well as cost effective to implement (Wiid & Diggines, 2010:199). As such, this study comprised a single cross-sectional, non-probability, convenience sample of 600 full-time undergraduate Generation Y students, as drawn from the sample frame.

#### **4.5.4 Sample size**

The sample size is described as the number of sample elements the researcher will include in the study (Malhotra, 2015:274). The process involved in determining the sample size relates to certain financial, managerial and statistical concerns (Wilson, 2006:208). Bradley (2013:175) asserts that the sample size is typically finalised before commencing with data collection and will depend on the study's objectives, the size and respondents' description, the time frame, funds and resources available in addition to the significance of the findings acquired from performing the particular research. The sample size for prospective research can be based on the sample size employed in previous research with a similar description (Clow & James, 2014:239).

A sample size of 600 full-time undergraduate Generation Y students was selected for this study. Given that research relating to activity-tracking device adoption is limited, the sample size is based on recent studies pertaining to the adoption of new technology and health related wearable devices, such as Choi *et al.* (2016:781) (sample size of 562), Ooi and Tan (2016:37) (sample size

of 459) and Gao *et al.* (2015:1704) (sample size of 462). The sample size of 600 Generation Y students was apportioned uniformly amongst the three HEIs, allowing a sample size of 200 students per HEI campus.

## **4.6 DATA COLLECTION METHOD**

The fourth step in the marketing research process involves the physical fieldwork or data collection (Berndt & Petzer, 2011:202), whereby responses are collected from the chosen sample. Hair *et al.* (2013:39) identify two approaches to gather the required data, namely observing consumers or market trends, known as observation methods and using self-completion questionnaires or interviewers to ask questions regarding market trends, known as surveys methods. Other data collection approaches include telephone interviews, mail surveys, personal interviews, internet methods, in-home and in-office interviews, mall-intercept interviews, fully automated interviews, group self-administered surveys, as well as drop-off surveys (Burns & Bush, 2014:184; Clow & James, 2014:169; Malhotra, 2015:298). The main objective remains to deliver reliable, free-of-error data regardless of the data collection method employed (Clow & James, 2014:38).

Observational research methods are used to collect data such as behavioural patterns, attitudes and motivations from the sample of interest either physically or by means of mechanical observations (Wiid & Diggines, 2010:59). However, this method provides insufficient information about the participants' actual decision-making process since the researcher can only draw conclusions based on the behaviour observed (Wiid & Diggines, 2013:131). Alternatively, survey research methods acquire information pertaining to consumers' attitudes, intentions, behaviours, motives, as well as demographical and lifestyle-based characteristics using structured, self-administered questionnaires (Burns & Bush, 2014:193; Malhotra, 2015:149; Wiid & Diggines, 2010:59). Burns and Bush (2014:172) assert that survey methods are particularly useful in scenarios involving a large number of participants where data needs to be obtained in an economical and efficient manner.

This study employed the group self-administered questionnaire survey method to collect the data. As soon as the questionnaire was submitted for approval and an ethics clearance certificate issued (Ethics Clearance Number: ECONIT-2017-033) by the Ethics Committee of the Faculty of Economic Sciences and Information Technology at the North-West University (Vaal Triangle Campus). Thereafter, academic staff members at each HEI were made contact with either telephonically or using e-mail messaging where personal meetings were arranged in order to discuss the study and subsequently ask for assistance. Once the lecturers granted permission, the questionnaire was personally distributed to the participating students, with the assistance of a trained fieldworker. It was determined that one class period sufficed to collect the data. After

the participants were briefed about the study's objectives and assured that all information provided on the questionnaire would be kept confidential, their voluntary participation was requested. Once the questionnaires were completed, it was collected immediately by the researcher and the fieldworker. Gratitude was expressed to the lecturers and participants for their participation and contribution to this study. The research instrument relating to the design of the questionnaire, the questionnaire content, the layout of the questionnaire and the pilot testing of the questionnaire are discussed in the next sections.

#### **4.6.1 Questionnaire design**

Most problems identified in marketing research are considered complex; therefore, require the collection of primary data in order for it to be solved. Using a questionnaire is a valuable instrument for collecting the necessary primary data (Shukla, 2008:86). Questionnaires are formal and structured documents that comprise a set of questions constructed to collect data from the sample elements with the intention of attaining the objectives set out by the study (Clow & James, 2014:323). Hair *et al.* (2013:188) assert that a proper questionnaire will enable the researcher to obtain data that is both valid and reliable. Moreover, the design of the questionnaire directly influences the quality of the data obtained from the sample (Burns & Bush, 2014:214). As such, a correct and proper questionnaire design is essential.

In order to reach the study's objectives, the questions contained within the questionnaire ought to meet the fundamental criteria pertaining to its applicability and correctness (Zikmund & Babin, 2010:270-71). These criteria include knowing what questions to insert, how these questions are to be worded, the order of the questions, the layout of the questionnaire and whether the questions will be pre-tested (Bradley, 2013:487). Additionally, the participants' cooperativeness is determined by the physical appearance of the questionnaire (Iacobucci & Churchill, 2010:221). Using a cover letter to introduce and explain to nature of the research at hand, providing clear instructions to complete a questionnaire that is grammatically straightforward, clear, brief, uses simple English and is focused on a single topic, will result in a professionally constructed questionnaire (Berndt & Petzer, 2011:197; Burns & Bush, 2014:217). A final consideration pertaining to the questionnaire design is the average time participants will need to complete the questionnaire (McDaniel & Gates, 2013:121). Given that an extensive questionnaire might discourage participants and subsequently influence the quality of the data obtained, the length of the questionnaire should be kept to a minimum (Kolb, 2008:205). McDaniel and Gates (2013:262) suggest that no more than 20 minutes should be spent administering and completing the questionnaires.

This study's questionnaire design was guided by the aforementioned recommendations. The questions were arranged in a structured and understandable manner where due care was taken



to guarantee that the language used was straightforward and comfortable to read and definite and concise words were used to formulate the questions. The questions were constructed based on the empirical objectives of this study as outlined in Chapter 1. A cover letter was embedded into the questionnaire, which stated the nature and intention of the study along with applicable contact details of the researcher. The questionnaire as used to gather the data for this study is presented in Annexure A.

#### **4.6.2 Questionnaire format**

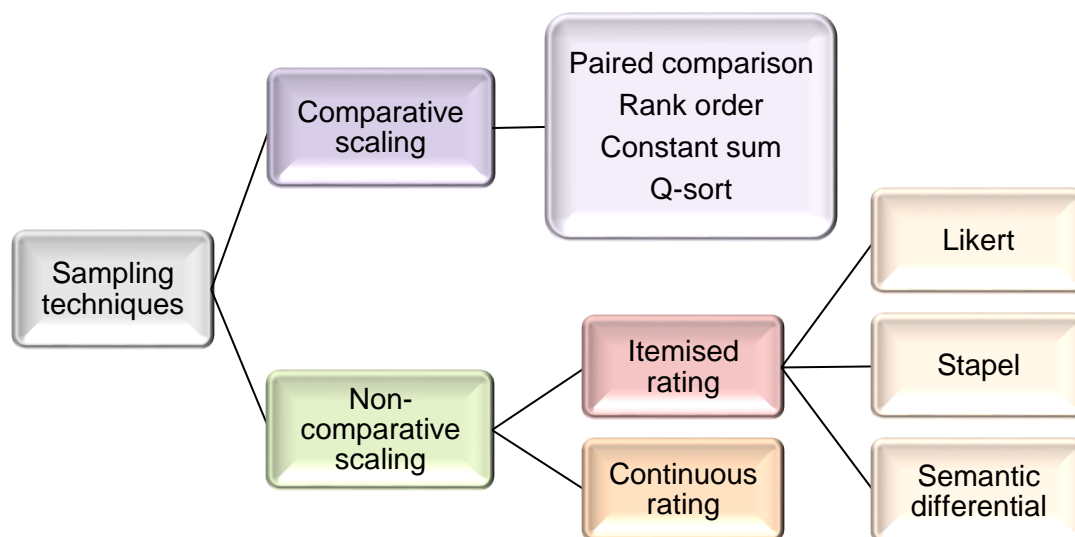
Formatting refers to the manner in which the survey questionnaire is laid out with specific reference to how the information is organised and presented as well as the size, colour and shape of the paper used (Fanning, 2005). The data required for this study was gathered by employing 6 previously validated scales. The questionnaire together with the items contained within was constructed in keeping with the primary objective (refer to Section 1.3.1) and empirical objectives (refer to Section 1.3.3) formulated for this study. In accordance with these objectives, the questionnaire comprised the adapted scales of Kim and Shin (2015), Nor and Pearson (2008), Yang *et al.* (2016), Lee (2009) and Venkatesh *et al.* (2003). These scales intended to measure participants' attitude towards activity-tracking devices (four items), perceived ease of use (three items), perceived usefulness (five items), perceived importance of brand name (three items), subjective norm (three items) and intention to use (three items). The items within each construct was measured on a six-point Likert scale (1= strongly disagree, 6= strongly agree) based on the participants' agreement or disagreement with the statements.

The questionnaire also included two sections designed to gather demographical data and relevant activity-tracking device background information. The demographical data included questions relating to participants' country- and province of origin, current year of study, gender, ethnicity, home language, age and institution. The background information, with regard to activity-tracking devices, aimed at uncovering whether participants owned such a device, were interested in tracking their daily activity, owned a smartphone, had an activity-tracking application on their smartphone, as well as the features of activity-tracking devices they considered as the most important. A cover letter was embedded in the questionnaire that clearly explained the nature and the purpose of the study.

There are two main types of questioning formats, namely structured or close-ended questions and unstructured questions, known as open-ended questions (Malhotra *et al.*, 2013:340; Pallant, 2013:7). A questionnaire using an unstructured format of questioning allows the participants to respond in their own words, which results in open-ended responses (Zikmund & Babin, 2010:274). A structured questioning format results in a questionnaire comprising of pre-determined questions where the participant selects the most applicable answer from a pre-determined set of responses.

The response format is either dichotomous, multiple-choice or a scale (Malhotra, 2015:245). Participants are more willing to complete a self-administered questionnaire if the questions are structured, rather than open-ended (Cant *et al.*, 2008:151). Moreover, the benefits of using a structured questionnaire to collect the required data, as opposed to using an unstructured questionnaire, is that it is simple to administer, complete as well as capture the results (Hair *et al.*, 2013:190).

The researcher should focus on selecting an appropriate sampling technique once the research design was formulated and questionnaire format selected. Figure 4-3 comprises a classification of the various scaling techniques.



**Figure 4-3: Classification of scaling techniques (Malhotra, 2015:289; Shukla, 2008:72)**

As evident in Figure 4-3, the scaling techniques employed within the marketing research field are classified into two main categories, that is, comparative scaling and non-comparative scaling (Shukla, 2008:71). Comparative scaling requires the participant to directly compare stimulus objects (Malhotra *et al.*, 2013:286-287), where non-comparative scaling involves the participant making judgements pertaining to brands, products, objects, a concept, person without any reference to other items or an ideal item (Clow & James, 2014:287). This study employed a non-comparative scaling technique.

Continuous rating scales and itemised rating scales are the two main types of non-comparative rating scales. A continuous rating scale, alternatively known as a graphic rating scale, requires

the participant to rate objects or a concept by placing a mark at the appropriate point on a line that is joined by bipolar ends, running from one extreme of the variable being tested, to the other (Malhotra *et al.*, 2013:304; Wiid & Diggines, 2013:156). An itemised rating scale comprises a finite set of distinctive response options whereby the participant has to mark the response option that best reflects their perceived view or attitude towards that variable or concept (Wilson, 2006:172). According to Wilson (2006:172), participants find itemised rating scales easier to interpret and complete and researchers find it easier to analyse. The three types of itemised rating scales used in research are the semantic differential scale, Stapel scale and the Likert scale (Berndt & Petzer, 2011:189-196; Cant *et al.*, 2008:141; Malhotra, 2015:207; Wiid & Diggines, 2013:156; Wilson, 2006:176-179). The semantic differential scale is described as a bipolar ordinal scale, which detains the participant's attitudes or opinions with regards to a given object or concept (Hair *et al.*, 2013:172). There are a finite number of choices, usually between five or seven in order to allow a neutral position, within this scale that are anchored by dichotomous words or phrases (Clow & James, 2014:298). Similar to the semantic differential scale is the Stapel scale, which uses only one anchor and both a negative and a positive numeric scale (Clow & James, 2014:301; Hair *et al.*, 2013:383). The Stapel scale is a unipolar, non-comparative vertical scale that measures attitudes using a single adjective placed in the middle of an even-numbered collection of values, typically 10, ranging from +5 to -5 with no zero point (Malhotra, 2015:222; Malhotra *et al.*, 2013:309). The Likert scale, a non-comparative measurement scale, requires the participant to indicate a degree of agreement or disagreement based on a series of statements about the stimulus objects (Hair *et al.*, 2013:171). A typical Likert scale comprises of five response options ranging from "strongly disagree" to "strongly agree" (Shukla, 2008:77), which allows the researcher to capture the intensity of the participant's feelings towards the statement given that they indicate how much they agree or disagree with the given statement (Burns & Bush, 2014:208). The Likert scale is one of the highly and most frequently used scaling techniques since it is easier to develop and understand and its representation makes it easy for participants to complete (Schiffman & Kanuk, 2014:38; Shukla, 2008:78).

After considering all of the before mentioned scaling techniques that determine the format of the questionnaire, an undisguised, structured, self-administered questionnaire was used to collect the data for this study. A combination of dichotomous questions and multiple-choice questions were used to obtain participants' demographical information (Section A of the questionnaire) where participants were required to indicated their higher education institution, country of origin, province of origin, their current year of study, gender, ethnicity, home language and age at the time the study was executed. One multi-response question along with several dichotomous questions were used to gather the relevant background information pertaining to activity-tracking devices (Section B of the questionnaire). A six-point Likert scale, ranging from strongly disagree (1) to strongly agree (6) taking the form of a multi-item scale was employed to measure the

participants' extent of agreement or disagreement with each of the items pertaining to several factors influencing their intention to use activity-tracking devices and attitude towards such devices (Section C of the questionnaire).

### 4.6.3 Layout of the questionnaire

The questionnaire's correct layout is imperative. Hair *et al.* (2013:199) advise that the questionnaire format and layout should guarantee that the participants could easily read, understand and follow the instructions provided. If the researcher fails to regard the importance of the questionnaire layout, the data quality obtained can be reduced significantly. Moreover, a well-organised and professionally arranged questionnaire will result in a greater response rate since it reduces confusion amongst the participants (Berndt & Petzer, 2011:196).

The questionnaire employed in this study, as can be seen in Annexure A, comprised three sections. Section A (A1-A9) was constructed to obtain specific demographical information. Section B (B1-B4) aimed at gathering specific background information with regards to activity-tracking devices. The third and last section, Section C (C1-C21) measured the participants' attitudes towards activity-tracking devices with specific reference to the factors that influence Generation Y students' intention to use activity-tracking devices.

Given that activity-tracking devices are considered a new technology (refer to Section 1.2) and only recently introduced into the South African consumer market, resulting in the topic being largely under researched, previous scales based on wearable technology and devices, smart watches and new technological products were used to gather the data in this study. Table 4-1 outlines the six possible factors that determine the participants' intention to use activity-tracking devices.

**Table 4-1: Possible factors influencing intention to use activity-tracking devices**

Factor	Author/s
Attitude	Choi and Kim (2016); Kim and Shin (2015); Park <i>et al.</i> (2016); Venkatesh <i>et al.</i> (2003); Wu <i>et al.</i> (2016)
Perceived ease of use	Davis (1989); Davis <i>et al.</i> (1989); Gao and Bai (2014); Nor and Pearson (2008); Taylor and Todd (1995)
Perceived usefulness	Davis (1989); Kim and Shin (2015); Shin (2007); Taylor and Todd (1995); Yang <i>et al.</i> (2016)

**Table 4-1: Possible factors influencing intention to use activity-tracking devices (continued)**

Factor	Author/s
Perceived importance of brand name	Brucks <i>et al.</i> (2000); Lau and Lee (1999); Yang <i>et al.</i> (2016)
Subjective norm	Gao and Bai (2014); Lee (2009); Morris <i>et al.</i> (2005); Wu and Chen (2005)
Intention to use	Venkatesh <i>et al.</i> (2003)

The following section contains an examination of the process involved in the pre-testing and piloting of the questionnaire.

#### **4.6.4 Pre-testing and pilot testing of the questionnaire**

Both pre-testing and a pilot study are essential in survey research, where refining measures are applied in order to reduce the risk of the main study being defective (Zikmund & Babin, 2010:54). Bradley (2013:215-216) asserts that the questionnaire should be pre-tested before the main data collection ensues as this process will ensure that the questionnaire measured what it intended to. Additionally, a pre-test, followed by a pilot test has to be done to ensure that participants understood the questions, whether there were certain questions participants accidentally missed or intentionally skipped, if the question wording were too complex and needed to be adapted as well as detect whether the same responses for all questions were given (Hair *et al.*, 2013:202). The time it took for the participants to complete the questionnaire can also be determined during the pilot-testing process. The participants used during the pilot-testing process should be similar to the participants of the main study. A small, representative group of participants, usually between 20 and 30 individuals, that are excluded from the main study, should be used to pilot the questionnaire (Clow & James, 2014:28; Hair *et al.*, 2008:180; Hair *et al.*, 2013:202). Conducting a pilot test proves pivotal in determining whether participants experienced any difficulties with regards to certain words, instructions, phrases, the flow of the sentences as well as any other aspects that they may have found problematic (Burns & Bush, 2014:229). Blythe (2005:118) suggests that the questionnaire should be piloted at least on one occasion.

This study's questionnaire was pre-tested using the debriefing and pilot testing approaches. The questionnaire pre-testing, by way of the debriefing method, was conducted to ensure both the face and content validity of the measuring instrument. A total number of five individuals were invited to participate in the debriefing process, two experienced researchers, one experienced researcher without prior knowledge or experience with activity-tracking devices, one academic with excellent knowledge and experience with activity-tracking devices, as well as an English-

speaking student. The five individuals assessed the questionnaire, after which it was determined that both first- and non-first language English-speaking participants would be able to easily understand and complete the questionnaire. This was important to establish since South Africa is a multilingual nation. Throughout the debriefing process, it was confirmed that participants took roughly 15 minutes to complete the questionnaire. McDaniel and Gates (2013:122) assert that this is a sufficient amount of time to complete the questionnaire. All of the remarks and suggestions obtained during the debriefing process were carefully considered and the subsequent changes made to the questionnaire.

Pilot testing followed the pre-testing stage to ensure the measuring instrument's internal-consistency reliability further. A convenience sample of 50 full-time undergraduate students were used to perform the pilot test. These participants were located on a South African HEI campus that was excluded from main study. The results of the pilot study are contained within Chapter 5, which includes an analyses and interpretation. The problems that surfaced after conducting the pilot test were amended and the main study was undertaken using the final questionnaire (refer to Annexure A).

The previous section included an examination pertaining to the data collection method, including the questionnaire design, format and layout as well as the procedure followed in pre-testing and piloting the questionnaire, leading up to the final questionnaire distribution. The subsequent section details the administration of the questionnaire in the main study.

## **4.7 ADMINISTRATION OF THE QUESTIONNAIRE**

The process of formally administering the questionnaires of the main survey was conducted between July 2017 and August 2017 using a sample of 600 Generation Y full-time undergraduate students. Given that this study's the sample frame comprised three HEIs campuses, the sample was apportioned uniformly and 200 questionnaires were dispensed per institution. The participating academic staff members and lecturers at each of the HEIs were contacted telephonically or via email-messaging to obtain permission to distribute the questionnaire to their students during class time. Prior to the distribution process, the questionnaire, accompanied by the ethical clearance certificate, was provided to the particular academic staff members. Once permission was granted, the relevant arrangements were made pertaining to a specific time and venue to do so. During the pilot study, it was determined that one class period was sufficient as the questionnaire took roughly 15 minutes to complete. The questionnaires were hand delivered to the physical venues where the participants were approached. A comprehensive discussion regarding the nature and objectives of the study was provided and voluntary assistance requested from the participants. Once the participants were assured of their anonymity in completing the questionnaire, the administration process commenced with the assistance of a trained

fieldworker. A cover letter was embedded in the questionnaire containing sufficient instructions on how to complete the questionnaire included throughout the document. The completed questionnaires were returned to the researcher immediately after being administered. The data collected from this study was tabulated and analysed in Chapter 5 in order to draw conclusions and make appropriate recommendations.

## **4.8 PRELIMINARY DATA ANALYSIS**

Once the fieldwork and data collection process had been concluded, the data have to be prepared and analysed to obtain meaning from the data gathered for the study (Iacobucci & Churchill, 2010:350). The fifth stage in the marketing research process, requires the researcher to prepare the data by following several steps, namely preparing a preliminary plan of data analysis, checking the questionnaire, editing, coding, transcribing, data cleaning, statistically adjusting the data and choosing a data analysis strategy (Malhotra, 2015:302; Malhotra *et al.*, 2013:447). According to Bradley (2013:313-315), the analysis of quantitative data is done by means of editing, coding, entering and tabulating the data.

Data editing is a process whereby the raw data are examined in order to identify possible mistakes produced by the interviewer or the respondents (Hair *et al.*, 2013:245). Thereafter, the data have to be coded; Burns and Bush (2014:306-307) define this process as identifying code values to be associated with the likely responses for each item on the questionnaire. During the coding process, specific numerical values are assigned to each response for every individual question (Hair *et al.*, 2013:249). Once numeric values are assigned to the questions, the data are entered into a statistical software package, after the questionnaire had been coded properly (Shukla, 2010:42). The final step, tabulation, comprises systematically arranging the data in a table or other abstract format so that the amount of responses to each response category is evident (Zikmund & Babin, 2010:355). Clow and James (2014:376) identify two types of tabulation, namely one-way tabulation and cross-tabulation, where one-way tabulation comprise counting the number of responses for every possible answer to a question and cross-tabulation involves counting the amount of responses in multiple response categories simultaneously.

The preliminary data analysis applied to this study comprised of the process as explained above. The study's questionnaire comprised three sections. Section A (A1 – A9) was constructed to obtain participants' demographical information and Section B (B1, B2, B3, B3a & B4) aimed at gathering participants' background information pertaining to activity-tracking devices. Section C (C1 – C21) was used to obtain information with regard to the research topic and objectives as stated in Chapter 1. A total of 6 dimensions pertaining to the potential factors that influence Generation Y students' attitude toward and intention towards activity-tracking devices, namely attitude, perceived ease of use, perceived usefulness, perceived importance of brand name,

subjective norm and intention to use, were examined in the last section of the questionnaire. The data obtained by means of the distribution of this questionnaire were edited, coded, entered into a statistical package and tabulated, as illustrated in Table 4-2.

**Table 4-2: Coding information**

<b>Data type</b>	<b>Code</b>	<b>Question number</b>
<b>Demographical data</b>	<b>A1-A9</b>	<b>Section A: Questions A1-A9</b>
<b>Activity-tracking device background information</b>	<b>B1-B4</b>	<b>Section B: Questions B1-B4</b>
<b>Attitudes towards activity-tracking devices</b>	<b>C1-C21</b>	<b>Section C: C1-C21</b>
Attitudes	C1-C4	Section C: Items C1-C4
Perceived ease of use	C5-C7	Section C: Items C5-C7
Perceived usefulness	C8-C12	Section C: Items C8-C12
Perceived importance of brand name	C13-C15	Section C: Items C13-C15
Subjective norm	C16-C18	Section C: Items C16-C18
Intention to use	C19-C21	Section C: Items C19-C21

By completing the data preparation stage, statistical analysis of the data can commence. A detailed discussion of the statistical analysis methods implemented to the data obtained for this study follows.

## **4.9 STATISTICAL ANALYSIS**

Data analysis encompasses the application of a statistical analysis program to determine consistent patterns as well as summarise relevant details in order to understand and interpret the gathered data (Zikmund & Babin, 2010:59). The second part of the fifth step in the marketing research process, namely analysing the data requires that the captured data be analysed and was done using SPSS and AMOS Version 25.0 for Windows. The subsequent statistical techniques were used on the empirical data sets:

- Frequency distribution analysis
- Factor analysis; principal components analysis
- Reliability analysis
- Validity analysis
- Descriptive statistical analysis
- Correlation analysis
- Multicollinearity diagnostics
- Structural equation modelling



The abovementioned statistical techniques applied to the data set of this study are detailed in detail the next sections.

#### **4.9.1 Frequency analysis**

Frequency distribution of individual variables contained within the data set is possibly the most basic method of listing and presenting data (Clow & James, 2014:116). A frequency distribution analysis is usually performed before any other statistical procedure (Malhotra, 2010:484). According to Hair *et al.* (2013:170) and Zikmund and Babin (2013:337), a frequency distribution is the procedure of summing the number of times each particular response to a variable in the scale was recorded by the entire group of participants. The result of a frequency analysis is a frequency table, which comprise frequency counts, percentages as well as cumulative percentages of all the values in each variable (Malhotra, 2015:331; Malhotra *et al.*, 2010:478). Burns and Bush (2014:321) state that the results and calculations brought forward by a frequency analysis can be used to present the data by means of charts or graphs. The data acquired in this study are presented using pie charts, bar charts as well as statistical tables in order to report on the frequency distribution.

#### **4.9.2 Factor analysis**

Factor analysis is a process whereby the interrelationships amongst variables are studied for simplifying the data (Wilson, 2006:246). When performing a factor analysis, a large number of items are reduced into smaller subsets of factors and underlying constructs are determined (Clow & James, 2014:311). There are two types of factor analysis, namely confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) (Wiid & Diggines, 2013:240).

Confirmatory factor analysis (CFA) is performed in order to establish that the scale variables load on their predicted factors as expected, therewith confirming the factor arrangement of the indicator variables (Malhotra, 2010:725). As such, the primary purpose of CFA is to either verify or reject the anticipated factor structure (Struwig & Stead, 2001:142). Contrary to CFA, Exploratory factor analysis (EFA) is performed to investigate the dimensionality of the scale by means of uncovering the minimum number of interpretable factors required to clarify the relationships amongst a set of variables (Torres-Reyna, 2016). Malhotra (2010:739) concurs, stating that EFA uncovers the underlying dimensions or constructs among a set of variables. According to Hair *et al.* (2010:102), the ratio of observations to items should at least be five to one in order for the factor analysis to be reliable. The two measures employed to determine the factorability of the data are the Bartlett's test of Sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Pallant, 2013:190). Factor analysis is considered appropriate when the KMO index generated a value

greater than 0.6 and the Bartlett's test of sphericity is significant, with a value smaller than 0.05, thus indicating sample adequacy.

Malhotra *et al.* (2010:643) identify two basic approaches used to extract factors, namely common factor analysis and principal components analysis. It is most appropriate to perform common factor analysis when the primary interest is to ascertain the underlying dimensions or constructs and the common variance is of interest, therefore, the factors are based solely on the common variance. In contrast, principal components analysis is performed to determine the lowest number of factors that accounts for the maximum variance explained in relation to the data. Therefore, in principal components analysis factors are based on the total variance (Malhotra *et al.*, 2013:629). The principal components analysis is most commonly used by researchers to extract factors (Pallant, 2013:189), whereby large sets of variables are condensed into fewer factors, accounting for maximum variance in the data. When employing the principal components analysis method, Pallant (2013:191) indicates that all communalities are initially expected to present an eigenvalue of 1.0. The eigenvalue is representative of the total variance explained by each factor (Malhotra *et al.*, 2013:624). Hence, the total variance explained by the variables may be measured by the factors or components, which implies a no error variance. Accordingly, the researcher is tasked with concluding the optimal number of factors that may be extracted for the purpose of illustrating the interrelations between the variables sets. There are two methods of factor rotation, namely orthogonal and oblique rotation, where the former rotates factors whilst keeping the items independent and the latter rotates the factors that are allowed to correlate (Rahn, 2018). Oblique rotation includes the direct oblimin and promax rotation, where orthogonal comprise quartimax, equamax and the varimax rotation methods. The nature of the varimax rotation method, with which the number of variables extracted is minimised and higher loadings on each factor are obtained, allows for the simplified interpretation of each factor (IBM Knowledge Center, 2016).

McDaniel and Gates (2013:379) state that the number of factors to be retained is based on the variation presented in the original data set as described by each factor. Several procedures can be used to determine the number of factors to retain, namely a priori determination, approaches based on eigenvalues and the scree plot approach (Malhotra *et al.*, 2013:629). Priori-criterion determination entails specifying the number of factors to retain based on the researcher's prior knowledge. With the eigenvalue approach, only the factors exhibiting an eigenvalue greater than 1.0 are retained (Malhotra, 2010:643). Retaining factors based on the scree plot approach involves plotting the number of dimensions or factors on the x-axis and the corresponding eigenvalues on the y-axis (Wiid & Diggins, 2013:242).

Considering the factor analysis process and the nature of this study, exploratory principal components analysis, using the varimax rotation, was employed to determine the underlying factors of the measurement instrument. A discussion regarding the reliability analysis follows.

### 4.9.3 Reliability analysis

Reliability, as an index of consistency, refers to a scale that produces similar, if not identical results after repeated measurements are made using a multi-item scale (Hair *et al.*, 2013:165; Iacobucci & Churchill, 2010:258; Malhotra *et al.*, 2013:317). An assessment of scale reliability determines the degree to which the measurement instrument is free from error (Clow & James, 2014:267). There are several approaches for assessing the reliability of a scale, namely test-retest reliability, alternative-forms reliability and internal consistency reliability (Malhotra, 2010:318-319).

In research where a summated scale - a scale in which of several items are summed to form a total score - is used, as in the case of this study, it is best to use internal-consistency reliability to determine the reliability of the instrument (Malhotra *et al.*, 2013:318). There are two methods that can be used to determine internal-consistency reliability, one of which is split-half reliability (Zikmund & Babin, 2010:249) and the other, Cronbach's alpha (Clow & James, 2014:268). When using the first method, the items of the scale are randomly divided into two groups and the resulting two half scores are correlated with each other (Clow & James, 2014:268). In the case where high correlations between the two halves are present, then the degree of internal consistency reliability is high, meaning that the items measure the same construct (Clow & James, 2014:268; Malhotra *et al.*, 2013:318). The other, more popular method of determining internal consistency reliability is by means of the coefficient alpha, also known as Cronbach's alpha (Shukla, 2008:84). Iacobucci and Churchill (2010:259) opine that the coefficient alpha is the more adequate technique to measure internal consistency reliability. That is, when employing the split-half technique, the coefficient of reliability alters based on how the items were split (McDaniel & Gates, 2013:278).

The coefficient alpha computes the average of all potential split-half measures stemming from the diverse division of the scale items (Hair *et al.*, 2013:166). Zikmund and Babin (2010:249) affirm that the coefficient alpha value ranges between zero, indicating no consistency amongst items, to one, indicating absolute consistency. Therefore, a scale is more reliable if the Cronbach's alpha score has a higher value (Clow & James, 2014:269). As a rule, an instrument producing a coefficient alpha value between 0.80 and 0.96 is considered to have exceptional reliability, where a value between 0.70 and 0.80 is considered satisfactory (Zikmund & Babin, 2010:249; Zikmund & Babin, 2013:257). A scale that produces a value between 0.60 and 0.70 is still considered acceptable, where a value below 0.60 is considered unsatisfactory internal consistency (Hair *et al.*, 2013:166; Wiid & Diggins, 2013:238). It is crucial to note that the Cronbach's alpha has a tendency to decrease as the number of items in a scale decreases. As such, the inter-item correlation should rather be reported to attest to the reliability of a scale comprising less than 10 items (Pallant, 2013:6). For the scale to be satisfactorily reliable, it should produce an inter-item correlation score between 0.15 and 0.50 (Spiliotopoulou, 2009:12).

The internal consistency reliability of the measuring instrument employed in this study was determined by means of computing the coefficient alpha values for the entire scale as well as each individual construct.

A reliable scale does not necessarily collect valid data (Hair *et al.*, 2013:166). Zikmund and Babin (2010:249) concur, stating that a reliable but invalid scale will produce consistently inaccurate results. For that reason, once the scale is deemed reliable, it has to be proven as valid by means of validity analysis.

#### **4.9.4 Validity analysis**

The validity of a scale pertains to whether the differences in the scores produced by the scale reflect the true differences in what is being measured (Wilson, 2006:182). Therefore, as corroborated by Wiid and Diggins (2013:241), validity is the extent to which a scale measures what it intended to measure. In addition to determining the degree to which a scale score truly represents a concept (Zikmund & Babin, 2010:250), validity, as a measurement process, aims to guarantee that scales are free from random- and systematic error (Malhotra, 2010:320). Cant *et al.* (2008:235) and Shukla (2010:26) assert that a perfectly valid scale is one without any measurement error. Researchers may consider assessing content validity, criterion validity or construct validity (Cant *et al.*, 2008:235; Iacobucci & Churchill, 2010:256; Zikmund & Babin, 2013:258).

Content validity pertains to the extent to which the scale items correspond to the theoretical construct being measured (Shiu *et al.*, 2009:382). Content validity of the scale is established by examining whether the items within the scale sufficiently cover the domain of the construct in question (Malhotra *et al.*, 2013:218), primarily based on the researcher's judgement (Pallant, 2010:7). The content validity of the scale employed in this study was evaluated by three knowledgeable marketing academics. Alternatively, criterion validity indicates the ability of the scale to perform as expected compared to other or similar variables selected as meaningful criteria (Shukla, 2010:27). Criterion validity of a scale is established when the scores it produced correlates with measures of similar constructs or criteria (Zikmund & Babin, 2013:259). Construct validity is the most challenging to establish given that the researcher is tasked to establish whether the scale and its various individual constructs are logically connected to the underlying theory and past research that supports the inclusion thereof (Pallant, 2013:7; Wilson, 2006:182). Construct validity is classified into three elements, namely convergent, discriminant and nomological validity (Malhotra, 2010:321; Shukla, 2010:27).

Nomological validity is used to evaluate to what extent one particular construct theoretically correlates with different, nonetheless related constructs (Shukla, 2008:83). Convergent validity is

described as the internal consistency of a scale, or in simple terms, the degree of correlation between constructs (Clow & James, 2014:271), whereas discriminant validity is the degree of dissimilarity with other constructs from which it is theoretically inclined to differ (Malhotra *et al.*, 2013:319). An average inter-item correlation value within the range of 0.15 and 0.5 is necessary for a scale to claim both convergent and discriminant validity (Clark & Watson, 1995:316), which was applicable in determining construct validity of the scale used in this study.

This study utilised face-and content validity analysis, construct validity analysis, nomological validity analysis, convergent analysis and discriminant validity analysis.

#### **4.9.5 Descriptive statistical analysis**

Descriptive statistical analysis is performed for converting large amounts of raw data in order to describe and present the elementary characteristics of the data set in summary form (Malhotra, 2010:486; Zikmund & Babin, 2013:364). In addition to simplifying and summarising large data sets, descriptive statistical analysis also helps to address particular research questions (Shukla, 2010:43). The most frequently used descriptive statistics, as applied in this study, are measures of location, measures of variability (Wilson, 2006:229) as well as measures of shape (Malhotra *et al.*, 2013:489).

##### **4.9.5.1 Measures of location**

Also known as measures of central tendency, measures of location describe the centre of the distribution (Malhotra *et al.*, 2013:480) and comprise the mean, mode and median. Mean, the most frequently employed measure of location (Hair *et al.*, 2012:268), refers to the arithmetic average derived from a set of numbers that results from totalling all the observed values and dividing the sum total by the number of observations (Burns & Bush, 2014:320). The value within the data set that appears most often is referred to as the mode (Zikmund & Babin, 2013:340), whereas the median equals the middle value observed when the data are arranged in either descending or ascending sequence (Malhotra, 2015:332). This study interpreted the mean scores computed for each construct as well as the entire scale.

##### **4.9.5.2 Measures of variability**

Also referred to as measures of dispersion, measures of variability pertain to the degree to which observed scores are spread out in the data set (Wilson, 2006:230) or how these observations diverge from the mean (Zikmund & Babin, 2010:330). Variability measures comprise the range, variance and standard deviation (McDaniel & Gates, 2010:407). Range refers to the distance between the lowest and the highest value in a prearranged data set (Burns & Bush, 2014:321). Hair *et al.* (2013:272) define variance as the mean squared deviation from the mean. According

to Malhotra (2015:333), variance is indicative of the difference or similarity of data points. Standard deviation is the square root of the variance (Malhotra *et al.*, 2013:481) and serves as an indicator of how dispersed data points are in proximity to the mean (Clow & James, 2014:273). This study interpreted the standard deviation values calculated for the total scale as well as for the individual constructs.

#### **4.9.5.3 Measures of shape**

In order to conduct advanced statistical techniques, it is necessary to assume that the data set is normal and free of outliers (Shukla, 2010:45) for the purpose of establishing the nature of the distribution (Malhotra, 2010:488). Measures of Skewness and kurtosis are used to determine the data's degree of normalcy (Shukla, 2008:101). Gonzales (2016) affirms that skewness represents a disproportion and asymmetry from the mean score, while kurtosis determines the degree of distribution flatness or peakedness (Struwig & Stead, 2001:159). In skewness analysis, distributions may be either positive, symmetrical or negative (Struwig & Stead, 2001:159), where positive distribution skew to the left and negative distributions to the right (Shukla, 2008:101). In kurtosis analysis, a value equal to zero represents normal distribution, where a positive kurtosis score is indicative of a peaked distribution and a negative kurtosis score of a flatter distribution (Malhotra *et al.*, 2013:482). Both the skewness and kurtosis of the data distribution were analysed in this study.

#### **4.9.6 Correlation analysis**

Also known as the Pearson correlation coefficient (Hair *et al.*, 2013:316) and Pearson product-moment correlation coefficient (Chapman & McDonnell Feit, 2015:96), correlation analysis investigates the extent to which one data set relates to another (Blythe, 2005:115). Additionally, correlation analysis is employed to determine the extent to which adjustments in a single variable are directly associated with alterations in another variable (McDaniel & Gates, 2013:367). Expressed as  $r$ , the Pearson correlation coefficient, which indicates the strength of the relationship between two linear variables (Wilson, 2006:237), ranges from -1, indicative of perfect negative correlation, to +1, indicative of perfect positive correlation (Berndt & Petzer, 2011:239; Pallant, 2010:128). Once the correlation coefficient is equal to zero, a futile relationship between two variables is evident (Berndt & Petzer, 2011:239). Within correlation analysis, a small relationship is indicated when the correlation value, calculated between two variables, is between 0.1 and 0.29, whereas a medium relationship is indicated by a value between 0.3 and 0.49 and a strong relationship between 0.5 and one (Pallant, 2013:139).

In this study, the Pearson correlation coefficient was calculated for determining the correlation between all variables as well as to measure the nomological validity of the proposed

measurement model in structural equation modelling. In addition, these correlation coefficients were computed to determine possible multicollinearity amongst the independent variables, namely attitude, perceived ease of use, perceived usefulness, perceived importance of brand name, subjective norm and intention to use activity-tracking devices. Multicollinearity among these variables could threaten the explanation of these variables' influence on the dependent variables, namely attitudes and intention to use activity-tracking devices. A discussion of multicollinearity diagnostics follows.

#### **4.9.7 Multicollinearity diagnostics**

According to Hair *et al.* (2010:201), it is essential to consider the possibility of multicollinearity occurring when applying multivariate statistical analysis to a data set. In basic terms, multicollinearity refers to the degree to which the independent variables are redundant (Zikmund & Babin, 2010:392). A clear view of this occurring is a situation where several independent variables are highly correlated with one another (Miles & Sevin, 2010:126), thus exhibiting remarkably high inter-item correlation values, which makes it challenging to approximate separate or independent regression coefficients for the correlated variables (Hair *et al.*, 2013:378; Smith & Albaum, 2010:337). An additional concern with the presence of multicollinearity is that it becomes problematical to evaluate the comparative importance of the independent variables in explaining the variation present in the dependent variable (Malhotra *et al.*, 2013:574). It is paramount, therefore, to determine whether multicollinearity is present and take the necessary steps to eliminate it.

The tolerance test, a customary determinant of multicollinearity, comprises a regression analysis to afford each independent variable the probability to become the dependent variable proportionate to the other predictor variables (Malhotra, 2010:586). According to Pallant (2013:164), this method clarifies the total variability of the independent variable that is not explained by the other independent variables in the model. The calculated coefficients of determination ( $R^2$ ) are subtracted from one to calculate the tolerance values. The presence of a high tolerance value indicates a small degree of multicollinearity (Hair *et al.*, 2010:201), where small tolerance value indicates possible multicollinearity (Pallant, 2013:164). Another, yet simple test for the presence of multicollinearity is the variance inflation factors (VIF), where values between one and two are usually not indicative of multicollinearity issues (Zikmund & Babin, 2010:392), or a value below 10 is accepted as free of multicollinearity (Burns & Bush, 2014:414).

This study comprised of a multivariate method in the data analysis, therefore, multicollinearity was excluded by means of performing a tolerance test. Structural equation modelling is discussed in the following section.

#### 4.9.8 Structural equation modelling

The structural equation model (SEM), a powerful multivariate analysis technique, is used to study the interrelationships among observed and latent variables (Song & Lee, 2012:3). Observed variables refer to the variables that can be directly measured, whereas latent variables can be defined conceptually, but not measured directly or without error. According to Malhotra *et al.* (2013:712), a SEM model consists of two models, namely the measurement model and the structural model. The measurement model, after allowing confirmatory factor analysis to be conducted, portrays how the observed or measured variables represent constructs, as well as the theory that denotes the observed variables for each individual construct, therefore, allowing construct validity to be evaluated. The structural model, conversely, illustrates how the constructs are interrelated with one another and whether a relationship is present, often resulting in multiple dependence relationships. The structural model is essential to directing path analysis (Hair *et al.*, 2017:14). Malhotra (2010:726) asserts that all relationships, between the different variables, should be specified before a SEM model can be estimated, therefore, it is crucial that the model is based on underlying theory.

Structural equation modelling establishes the extent to which the proposed theory explains the observed correlation or covariance matrix amid measured variables (Malhotra *et al.*, 2013:714). Model fit thenceforth, is determined by comparing the degree of similarity between the estimated covariance matrix and the observed (sample) covariance matrix (Malhotra, 2010:731). Goodness-of-fit explains how well the specified model reproduces the covariance matrix amongst the indicator items (Malhotra, 2010:731). The model is perceived to have better fit when the values of the two matrices are closer to each other. With SEM analysis, several fit indices can be calculated. According to Reisinger and Mavondo (2007:57), the chi-square is a null hypothesis significance test executed to determine whether the intended model fits the data. When the chi-square value is low and non-significant the model can be accepted. Conversely, Hair *et al.* (2008:666-667) claim that the chi-square is particularly sensitive and variable to the effects of larger sample sizes. The limitations associated with the chi-square statistic can be overcome by various alternative goodness-of-fit indices. These indices, including absolute fit indices, incremental fit indices and parsimonious fit indices, were developed to provide a more pragmatic approach to determining model fit.

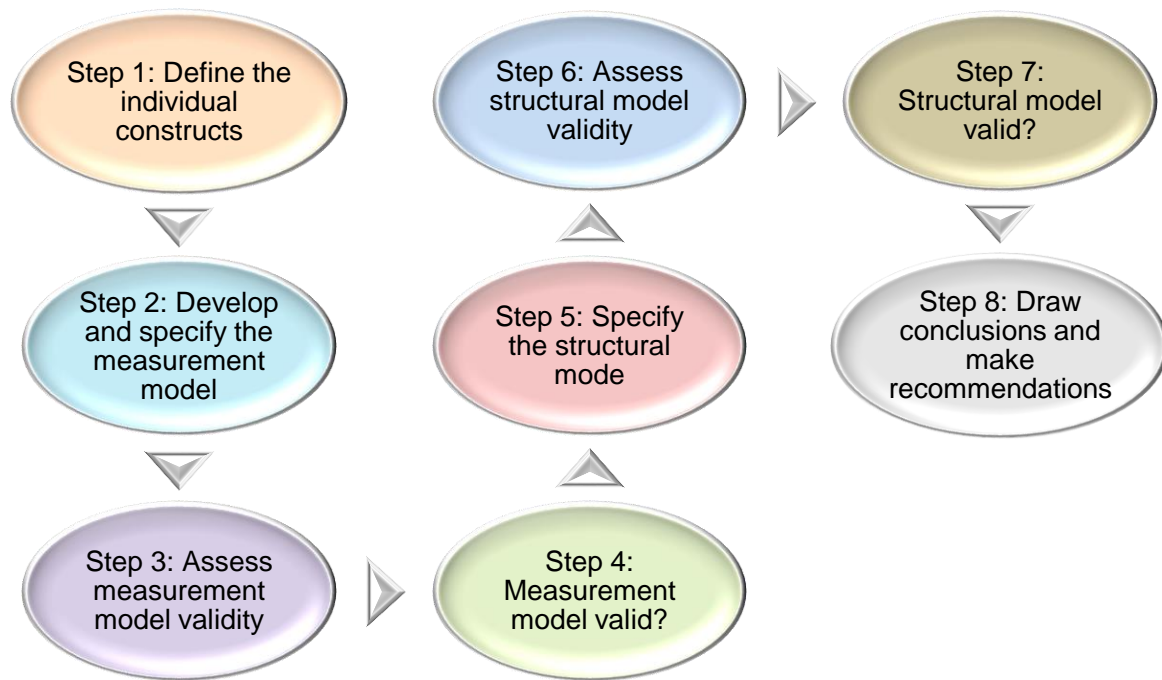
Absolute fit indices denote how well a hypothesised model correspond with the empirical data suggested by the study. These indices comprise goodness-of-fit measures, including the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), and badness-of-fit measures, which comprise the chi-square test, the standardised root mean residuals and the root mean square error of approximation. Hair *et al.* (2010:667) propose that a GFI and AGFI value larger than 0.90 signifies good model fit, while greater than 0.95 is preferred. The incremental fit



indices, on the other hand, reveals to how well the specified model is performing compared to the null model in which the variables are assumed to be uncorrelated (Miles & Shevlin, 2007:870). Incremental fit indices comprise the incremental fit index (IFI), the comparative fit index (CFI), the normed fit index (NFI) and the Tucker-Lewis index (TLI) (Malhotra, 2010:733). According to Byrne (2010:80), a value above 0.90 for all incremental fit indices denote an acceptable model fit. Lastly, parsimonious fit indices estimate whether a model fit has been achieved. The Akaike information criterion (AIC) and Bozdogan's consistent version of the AIC (CAIC) are used to compare two or more models (Byrne, 2010:82). These two measures are primarily used to choose between multiple models and are not used in significance testing Hair *et al.* (2010:667). In addition to examining causal relationships among constructs, Wang and Wang (2012:2) identify several advantages of using SEM, including the capacity to model numerous dependent variables at once as well as the ability to examine complete model fit, direct and indirect effects across variables, multifaceted and distinctive hypotheses and parameter invariance across multiple between-disciplines groups.

As with any multivariate technique, sample size should be considered when using SEM (Hair *et al.*, 1998:604). The sample size necessary to conduct structural equation modelling is dependent upon numerous considerations, such as the complexity of the model, estimation procedure, quantity of missing data, the extent of average error variance amid the variables and multivariate allocation of the data (Lei & Wu, 2007:34; Malhotra *et al.*, 2013:716). All influences considered, a sample size of at least 400 participants should be selected to conduct SEM in a study with more than five constructs (Malhotra *et al.*, 2013:717), provided that the larger the sample, the more precise the model (Hair *et al.*, 2017:19).

In order to conduct a SEM analysis, several steps have to be followed, the first of which is to define the individual constructs. The succeeding steps include specifying the measurement model and evaluating the reliability and validity of the measurement model, followed by specifying the structural model, assessing the structural model fit and finally drawing conclusions and compiling recommendations (Kline, 2011:92; Malhotra, 2010:729; Malhotra *et al.*, 2013:715-724). The process for structural equation modelling is depicted in Figure 4-4.



**Figure 4-4: Structural equation modelling process (Malhotra *et al.*, 2013:715)**

Lei and Wu (2007:35) maintain that a prerequisite of SEM is that the model should be based on thorough theory and prior knowledge. As soon as construct measures have been defined based on the theory, the measurement- and structural theory can be detailed (Hair *et al.*, 2010:638). As mentioned previously, the measurement model depicts how the observed or measured variables represent constructs. Additionally, the purpose of this model is to denote the level of variance explained by the measured items as well as to assess the complete model fit (Babin & Svensson, 2012:325; Reisinger & Mavondo, 2007:43). Therefore, it is paramount to assess the measurement model's validity and reliability, by means of composite reliability (CR) and the average variance extracted (AVE). Validity of the measurement model, particularly concerning SEM, is estimated by calculating the average variance extracted (AVE). The following equation is used to determine validity:

$$[(FI_{12}+FI_{22}+FI_{32}+...) / (FI_{12}+FI_{22}+FI_{32}+...) + (err_1+err_2+err_3+...)]$$

Hair *et al.* (2010:688,709) maintain that the AVE measures the total variables present in the indicators, as accounted for by the latent variables. Further, convergent validity is attained when all constructs yield a critical level value of 0.50 or greater for the average variance extracted. Discriminant validity can be established given that the square root of the AVE is greater than the correlation coefficients (Malhotra *et al.*, 2013:721).

Conversely, composite reliability (CR), an alternative to internal consistency reliability (Hair *et al.*, 2017:111), is defined as “the total amount of true score variance in relation to the total score variance” (Malhotra, 2010:734; Malhotra *et al.*, 2013:719) and computed accordingly:

$$[(FI1+FI2+FI3+...) / (FI1+FI2+FI3+...) + (err1+err2+err3+...)]$$

Hair *et al.* (2017:112) assert that the CR varies between zero and one, where values between 0.70 and 0.90 are regarded as satisfactory, especially in more advanced stages of research.

Once the reliability and validity of the measurement model has been established, the structural model can be specified. The structural model is equal to a theoretical model in that it represents a combination of the measurement model and the path model (Reisinger & Mavondo, 2007:43). Further, this model illustrates the interrelationships amid different constructs (Weston & Gore, 2006:724) and outlines the causal relationships amongst the latent variables (Gefen *et al.*, 2000:29). The validity of this model has to be established, which comprise assessing the model fit, paralleling the proposed structural model with similar models as well as examining the structural relationships and hypotheses (Malhotra *et al.*, 2013:723). After the validity of the model has been established, conclusions can be drawn and appropriate recommendations made.

## 4.10 CONCLUSION

This chapter’s purpose was to discuss each of the marketing research steps in detail, as outlined in Figure 4-1. Therefore, this chapter aimed to provide a discussion pertaining to the research methodology applied in the empirical portion of this study. This discussion necessitated the inclusion of details regarding the research approach and design, the sampling procedure, data collection method as well as the statistical analysis techniques to employ.

Considering the nature of this study, a quantitative research approach, employing the survey method was applied and a descriptive research design, employing a single cross-sectional sample, was followed. The sampling procedure that was followed included a non-probability, convenience sample of 600 full-time undergraduate Generation Y students drawn from the sample frame, the 26 public registered HEIs in South Africa of which three HEIs in the Gauteng province were selected. The data were gathered by means of a self-administered questionnaire that included demographic information as well as information directly related to the topic of the study. The data were then analysed using IBM SPSS Statistics and AMOS Version 25.0. The statistical analysis methods used to study the data to subsequently draw conclusions, included frequency analysis, principal components analysis, internal-consistency reliability, construct validity analysis, descriptive statistical analysis (mean, variance, standard deviation, skewness and kurtosis), correlation analysis, multicollinearity diagnostics as well as structural equation modelling. The concluding step in the marketing research process, namely preparing and

presenting the report is discussed and achieved in the following chapter after the necessary steps have been followed.

In Chapter 5, the results obtained from applying the above-mentioned statistical analysis to the gathered data of both the pilot and main study are presented and reported on. Additionally, the hypothesised relationships included in the proposed model of factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices are tested in Chapter 5.

## **CHAPTER 5**

### **ANALYSIS AND INTERPRETATION OF EMPIRICAL FINDINGS**

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#### **5.1 INTRODUCTION**

The research methodology applied to execute this study was detailed in Chapter 4. This chapter reports on the empirical findings of this study using the processes described in Chapter 4 as a foundation. The main purpose of Chapter 5 is to report on and interpret the empirical objectives that were formulated in Chapter 1, as outlined in Section 1.3.3.

In order to report on the findings obtained from the main study, the questionnaire had to be finalised by means of a pilot test. The results obtained from the pilot testing of the questionnaire are described in Section 5.2. The data gathering process is described in Section 5.3 and followed by a segment on the preliminary data analysis in Section 5.4, including how the data were coded, cleaned and tabulated. Section 5.5 provides the sample's background information pertaining to the participants' demographic information as well as activity-tracking devices. The results of a principal components analysis, a type of factor analysis, are portrayed in Section 5.6 and the internal-consistency reliability of the factors extracted from the previous section is detailed in Section 5.11.2.

Section 5.7 comprises a discussion of the descriptive statistics of the study and Section 5.8 outlines the correlation analysis conducted in the study. Section 5.9 comprises the multicollinearity diagnostics analysis, where Section 5.10 includes the formulation and testing of the study's hypotheses. Section 5.11 outlines the structural equation modelling with specific reference to the results of the empirical testing of the model of the factors influencing Generation Y students' attitude towards and intention to use activity-tracking devices as proposed in Chapter 3 (refer to Section 3.6).

The data gathered in this study were examined using IBM SPSS Statistics and AMOS, Version 25.0 for Windows. The data analysis was conducted in two stages - the first stage reporting on the results obtained during the pilot testing followed by and examination of the results obtained from the main survey. The succeeding section provides insight into the results obtained from the pilot testing.

#### **5.2 PILOT TEST RESULTS**

The questionnaire used to gather the data for this study was pre-tested to ensure both the face and content validity of the measuring instrument. The feedback from the pre-testing process was considered and a pilot study commenced. The pilot study was carried out in order to establish the

measuring instrument's internal-consistency reliability. The questionnaire was piloted to a non-probability convenience sample of 50 full-time undergraduate students, located on a South African HEI campus that was excluded from the main study's sampling frame. Table 5-1 outlines the outcomes obtained from the pilot test.

**Table 5-1: Summary of the pilot testing results**

Items	Number of variables	Mean	Standard deviation	N	Cronbach alpha
C1 – C4	4	5.225	0.695	50	0.884
C5 – C7	3	5.033	0.783	50	0.867
C8 – C12	5	4.988	0.683	50	0.835
C13 – C15	3	4.695	0.709	50	0.794
C16 – C18	3	2.847	1.129	50	0.858
C19 – C21	3	4.853	1.192	50	0.948

The internal-consistency reliability of the measuring instrument was concluded by computing the Cronbach alpha coefficient. The values obtained for each of the constructs were above the recommended level of 0.6, which indicates an acceptable internal-consistency reliability (Wiid & Diggines, 2013:238; Spiliotopoulou; 2009:12). The total scale recorded a Cronbach alpha value of 0.898 and an average inter-item correlation score of 0.295, which falls within the recommended range of 0.15 and 0.5 (Clark & Watson, 1995:316).

As such, based on the findings obtained from the pilot test, the final questionnaire to be administered in the main study was drafted (refer to Annexure A). Table 5-2 outlines the coding information as well as descriptions of the variables contained within each construct.

**Table 5-2: Description of constructs and variables**

Code	Variable	Construct
<b>Scale C: Attitude towards activity-tracking devices</b>		
C1	Using an activity-tracking device is a good idea.	Construct 1 - Attitude
C2	Generally, I have a favourable attitude towards using an activity-tracking device.	
C3	I like the idea of using an activity-tracking device.	

**Table 5-2: Description of constructs and variables (continued)**

Code	Variable	Construct
<b>Scale C: Attitude towards activity-tracking devices</b>		
C4	Overall, I think using an activity-tracking device is beneficial.	Construct 1 - Attitude
C5	Learning how to use an activity-tracking device is easy.	
C6	It is easy to use an activity-tracking device to track your daily activity.	
C7	It is easy to remember how to use an activity-tracking device.	Construct 2 - Perceived ease of use
C8	An activity-tracking device is useful to your life in general.	
C9	An activity-tracking device provides you with useful information about your physical activity.	
C10	An activity-tracking device improves the quality of your physical activity.	Construct 3 – Perceived usefulness
C11	An activity-tracking device increases your level of physical activity.	
C12	An activity-tracking device enhances the effectiveness of your physical activity.	
C13	A reliable brand name is one of the key factors when choosing an activity-tracking device.	Construct 4 – Perceived importance of brand name
C14	A reliable brand name reflects the quality of an activity-tracking device.	
C15	There is less risk of being disappointed if you buy an activity-tracking device with a reliable brand name.	
C16	People who are important to me think I should use an activity-tracking device.	Construct 5 – Subjective norm
C17	People whose opinions I value think I should use an activity-tracking device.	
C18	People who influence my decisions think that I should use an activity-tracking device.	
C19	I intend to use an activity-tracking device in the future.	Construct 6 – Intention to use
C20	I predict I will use an activity-tracking device in the future.	
C21	I plan to use an activity-tracking device in the future.	

The data gathering process applied in this study follows.

## **5.3 DATA GATHERING PROCESS**

In keeping with the sampling plan specified in the previous chapter, this study's data were collected from 600 Generation Y full-time students registered at three selected South African HEI campuses situated in the Gauteng province. The data were gathered by means of employing a self-administered questionnaire.

In order for the questionnaires to be distributed amongst the students within the duration of predetermined lectures, permission was requested from relevant academic staff at the three campuses. The group self-administered survey approach was applied to gather the data. The questionnaires were administered by the researcher to the participating students during a single scheduled lecture of the academics who conferred permission, with the assistance of a trained fieldworker. Consistent with the specified sample size, 600 questionnaires were distributed – 200 per HEI campus. After allowing an appropriate amount of time, the researcher and the fieldworker collected the completed questionnaires. The prospective student participants were notified that the questionnaires were to be completed voluntarily and that the information provided, as well as the name of their institution where they are registered, would be kept confidential. As such, no student was coerced into participating in this research study.

The subsequent section addresses the preliminary data analysis undertaken in this study.

## **5.4 PRELIMINARY DATA ANALYSIS**

It is advisable to perform a preliminary data analysis before analysing the final data set. Such an analysis comprises of coding and tabulation. An overview of the coding, data cleaning and tabulation relating to the final data set follows.

### **5.4.1 Coding**

This study's questionnaire comprised three sections. The purpose of Section A was to obtain participants' demographical information, where Section B gathered participants' background information pertaining to activity-tracking devices. Section C measured participants' attitude towards and intention to use activity-tracking devices. Table 5-3 depicts the coding information with specific reference to codes, variables as well as the values assigned to responses.



**Table 5-3: Coding information**

Section A: Demographical information			
Question	Code	Variable	Value assigned to responses
Question 1	A1	Institution	Traditional university (1); University of technology (2); Comprehensive university (3)
Question 2	A2	Country of origin	South Africa (1); Other (2)
Question 3	A3	Province of origin	Eastern Cape (1); Free state (2); Gauteng (3); KwaZulu-Natal (4); Limpopo (5); Mpumalanga (6); Northern Cape (7); North West (8); Western Cape (9);
Question 4	A4	Registered	Full-time (1); Part-time (2)
Question 5	A5	Current year of study	1st (1); 2nd (2); 3rd (3); 4th (4); Post graduate (5)
Question 6	A6	Gender	Male (1); Female (2)
Question 7	A7	Ethnic group	Black/African (1); Coloured (2); Indian/Asian (3); White (4); Other (5)
Question 8	A8	Home language	Afrikaans (1); English (2); isiNdebele (3); isiXhosa (4); isiZulu (5); Sepedi (6); Sesotho (7); Setswana (8); siSwati (9); Tshivenda (10); Xitsonga (11); Other (12)
Question 9	A9	Age at last birthday	<18 (1); 18 (2); 19 (3); 20 (4); 21 (5); 22 (6); 23 (7); 24 (8); 25 (9); >25 (10)
Section B: Activity-tracking device background information			
Question	Code	Variable	Value assigned to responses
Question 1	B1	Own an ATD	Yes (1); No (2)
Question 2	B2	Track daily activity interest	Yes (1); No (2)
Question 3	B3	Own a smartphone	Yes (1); No (2)
	B3a	Activity-tracking app on smartphone	Yes (1); No (2)
Question 4	B4	Most important features of ATD	Tracking steps and distance travelled (1); Tracking sleep patterns (2); Measuring heart rate and blood pressure (3); Calculating daily calories burnt (4); GPS tracking (5); Inactivity alert (6); Waterproof/water resistant (7); Multi-sport tracking (8); Perspiration levels (9); 24/7 activity tracking (10); Interchangeable bands (11); Smart notifications (12); On-screen workout programme (13); Food logging (14); Active time (15); Other (16)

**Table 5-3: Coding information (continued)**

Section C: Attitude towards and intention to use activity-tracking devices			
Item	Code	Variable	Value assigned to responses
Item 1 - 4	C1 – C4	Attitude	
Item 5 - 7	C5 – C7	Perceived ease of use	
Item 8 - 12	C8 – C12	Perceived usefulness	Strongly disagree (1); Disagree (2); Disagree somewhat (3); Agree somewhat (4); Agree (5); Strongly agree (6)
Item 13 - 15	C13 – C15	Perceived importance of brand name	
Item 16 - 18	C16 – C18	Subjective norm	
Item 19 - 21	C19 – C21	Intention to use	

The following section comprises an explanation of the data cleaning process applied to the data set.

### **5.4.2 Data cleaning**

Data cleaning was applied to remove the questionnaires that were completed by participants that fell outside the boundaries set for the defined target population. In addition, those questionnaires that had missing values greater than 10 percent were set to be discarded. Of the 600 questionnaires distributed, 543 were returned, resulting in a 90.5 percent response rate. After completing the data cleaning process, 480 questionnaires were deemed viable to include in the data set for further statistical analysis. Therefore, the actual response rate was 80 percent. In the event where questionnaires had missing values equalling to less than 10 percent, the missing values for the scaled response items were calculated based on the mode value.

The following section provides details pertaining to the tabulation applied in this study.

### **5.4.3 Tabulation of variables**

Tabulation follows the coding and data cleaning processes. Within Table 5-4, the frequencies recorded for each scale response recorded in Section C (C1 – C21) are displayed.

**Table 5-4: Frequency table of responses**

Scale item	Strongly disagree	Disagree	Disagree somewhat	Agree somewhat	Agree	Strongly agree
	1	2	3	4	5	6
<b>Construct 1 - Attitude</b>						
<b>C1</b>	8	3	12	75	209	173
<b>C2</b>	5	28	39	158	160	90
<b>C3</b>	8	14	21	88	188	161
<b>C4</b>	7	3	15	89	167	199
<b>Construct 2 – Perceived ease of use</b>						
<b>C5</b>	13	26	81	173	126	61
<b>C6</b>	3	19	61	149	161	87
<b>C7</b>	6	21	49	155	163	86
<b>Construct 3 – Perceived usefulness</b>						
<b>C8</b>	9	28	36	150	167	90
<b>C9</b>	5	9	18	90	177	181
<b>C10</b>	4	15	30	113	170	148
<b>C11</b>	9	24	54	107	169	117
<b>C12</b>	5	19	46	130	182	98
<b>Construct 4 – Perceived importance of brand name</b>						
<b>C13</b>	10	18	57	96	144	155
<b>C14</b>	13	13	38	121	138	157
<b>C15</b>	16	18	51	104	132	159
<b>Construct 5 – Subjective norm</b>						
<b>C16</b>	89	105	64	96	74	52
<b>C17</b>	77	104	73	83	98	45
<b>C18</b>	80	109	68	96	89	38
<b>Construct 6 – Intention to use</b>						
<b>C19</b>	15	14	28	107	148	168
<b>C20</b>	18	10	30	114	148	160
<b>C21</b>	18	17	30	108	140	167

The following segment, Section 5.5, reports on the demographic and activity-tracking device background information of the participants who participated in this study.

## **5.5 DEMOGRAPHIC AND ACTIVITY-TRACKING DEVICE BACKGROUND INFORMATION**

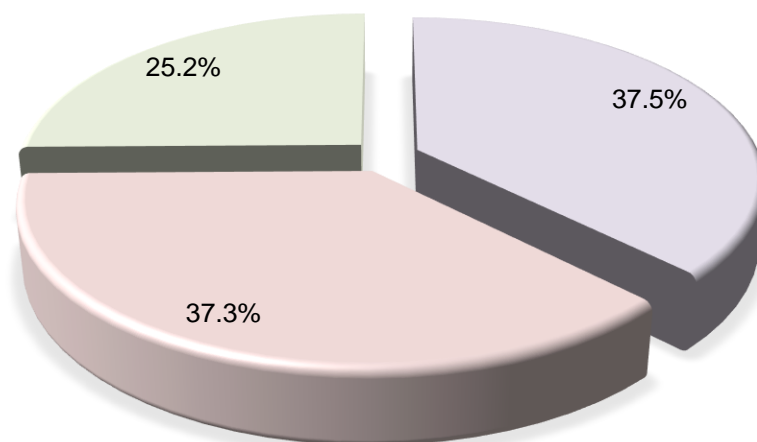
This section initially provides an illustrative description of the sample in terms of certain demographic attributes, followed by a depiction of the samples' reported background information pertaining to activity-tracking devices.

The demographical information and activity-tracking device background information is illustrated using pie charts, bar graphs and frequency tables.

### **5.5.1 Sample description**

As denoted in Section 5.4.2, of the 600 questionnaires dispersed, 543 were returned, of which 480 were usable, translating to an 80 percent actual response rate. Provided that the final sample only comprised participants that fell inside the defined target population, no illustrations are depicted for country of origin, full- or part-time registration status, neither undergraduate (registered as first year to fourth year students) or post graduate registration status. Therefore, questionnaires completed by participants who indicated a country of origin other than South Africa, were registered part-time and not on a full-time basis and were postgraduate students rather than undergraduate students, were discarded. A description of the final, valid samples' demographic attributes with regard to their HEI, province of origin, gender, ethnicity, home language and age follows. Table 5-5 depicts the distribution of participants among the three HEIs.

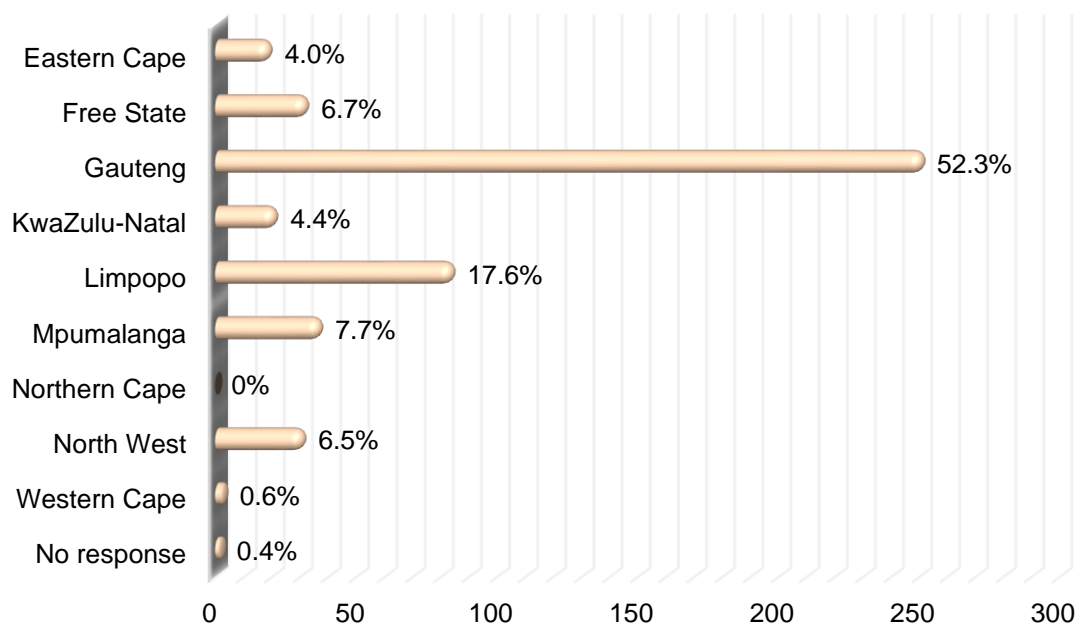
**Table 5-5: Higher education institutions**



■ Traditional university ■ University of technology ■ Comprehensive university

Institution	<i>f</i>	%
Traditional university	180	37.5
University of technology	179	37.3
Comprehensive university	121	25.2
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

The questionnaires were distributed at three HEIs campuses in Gauteng, based on the judgement of the researcher. The total of 600 intended questionnaires were divided amongst the three HEI campuses, resulting in a distribution of 200 questionnaires per campus. As presented in Table 5-5, 37.5 percent of the participants emerged from a traditional university, 37.3 percent from a university of technology and 25.2 percent were from a comprehensive university.

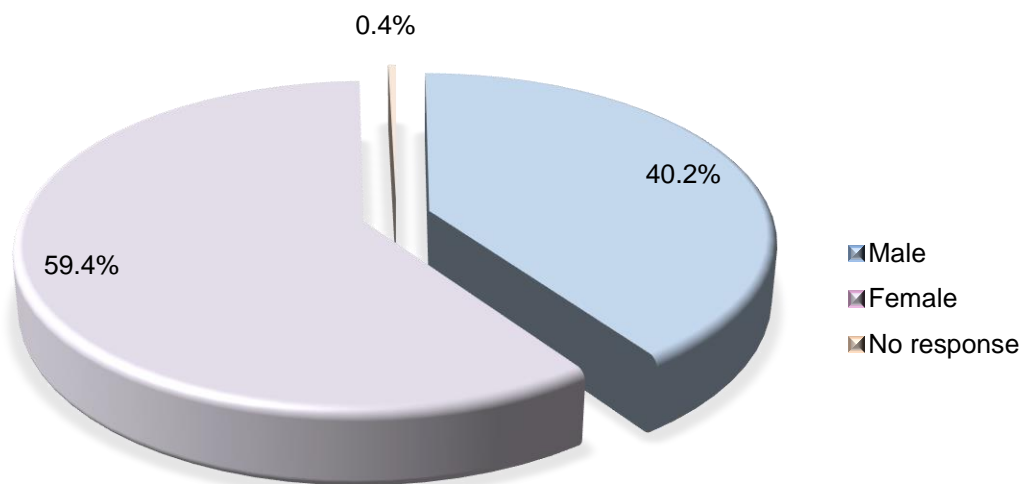
**Table 5-6: Province of origin**

Province	<i>f</i>	%
Eastern Cape	19	4.0
Free State	32	6.7
Gauteng	251	52.3
KwaZulu-Natal	21	4.4
Limpopo	84	17.6
Mpumalanga	37	7.7
Northern Cape	0	0
North West	31	6.5
Western Cape	3	0.6
No response	2	0.4
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

Table 5-6 indicates that most of the participants originated from the Gauteng province with a response of 52.3 percent. Participants originating from the Eastern Cape were four percent, from the Free State 6.7 percent, from KwaZulu-Natal 4.4 percent, where the second largest concentration emanated from the Limpopo province with 17.6 percent of the total sample.

Furthermore, 7.7 percent of participants were from Mpumalanga, 6.5 percent from the North West province, 0.6 percent from the Western Cape. Unfortunately, none of the participants emerged from the Northern Cape and 0.4 percent did not respond to the question.

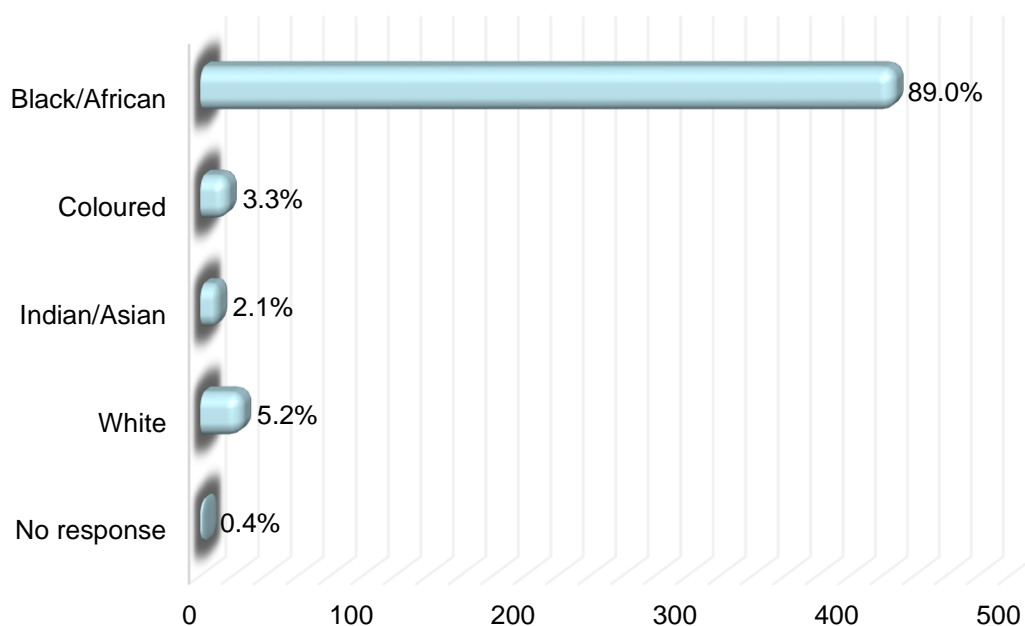
**Table 5-7: Gender profile**



Gender indicated	<i>f</i>	%
Male	193	40.2
Female	285	59.4
No response	2	0.4
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

Table 5-7 illustrates the samples' gender distribution. Among the 480 participants, 193 or 40.2 percent were males and 285 or 59.4 percent were females, where 0.4 percent did not respond to the question.

The following table, Table 5-8, indicates the samples' ethnicity.

**Table 5-8: Sample ethnicity**

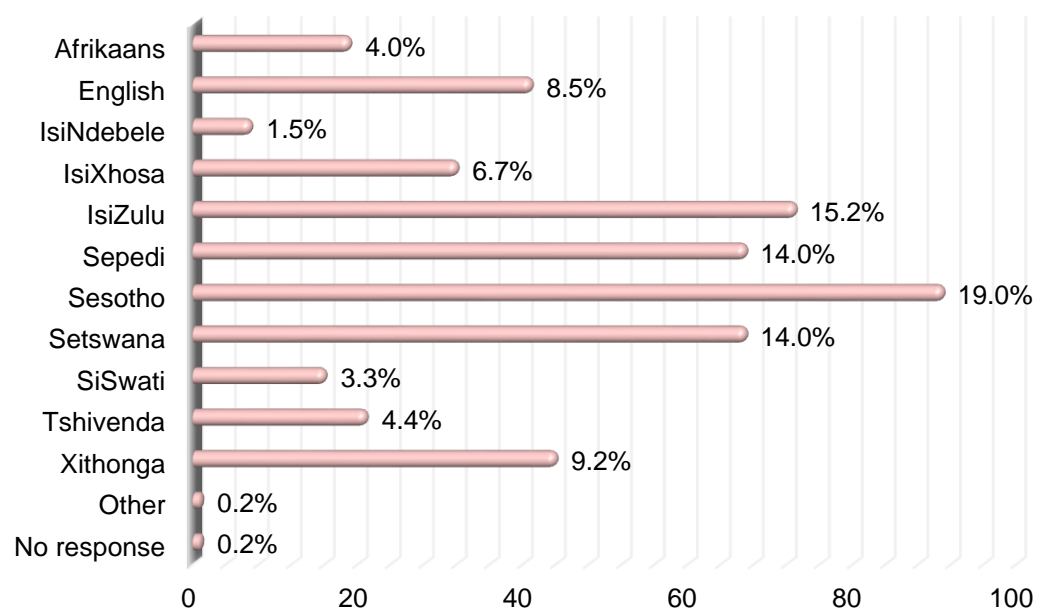
Ethnicity indicated	<i>f</i>	%
Black/African	427	89.0
Coloured	16	3.3
Indian/Asian	10	2.1
White	25	5.2
No response	2	0.4
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

As can be seen in Table 5-8, the majority of the participants were of a Black/African ethnicity, with 89.0 percent of the total sample. Thereafter, the second largest distribution of the sample indicated a White ethnicity (5.2%), followed by Coloured individuals (3.3%) and Indian/Asian individuals (2.1%). Two participants failed to respond to this demographic question, accounting for 0.4 percent of the sample.

As part of the demographic information, participants were requested to indicate their home language. The results are indicated in Table 5-9.



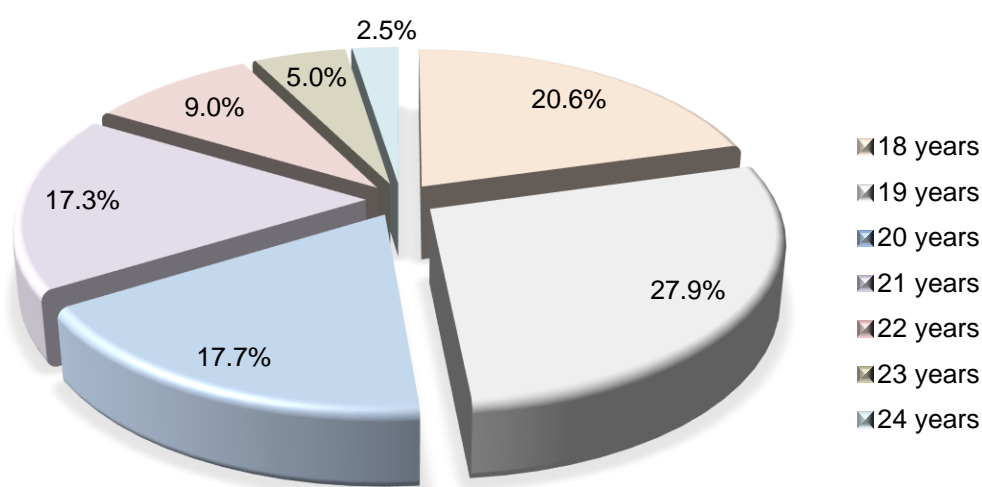
**Table 5-9: Participants' home language**



Language	<i>f</i>	%
Afrikaans	19	4.0
English	41	8.5
IsiNdebele	7	1.5
IsiXhosa	32	6.7
IsiZulu	73	15.2
Sepedi	67	14.0
Sesotho	91	19.0
Setswana	67	14.0
SiSwati	16	3.3
Tshivenda	21	4.4
Xitsonga	44	9.2
Other	1	0.2
No response	1	0.2
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

Table 5-9 points out that four percent of the sample indicated Afrikaans as their home language, 8.5 percent English, 1.5 percent IsiNdebele, 6.7 percent IsiXhosa, 15.2 percent IsiZulu, 14.0 percent Sepedi and Setswana respectively, 3.3 percent SiSwati, 4.4 percent Tshivenda 9.2 percent Xitsonga, 0.2 percent another language other than the 11 official languages of South Africa, which was Portuguese and 0.2 percent did not respond to the question. The largest representation concerning the participants' home language was Sesotho, represented by 19.0 percent of the sample.

**Table 5-10: Participants' age distribution**



Age indicated	<i>f</i>	%
18 years	99	20.6
19 years	134	27.9
20 years	85	17.7
21 years	83	17.3
22 years	43	9.0
23 years	24	5.0
24 years	12	2.5
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

Table 5-10 presents the participants' age distribution and indicates that 20.6 percent were 18 years of age, 27.9 percent 19 years of age, 17.7 percent 20 years of age, 17.3 percent 21 years

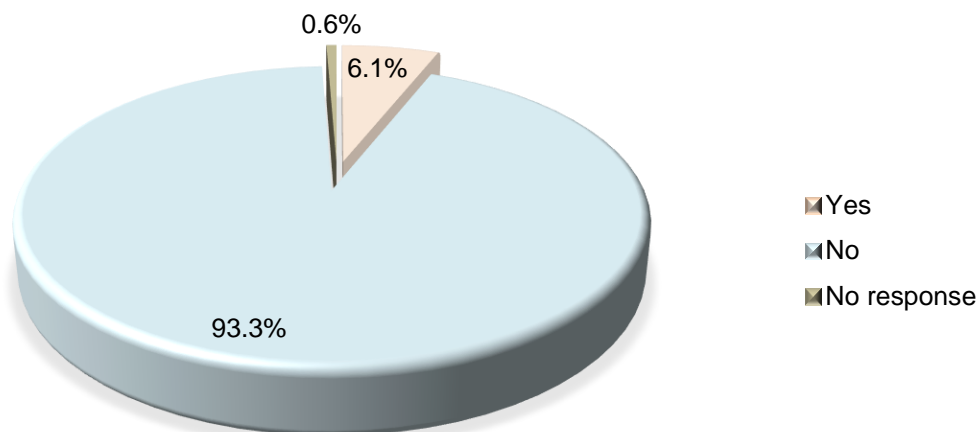
of age, nine percent 22 years of age, five percent 23 years of age and 2.5 percent 24 years of age.

The following section presents participants' activity-tracking device background information.

### 5.5.2 Activity-tracking device background information

Section B of the questionnaire incorporated five questions designed to determine participants' background information pertaining to activity-tracking devices. The first question (B1) examined whether participants owned a wearable activity-tracking device. The second question (B2) probed participants to indicate whether they were interested in tracking their daily activity. The third question (B3) requested participants to indicate whether they owned a smartphone, where part two (B3a) determined whether those who indicated ownership of a smartphone, had an activity-tracking application installed on the device. The fifth question (B4) required participants to indicate, in their opinion, the five most important features of activity trackers, out of a pool of 15 response options. The results are presented as follows.

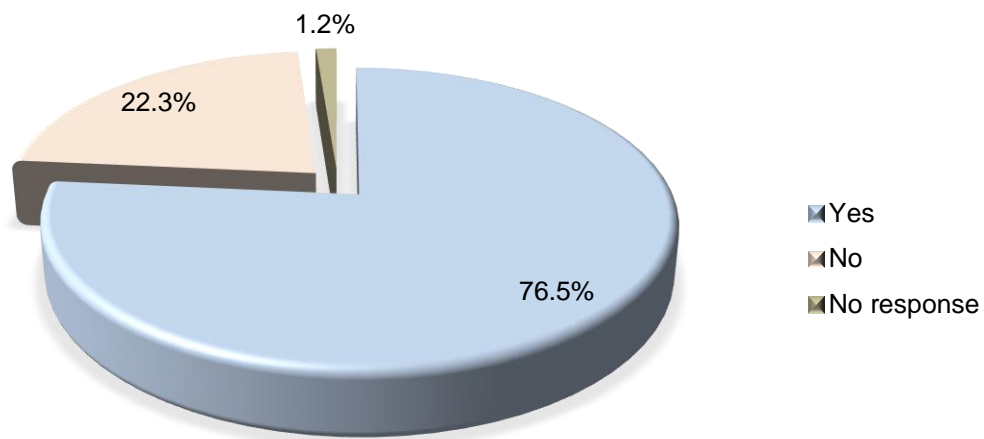
**Table 5-11: Participants' ownership of a wearable activity-tracking device**



Own a device	<i>f</i>	%
Yes	29	6.1
No	448	93.3
No response	3	0.6
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

Wearable activity-tracking devices were only recently introduced in the South African consumer market and approaching the growth phase, some devices the maturity phase, of the product life cycle. This is evident in Table 5-11, which indicates that only 6.1 percent of the total sample owned an activity-tracking device in 2017 when this study was conducted, where the majority (93.3%) did not own such a device and 0.6 percent did not respond to the question.

**Table 5-12: Participants' interest in tracking their daily activity**



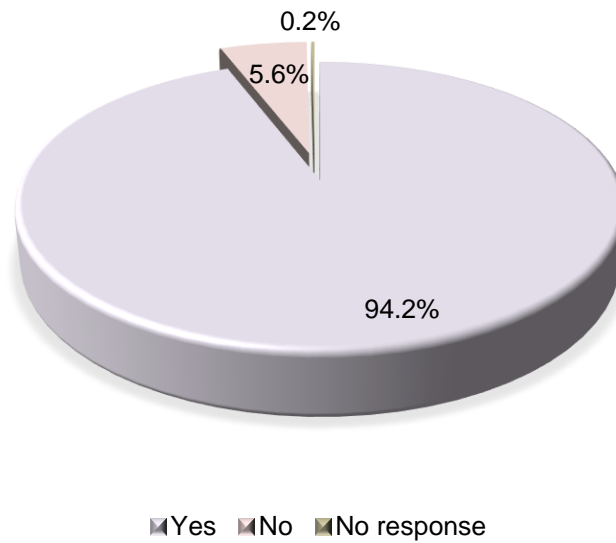
Track daily activity	<i>f</i>	%
Yes	367	76.5
No	107	22.3
No response	6	1.2
<b>Total sample (N)</b>	<b>480</b>	<b>100</b>

Table 5-12 presents the distribution of the samples' interest in tracking their daily activity. Interestingly, despite the absence of an activity tracker, the majority of the participants or 76.6 percent indicated an interest in tracking their daily activity, where 22.3 percent were not interested and 1.2 percent did not respond to the question. This contrasting finding proposes an investigation of identifying, despite the participants' interest of tracking their activity, why they do not own a device to achieve this.

Figure 5-1 and 5-2 relates to questions relating to smartphone ownership.

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## OWN A SMARTPHONE



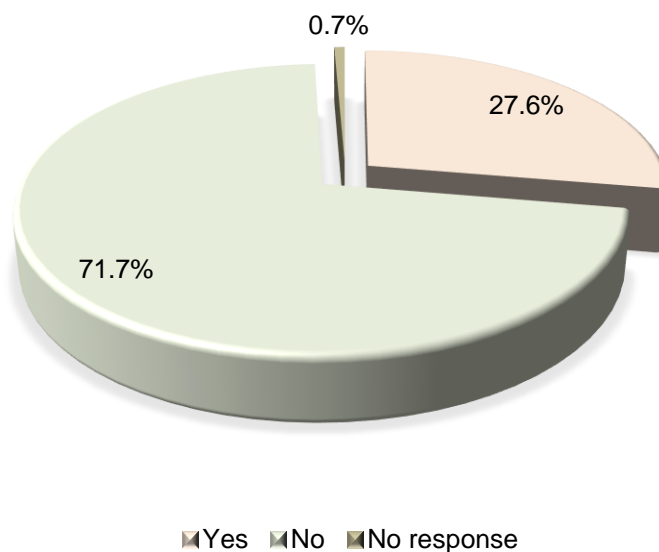
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**Figure 5-1: Participants' ownership of a smartphone**

Participants were asked to indicate whether they own a smartphone. The results indicate that 94.2 percent (452 participants) of the total sample owned a smartphone. Furthermore, 5.6 percent or 27 participants did not have a smartphone and one participant did not respond to the question, which accounts for the 0.2 percent of the total sample.

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## ACTIVITY-TRACKING APPLICATION



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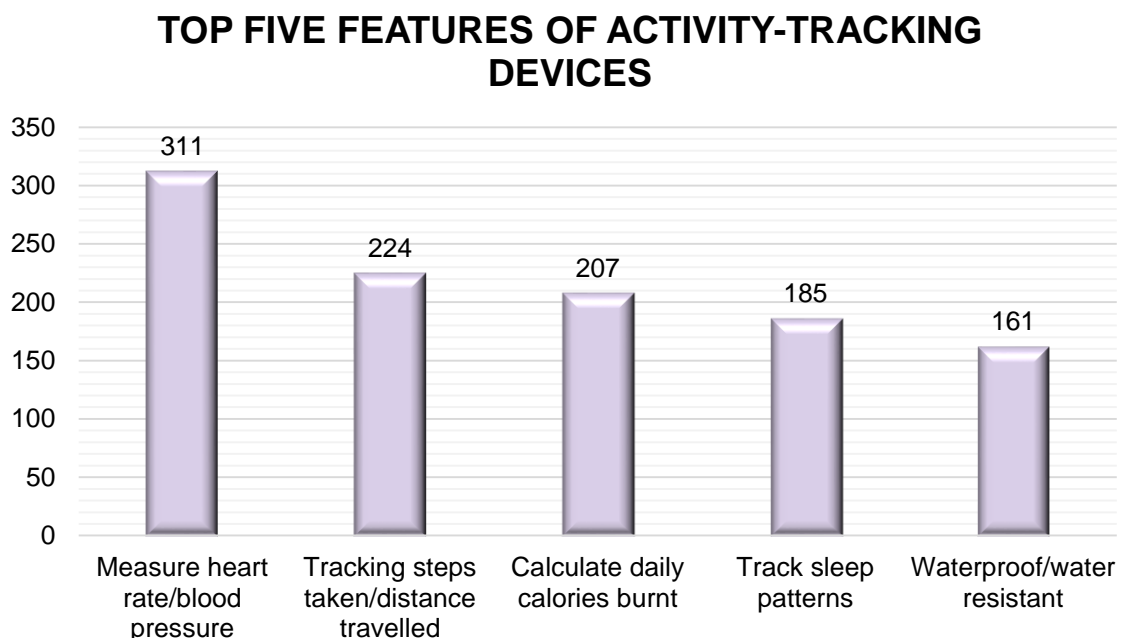
**Figure 5-2: Activity-tracking application present on smartphone**

Given that various fitness apps are readily available to download on smartphones such as a pedometer step counter Runtastic, Google Fit, S-health and Lifelog, participants were asked to

indicate whether they have an activity-tracking application on their smartphones. It should be noted that the total sample is N=452, since the responses of those individuals who indicated ownership of a smartphone are valid in relation to the stated question.

The results indicate that of the 452 participants, only 125 (27.6 %) have an activity-tracking application on their smartphones, where 324 (71.7 %) of the participants do not and three (0.7 %) did not respond to the question.

As discussed in Chapter 3, activity-tracking devices comprise several different characteristics and features. Participants were asked to indicate, out of a pool of 15 different features, the five most important features in their opinion. The results are illustrated in Figure 5-3.



**Figure 5-3: The five most favoured activity-tracking device features amongst participants**

Participants were required to indicate, in their opinion, the five most important features of activity-tracking devices, out of 15 possible options, namely tracking steps and distance travelled, tracking sleep patterns, measuring heart rate and blood pressure, calculating daily calories burnt, GPS tracking, inactivity alert, waterproof/water resistant, multi-sport tracking, perspiration levels, 24/7 activity tracking, interchangeable bands, smart notifications, on-screen workout programme, food logging and active time.

Figure 5-3 presents the results in descending order, where measuring heart rate and blood pressure accrued 311 responses, tracking steps and distance travelled 224 responses,

calculating daily calories burnt 207 responses, tracking sleep patterns 185 responses and being waterproof or water resistant 161 responses, where N=480.

The above section has presented details regarding the samples' demographic attributes as well as background information pertaining to activity-tracking devices. The next section comprises a discussion regarding the exploratory principal components analysis performed on the scaled responses (Section C) of the main study's questionnaire.

## **5.6 EXPLORATORY PRINCIPAL COMPONENTS ANALYSIS**

Exploratory principal components analysis was conducted on the data set in this study in order to discern whether the 21 scale-related items used in Section C of the questionnaire produced the proposed constructs, as well as whether the items loaded on the predicted constructs.

Before performing the procedure, the data had to be assessed based on their factorability and was done by performing the Kaiser-Meyer-Olkin (KMO) test and the Barlett's test of Sphericity. According to (Pallant, 2013:190), a KMO value of 0.6 and above in addition to a significant Barlett's test of Sphericity value is indicative of sample adequacy, therefore, suited for factor analysis. In this pre-evaluation, both tests returned satisfactorily values [KMO=0.865, chi-square Bartlett test=5899.655 (df=190),  $p=0.000<0.05$ ], thus validating the data's appropriateness for principal components analysis.

Upon confirming the factorability of the data, principal components analysis, using the varimax rotation, was performed on the 21 scaled items. Six factors were extracted with eigenvalues above 1.0, which explained 74.35 percent of the total variance. However, one item, item C8, displayed a lower factor loading in relation to the other items in the construct as well as a low commonality value. The item C8 was removed from the data set and excluded from further analysis as all commonality values should exceed the 0.5 level (Hair *et al.*, 2014:117). The item was removed once it had been inspected to establish that its removal would not alter the initial meaning of the construct. The deletion of the item increased the total variance explained to 76.09 percent. The final results of the factor analysis are displayed in Table 5-13.

**Table 5-13: Exploratory principal components analysis results**

Item	Factors						Communalities
	1	2	3	4	5	6	
C1	0.758						0.675
C2	0.714						0.606
C3	0.803						0.773
C4	0.779						0.726
C5						0.800	0.655
C6						0.817	0.724
C7						0.769	0.657
C9			0.643				0.559
C10			0.824				0.776
C11			0.809				0.739
C12			0.774				0.690
C13					0.865		0.796
C14					0.866		0.809
C15					0.788		0.685
C16		0.915					0.890
C17		0.933					0.924
C18		0.910					0.883
C19				0.851			0.872
C20				0.879			0.899
C21				0.863			0.877
Eigenvalues	6.788	2.200	1.920	1.766	1.448	1.096	
%Variance	33.939	11.000	9.599	8.829	7.0239	5.482	

It is evident from Table 5-13 that all six factors aligned in accordance with the specified scale and that 20 items remain after the removal of C8, explaining 76.09 percent of the total variance. The following section interprets the descriptive statistical analysis.

## 5.7 DESCRIPTIVE STATISTICAL ANALYSIS

The most frequently used descriptive statistics are measures of location, measures of variability (Wilson, 2006:229) as well as measures of shape (Malhotra *et al.*, 2013:489) and were calculated for all scaled items used in this study. The calculation of descriptive statistics addressed the first



six empirical objectives. The scaled responses were measured using a six-point Likert scale, ranging from 1=strongly disagree to 6=strongly agree. Therefore, higher mean values represent a greater degree of agreement amongst the sampled Generation Y students. Table 5-14 presents a summary of the descriptive statistics pertaining to the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices.

**Table 5-14: Descriptive statistics summary**

<b>Factors</b>	<b>Valid N</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Skewness</b>	<b>Kurtosis</b>
Overall scale	480	4.491	0.702	-0.658	0.746
Attitude	480	4.887	0.867	-1.234	2.225
Perceived ease of use	480	4.367	0.918	-0.388	0.175
Perceived usefulness	480	4.747	0.910	-0.695	0.280
Perceived importance of brand name	480	4.691	1.101	-0.934	0.950
Subjective norm	480	3.272	1.531	0.071	-1.175
Intention to use	480	4.766	1.184	-1.159	1.372

As illustrated in Table 5-14, the overall scale recorded a high mean value (mean=4.491), where the highest mean score was recorded on attitude towards activity-tracking devices (mean=4.887), followed by intention to use such devices (mean=4.766), perceived importance of brand name (mean=4.691) and perceived usefulness (mean=4.693). This indicates that Generation Y students have both a positive attitude towards and intention to use activity-tracking devices. Furthermore, this suggests that brand name plays an imperative role in Generation Y students' decision making pertaining the purchase of such devices and that these devices are also positively perceived as useful when monitoring activity levels as well as overall health and well-being. Conversely, the lowest mean scores were recorded for subjective norm (mean=3.272). This suggests that Generation Y students not necessarily perceive that their significant others believe that they should use activity-tracking devices. As such, it might take time for activity trackers to become a social norm.

Despite the fact that the highest means were recorded on attitude towards activity-tracking devices, intention to use activity-tracking devices, perceived importance of brand name and perceived usefulness concerning activity-tracking devices, it is important to note that all mean scores were significantly high. This emphasises the importance of each of the six factors and their likely positive influence on attitude towards and intention to use activity-tracking devices amongst Generation Y students.

Table 5-14 also demonstrates that the highest standard deviation values were computed for subjective norm (Std. Dev. = 1.531) and intention to use activity-tracking devices (Std. Dev. = 1.184), which indicates a larger dispersal in responses to the items in these constructs. The lowest standard deviation values, which indicates less dispersal in responses to the same items, was recorded for attitude towards activity-tracking devices (Std. Dev. = 0.867) and perceived ease of use (Std. Dev. = 0.918).

Given that none of the skewness values fell outside the required -2 to +2 range, the data set may be classed as distributed normally. Moreover, the kurtosis values indicate that the data set is rather more peaked than normal, since the majority of the variables diverged from zero.

Conducting a correlation analysis precedes performing structural equation modelling so that significant relationships between the hypothesised factors influencing attitude towards and intention to use activity-tracking devices can be established. The following section delineates this process.

## 5.8 CORRELATION ANALYSIS

The compilation of a correlation matrix of the relationship between the factors extracted in the exploratory principal components analysis is a useful tool in evaluating the nomological validity of a proposed measurement model (Hair *et al.*, 2010:710). In this study, the Pearson's Product-Moment correlation coefficients (*r*) were computed between each pair of factors, where values between 0.1 and 0.29 signify a small relationship, values between 0.3 and 0.49 an average relationship and values between 0.5 and 1 a strong relationship (Pallant, 2013:139).

The correlation matrix is presented in Table 5-15.

**Table 5-15: Correlation matrix of relationships between extracted factors**

Factors	1	2	3	4	5	6
Attitude	1					
Perceived ease of use	0.336**	1				
Perceived usefulness	0.461**	0.313**	1			
Perceived importance of brand name	0.304**	0.193**	0.347**	1		
Subjective norm	0.286**	0.142**	0.340**	0.207**	1	
Intention to use	0.530**	0.136**	0.426**	0.349**	0.338**	1

\*\* Correlation is significant at the 0.01 level (2-tailed)

As indicated in Table 5-15, there was significant positive correlation at a significance level of 0.01 between each of the pairs of factors, which provides evidence of nomological validity.

The succeeding section addresses the multicollinearity diagnostics of the data set.

## 5.9 MULTICOLLINEARITY DIAGNOSTICS

According to Hair *et al.* (2010:201), it is essential to consider the possibility of multicollinearity occurring when applying multivariate statistical analysis to a data set. There are two main methods of determining the presence of multicollinearity in the data set, namely a tolerance test and the variance inflation factors (VIF) (Miles & Shevlin, 2010:130). The tolerance test comprises a regression analysis to afford each independent variable the probability to become the dependent variable proportionate to the other predictor variables (Malhotra, 2010:586). Tolerance is measured between zero and one, where a tolerance level closer to one is acceptable (Miles & Shevlin, 2010:130). Furthermore, variance inflation factors (VIF) should display values between one and two (Zikmund & Babin, 2010:392) or a value below 10 (Burns & Bush, 2014:414), which typically indicates no multicollinearity issues.

The results of the multicollinearity diagnostics performed on the factors present in the data set of this study, is shown in Table 5-16.

**Table 5-16: Multicollinearity diagnostics of the data set**

Model	Tolerance	VIF
Attitude	0.606	1.649
Perceived ease of use	0.841	1.190
Perceived usefulness	0.664	1.507
Perceived importance of brand name	0.817	1.224
Subjective norm	0.833	1.200
Intention to use	0.626	1.598

---

Constant = dependant variable (intention to use activity-tracking devices)

---

As illustrated in Table 5-16, high tolerance values ranging from 0.606 to 0.841 were computed. In addition, all the VIF values recorded were between one and two. As such, the data set exhibits no multicollinearity concerns.

Structural equation modelling was employed to test the hypotheses as outlined in the succeeding section.

## 5.10 HYPOTHESES TESTING

Hypotheses are empirically testable, yet unproven statements developed to explain a phenomenon based on a preconceived notion of the relationship between gathered data (Shukla, 2008:102). Additionally, according to Zikmund and Babin (2013:275), hypotheses are considered a postulation regarding the nature of a particular situation. In hypothesis development, the null hypothesis ( $H_0$ ) affirms that there is no relationship between the observed variables (Hair *et al.*, 2013:67). Conversely, an alternative hypothesis ( $H_a$ ), refers to a statement that suggests some difference or effect between variables (Burns & Bush, 2014:357), where accepting the alternative hypothesis generally leads to changes in opinions and actions (Malhotra, 2015:336).

In this study, the significance level for the hypothesis testing was set at the conventional 1 percent level ( $\alpha = 0.01$ ), where:

- If P-value  $> \alpha$ , then conclude  $H_0$
- If P-value  $\leq \alpha$ , then conclude  $H_a$

In keeping with the literature reviewed in Chapters 2 and 3 combined with the observed significant relationships evident in the correlation analysis (refer to Table 5-16), the subsequent hypotheses were formulated:

- $H_{01}$ : The factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices is not a six-factor structure comprising attitudes towards activity-tracking devices, perceived ease of use, perceived usefulness, perceived importance of brand name, subjective norm and intention to use activity-tracking devices.
- $H_{a1}$ : The factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices is a six-factor structure comprising attitudes towards activity-tracking devices, perceived ease of use, perceived usefulness, perceived importance of brand name, subjective norm and intention to use activity-tracking devices.
- $H_{02}$ : Perceived ease of use (+) does not have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- $H_{a2}$ : Perceived ease of use (+) does have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- $H_{03}$ : Perceived ease of use (+) does not have a significant direct influence on Generation Y students' perceived usefulness concerning activity-tracking devices.

- H<sub>a3</sub>: Perceived ease of use (+) does have a significant direct influence on Generation Y students' perceived usefulness concerning activity-tracking devices.
- H<sub>o4</sub>: Perceived usefulness (+) does not have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- H<sub>a4</sub>: Perceived usefulness (+) does have a significant direct influence on Generation Y students' attitude towards activity-tracking devices.
- H<sub>o5</sub>: Perceived usefulness (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a5</sub>: Perceived usefulness (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>o6</sub>: Perceived importance of brand name (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a6</sub>: Perceived importance of brand name (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>o7</sub>: Subjective norm (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a7</sub>: Subjective norm (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>o8</sub>: Attitude (+) does not have a significant direct influence on Generation Y students' intention to use activity-tracking devices.
- H<sub>a8</sub>: Attitude (+) does have a significant direct influence on Generation Y students' intention to use activity-tracking devices.

The succeeding section discusses the structural equation modelling used to test the proposed model of the factors influencing Generation Y students' attitudes toward and intention to use activity-tracking devices; that is, H<sub>o1</sub> to H<sub>o8</sub>.

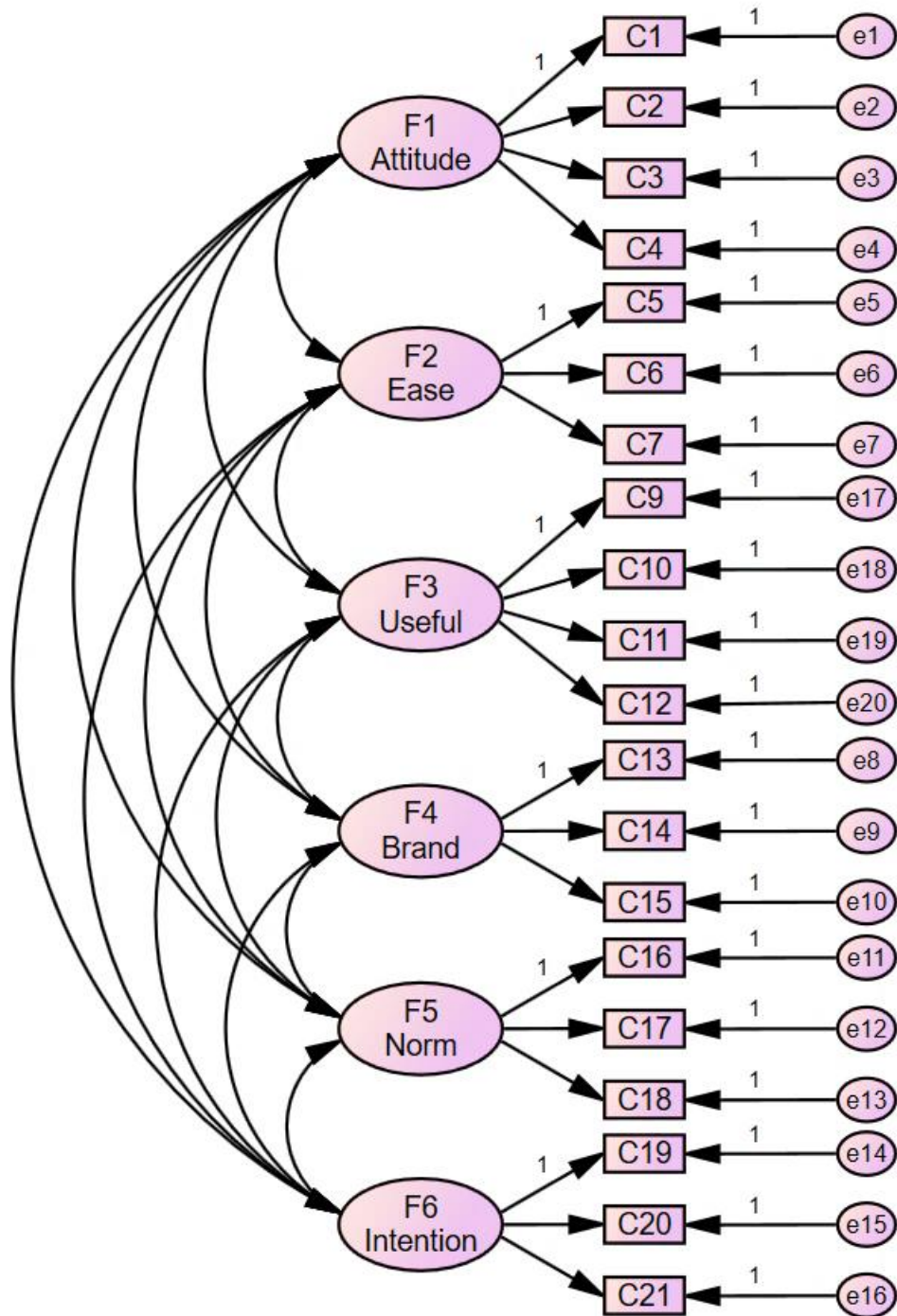
## 5.11 STRUCTURAL EQUATION MODELLING

The final two empirical objectives are addressed in this section (refer to Section 1.3.3). The succeeding section delineates the process that was followed to conduct structural equation modelling with regards to the measurement model and structural model.

### **5.11.1 Measurement model specification**

As stated in Chapter 4 (refer to Section 4.9.8), developing and specifying the measurement model succeeds defining the individual constructs. Given that SEM analysis should be based on theory (Malhotra *et al.*, 2012:870), all relevant constructs, that are hypothesised to constitute the structural model, are defined in Section 3.5. Therefore, the next step is to specify the measurement model. In keeping with model recommended in Chapter 3 (refer to Section 3.6), the measurement, testing the first hypothesis, is a six-factor structure that comprise six latent or unobserved factors, namely attitude towards activity-tracking devices (F1) (four indicators), perceived ease of use (F2) (three indicators), perceived usefulness (F3) (four indicators), subjective norm (F4) (three indicators), perceived importance of brand name (F5) (three indicators) and intention to use activity-tracking devices (F6) (three indicators).

Figure 5-4 illustrates the hypothesised measurement model.



**Figure 5-4: Specified measurement model**

Note, for measurement model: **F1** = Attitudes towards activity-tracking devices; **F2** = Perceived ease of use; **F3** = Perceived usefulness; **F4** = Perceived importance of brand name; **F5** = Subjective norm; **F6** = Intention to use activity-tracking devices.

The first loading of each of the six factors were fixed at 1.0. this was done for model identification purposes. As a result, there are 210 distinct sample moments and 55 parameters to be estimated,

leaving 155 degrees of freedom (df) based on the over-identified model. Moreover, a chi-square value of 286.634 was produced with a probability level equal to  $p=0.000$ .

The standardised coefficients of the measurement model are indicated in Table 5-17.

**Table 5-17: Standardised coefficients of the measurement model**

Latent factors	Factors	Indicators	Factor loadings		Error variance
F1	Attitude towards activity-tracking devices	C1	0.720	+	0.518
		C2	0.670	+	0.449
		C3	0.851	+	0.724
		C4	0.803	+	0.644
F2	Perceived ease of use	C5	0.629	+	0.396
		C6	0.805	+	0.648
		C7	0.702	+	0.493
F3	Perceived usefulness	C9	0.640	+	0.410
		C10	0.827	+	0.685
		C11	0.798	+	0.637
		C12	0.757		0.573
F4	Perceived importance of brand name	C13	0.833	+	0.694
		C14	0.879	+	0.772
		C15	0.698	+	0.481
F5	Subjective norm	C16	0.918	+	0.842
		C17	0.964	+	0.929
		C18	0.895	+	0.802
F6	Intention to use activity-tracking devices	C19	0.897	+	0.804
		C20	0.926	+	0.857
		C21	0.902	+	0.813

The model was examined for any problematic estimates, such as negative error variances, commonly referred to as Heywood cases and standardised factor loadings below -1.0 or above 1.0 (Hair *et al.*, 2010:706). As illustrated in Table 5-17, there were no problematic estimates in the model as all item loadings on the six factors returned values above the 0.5 level. Hence, no factor loadings above 1.0 or below -1.0 and no negative error variances were observed.



For measuring the fit of the model, the subsequent indices produced by AMOS, namely the absolute fit indices of the chi-square, the root mean square of approximation (RMSEA), the incremental fit index (IFI), the comparative fit index (CFI) and the Tucker-Lewis index (TLI) were used. A significant chi-square value of 286.634 was calculated with 155 degrees of freedom. While this is indicative of poor fit, Malhotra *et al.* (2012:874), argue that the chi-square measurement is sensitive to sample size and the number of observed variables, therefore, alternative model fit indices should be examined. The remaining fit indices showed an acceptable degree of fit between the measurement model and the data, RMSEA=0.042, IFI=0.977, CFI=0.977 and TLI=0.972.

In keeping with these results, the reliability and validity of the measurement model were calculated and examined.

### **5.11.2 Reliability and validity of the measurement model**

According to Malhotra *et al.* (2012:888), the main objective of the measurement model is to examine and verify that each scale item used to resemble each independently defined construct are both reliable and valid. The purpose of this study was to measure the extent to which various factors influence Generation Y students' attitude towards and intention to use activity-tracking devices within the South African context. As such, several methods were employed to measure the reliability and validity of the measurement model, namely the composite reliability (CR), average variance extracted (AVE) and the correlation coefficients. Additionally, the internal-consistency reliability of the measuring instrument for this study was determined by computing the coefficient alpha values for the entire scale as well as each individual construct. A scale with a Cronbach alpha value between 0.70 and 0.80 is considered to have satisfactory reliability where a scale producing such a value between 0.80 and 0.96 is considered to have exceptional reliability (Zikmund & Babin, 2010:249; Zikmund & Babin, 2013:257).

Table 5-18 presents the Cronbach alpha values, CR, AVE and correlation coefficient values.

**Table 5-18: Measurement model: construct reliability, average variance extracted and correlation matrix**

	$\alpha$	CR	AVE	$\sqrt{\text{AVE}}$	1	2	3	4	5
Attitudes	0.844	0.848	0.584	0.764					
Perceived ease of use	0.754	0.757	0.512	0.716	0.418				
Perceived usefulness	0.838	0.843	0.576	0.759	0.522	0.380			
Perceived importance of brand name	0.841	0.846	0.649	0.806	0.333	0.213	0.391		
Subjective norm	0.947	0.948	0.858	0.926	0.302	0.185	0.375	0.216	
Intention to use	0.934	0.934	0.825	0.908	0.596	0.167	0.463	0.387	0.357

It is evident from Table 5-18 that all constructs exceeded the recommended Cronbach alpha value of 0.60, thereby indicating satisfactory internal-consistency reliability. The Cronbach alpha value computed for the entire scale equalled 0.893, which is indicative of an exceptional internal-consistency reliability. As further indicated in Table 5-18, all CR values surpassed the proposed level of 0.7, therefore, denoting the reliability of all factors. In addition, all factor loadings (refer to Table 5-18), exceeded the 0.50 level and the calculated AVE values also surpassed the proposed 0.50 and above level, subsequently indicating convergent validity (Hair *et al.*, 2010:709). The correlation coefficients calculated for the measurement model, between each factor, were smaller than the square root of the AVE, thus providing proof of discriminant validity.

Considering the abovementioned information, it is evident that the specified measurement model demonstrates acceptable reliability, convergent validity and discriminant validity. Hence, the overall measurement model is both reliable and valid and displays acceptable fit, thus making it suitable structural model for testing.

The results of the reliability and validity testing conducted on the measurement model, provides sufficient evidence to reject the null hypothesis,  $H_01$ , therefore, to accept the alternative hypothesis,  $H_{a1}$ . This concludes that the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices are in fact a six-factor structure – hence, achieving the seventh empirical objective formulated in Chapter 1.

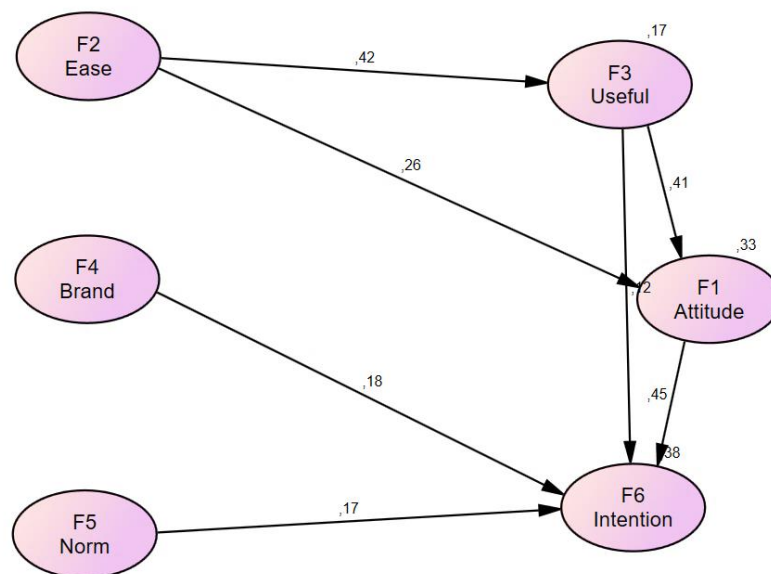
The hypothesised structural model is illustrated and discussed in the succeeding section.

### **5.11.3 Structural model**

In the primary hypothesised structural model, Structural Model A, it was proposed that perceived ease of use (F2) and perceived usefulness (F3) have a direct positive influence on attitude towards activity-tracking devices and that perceived ease of use (F2) has a direct positive influence on perceived usefulness (F3). Moreover, it was hypothesised that attitude towards activity-tracking devices (F1), perceived usefulness (F3), perceived importance of brand name (F4) and subjective norm (F5) have a direct positive influence on intention to use activity-tracking devices (F6). As such, Structural Model A is based on both the TAM and the TRA, with the extension and addition of perceived importance of brand name concerning activity-tracking devices. This hypothesised Structural Model A is in line with other studies of a similar nature (Blut *et al.*, 2016; Bruner & Kumar, 2005; Chae, 2009; Choi & Kim, 2016; Chuah *et al.*, 2016; Kim & Shin, 2015; Yang *et al.*, 2016).

The regression path estimates contained within Structural Model A is presented in Figure 5-5. For improving the graphic understanding, the covariance lines linking the independent variables, the latent factors' indicator variables, in addition to the residuals of the dependent variables and the

modification indices have been eliminated from all structural model figures. For the complete detailed structural models, refer to Annexure B.



**Figure 5-5: Structural Model A**

Note, for Structural Model A: **Attitude** = Attitudes towards activity-tracking devices; **Ease** = Perceived ease of use; **Useful** = Perceived usefulness; **Brand** = Perceived importance of brand name; **Norm** = Subjective norm; **Intent** = Intention to use activity-tracking devices.

While Structural Model A produced a problematic chi-square=385.830 (df=160) value, which may be owed to this statistic being sensitive to sample size (Malhotra *et al.*, 2012:874), the model produced other acceptable model fit indices of RMSEA=0.054, IFI=0.961, TLI=0.954, CFI=0.961.

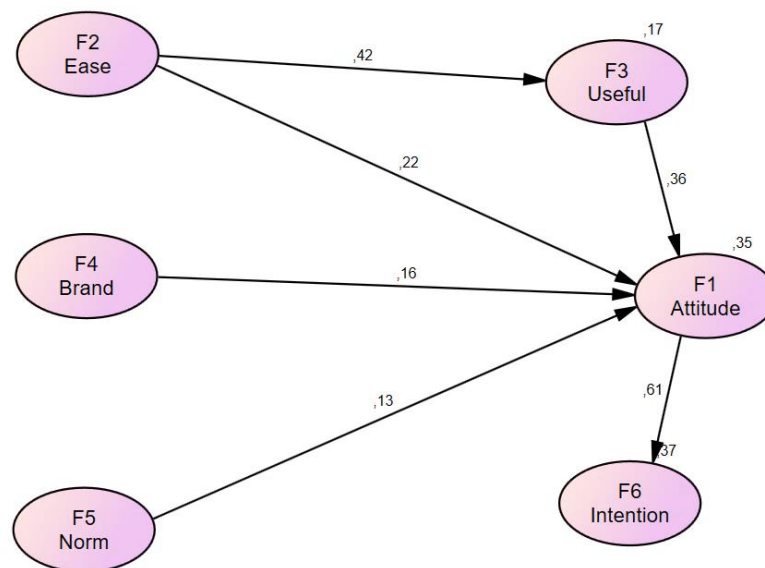
According to Structural Model A, perceived ease of use (F2) (path estimate=0.26,  $p=0.000<0.01$ ) and perceived usefulness (F3) (path estimate=0.41,  $p=0.000<0.01$ ) have a significant positive influence on Generation Y students' attitude towards activity-tracking devices. As such, providing grounds for  $H_{o2}$  and  $H_{o4}$  to be rejected and the alternative,  $H_{a2}$  and  $H_{a4}$ , concluded. In addition, perceived ease of use (F2) (path estimate=0.42,  $p=0.000<0.01$ ) has a direct positive influence on perceived usefulness (F3), thus providing sufficient evidence to conclude  $H_{a3}$  and reject the null hypothesis,  $H_{o3}$ . These results are in line with similar studies employing the TAM model to explain the acceptance of new technology, which show that perceived ease of use and perceived usefulness have a direct positive influence on individuals' attitude towards the new technology (Chuah *et al.*, 2016:281; Kim & Shin, 2015:534; Park, 2016:726; Taylor & Todd, 1995b:149; Wu *et al.*, 2016:388). Moreover, the results indicate that perceived ease of use has a direct positive influence on perceived usefulness of the technological device, which is similar to previous research (Choi & Kim, 2016:784; Chuah *et al.*, 2016:281; Chun *et al.*, 2012:476; Cyr *et al.*, 2006:957; Gao & Bai, 2014:222; Kim & Shin, 2015:534; Nikou & Economides, 2017:91; Taylor &

Todd, 1995b:149; Venkatesh, 2000:357). However, on the basis of employing the TAM, necessitating a significant influence of perceived usefulness on intention to use activity trackers, as previously established (Chuah *et al.*, 2016:281; Chun *et al.*, 2012:476; Gao & Bai, 2014:222; Park *et al.*, 2016:272; Taylor & Todd, 1995b:149), it is evident in Structural Model A that perceived usefulness (F3) (path estimate=0.12,  $p=0.026>0.01$ ) does not have a significant direct positive influence on Generation Y students' intention to use activity-tracking devices (F6) at the conventional 0.01 level. Similarly, a related study, based on novel wearable technology, could not conclude that perceived usefulness had an influence on intention to use smart watches (Kim & Shin, 2015:534). For this reason, there is not sufficient evidence to reject the null hypothesis,  $H_{o5}$ .

Subjective norm (F5) (path estimate=0.17,  $p=0.000<0.01$ ) and attitude towards activity-tracking devices (F1) (path estimate=0.45,  $p=0.000<0.01$ ) both have a significant direct positive influence on Generation Y students' intention to use activity-tracking devices (F6), inferring that the null hypotheses  $H_{o7}$  and  $H_{o8}$  be rejected and the alternative  $H_{a7}$  and  $H_{a8}$  concluded. Thus, employing the TRA was of significance concerning activity-tracking device adoption, similar to the findings of previous related research (Adams *et al.*, 2017; Khalil & Abdallah, 2013; Teo, 2013). Further indicated by Structural Model A, is that perceived importance of brand name (F4) (path estimate=0.18,  $p=0.000<0.01$ ) has a significant direct positive influence on Generation Y students' intention to use activity-tracking devices, as such, concluding  $H_{a6}$ .

Based on the lack of sufficient evidence to reject the null hypothesis  $H_{o5}$ , a decision was made to propose and test a revised model based on the measurement model presented in Figure 5-5. This decision is supported by Hair *et al.* (2010:647), who recommend presenting an opposing model to proclaim that the hypothesised model, Structural Model A, represents the best conceivable model fit. Given the vast variety of adaptations to both the TRA and TAM (refer to Table 3-2), this study proposes alternative models to explain the factors the influence Generation Y students' attitude towards and intention to use activity-tracking devices with the most suitable model. As such, Structural Model B (Figure 5-6) presents the first competing model to Structural Model A. Byrne (2010:82) asserts that Akaike's information criterion (AIC) and Bozdogan's consistent version of the AIC (CAIC) should be considered when two or more models are compared, where smaller values are favoured as it indicates a better fitting model. The AIC and the CAIC indices for Structural Model A were 485.83 and 744.52 respectively. Given the pioneering nature of this study, combined with the lack of research on the topic of wearable activity trackers, combined with the high correlations between all latent variables, the paths between brand name and subjective norm were moved from intention to attitude towards activity trackers. This move is supported by the theory that attitude inevitably leads to behaviour (Ajzen, 1991). The path between Perceived usefulness and intention to use activity trackers was removed based

on its insignificance and the lack of evidence to accept H<sub>0</sub>5. Figure 5-6 presents the competing model, Structural Model B.



**Figure 5-6: Structural Model B**

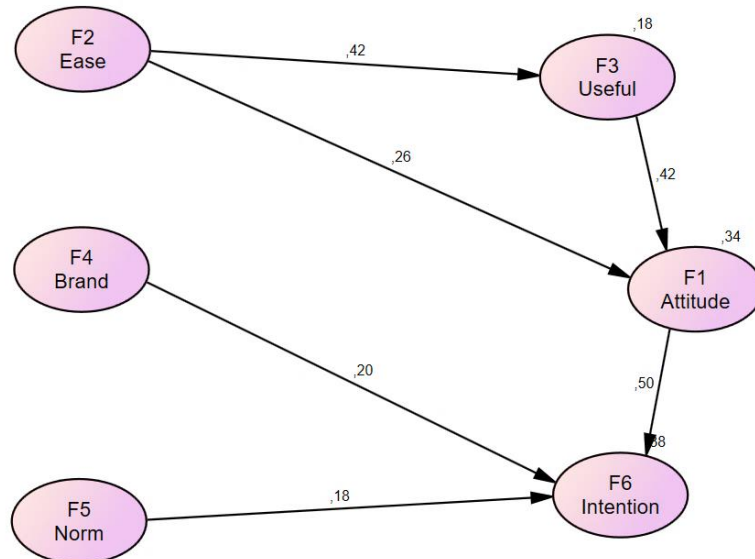
Note, for Structural Model B: **Attitude** = Attitudes towards activity-tracking devices; **Ease** = Perceived ease of use; **Useful** = Perceived usefulness; **Brand** = Perceived brand importance; **Norm** = Subjective norm; **Intent** = Intention to use activity-tracking devices.

Structural Model B produced model fit indices of chi-square= 413.694 (df=161), RMSEA=0.057, IFI=0.957, TLI=0.949, CFI=0.956. The AIC value of 511.694 and CAIC value of 765.209 is higher than that of Structural Model A. The chi-square of Structural Model B is higher than the chi-square of Model A. Moreover, the difference between the chi-square values and degrees of freedom were 27.864 and 1 respectively. The model fit indices and increased AIC and CAIC values produced by Structural Model B declare the model unfit, therefore, rejected.

As indicated by Structural Model B, perceived ease of use (F2) (path estimate=0.22,  $p=0.000<0.01$ ) and perceived usefulness (F3) (path estimate=0.36,  $p=0.000<0.01$ ) continue to have a significant positive influence on Generation Y students' attitude towards activity-tracking devices (F1). The adjusted paths between perceived importance of brand name (F4) (path estimate=0.16,  $p=0.000<0.01$ ) and subjective norm (F5) (path estimate=0.13,  $p=0.003<0.01$ ) have a significant direct positive influence on Generation Y students' attitude towards activity-tracking devices (F1). The computed squared multiple correlation (SMC) coefficient for attitude towards activity-tracking devices was 0.346, which indicates that perceived ease of use, perceived usefulness, subjective norm and perceived importance of brand name combined, explain 34.6 percent of the variance in Generation Y students' attitude towards activity-tracking devices. Furthermore, perceived ease of use (F2) (path estimate=0.42,  $p=0.000<0.01$ ) maintains

its significant direct positive influence on perceived usefulness (F3). The SMC calculated for perceived usefulness was 0.175, which indicate that perceived ease of use explain 17.5 percent of the variance in Generation Y students' perceived usefulness concerning activity-tracking devices.

Furthermore, attitude towards activity-tracking devices (F1) (path estimate=0.61,  $p=0.000<0.01$ ) continue to have a significant direct positive influence on Generation Y students' intention to use activity-tracking devices (F6). The SMC calculated for intention to use activity-tracking devices was 0.368, which indicates that Generation Y students' attitude towards activity trackers explain 38.6 percent of the variance in their intention to use activity-tracking devices. Nonetheless, based on the model fit indices, in conjunction with the higher AIC and CAIC produced by Structural Model B, this model cannot be accepted and an alternative model, Structural Model C was introduced. This third Model is proposed in order to find the best possible model to explain Generation Y students' attitude towards and intention to use activity-tracking devices. In Structural Model C, the hypothesised paths of Structural Model A are kept and the problematic path between perceived ease of use (F3) and intention to use (F6) [(F6  $\leftarrow$  F3) ( $p=0.026>0.01$ )] was removed in order to assess the model fit. Structural Model C is presented in Figure 5-7.



**Figure 5-7 Structural Model C**

Note, for Structural Model C: **Attitude** = Attitudes towards activity-tracking devices; **Ease** = Perceived ease of use; **Useful** = Perceived usefulness; **Brand** = Perceived brand importance; **Norm** = Subjective norm; **Intent** = Intention to use activity-tracking devices.

Structural Model C produces statistically significant direct positive paths between all latent variables as indicated in Figure 5-7. Furthermore, Structural Model C produced model fit indices

of chi-square= 390.377 (df=161), RMSEA=0.055, IFI=0.961, TLI=0.953, CFI=0.960. The AIC and CAIC value of 488.377 and 741.892 respectively, is lower than that of Structural Model B (AIC=511.694 and CAIC=765.209), where the CAIC value of Structural Model C is lower than A. The chi-square of Structural Model C is also lower than the chi-square of Structural Model B, but slightly higher than that of Structural Model A (385.830). However, the difference between the chi-square values and degrees of freedom of Model C and B were 23.317 and zero respectively and 4.547 and one between Model C and Model A, which indicate that there is a statistically insignificant difference based on the traditional criteria. For this reason, the problematic parameters [(F6 ← F3) ( $p=0.026>0.01$ )] can be removed and Structural Model C accepted (Werner & Schermelleh-Engel, 2010:3).

As indicated by Structural Model C, perceived ease of use (F2) (path estimate=0.26,  $p=0.000<0.01$ ) and perceived usefulness (F3) (path estimate=0.42,  $p=0.000<0.01$ ) continue to have a significant positive influence on Generation Y students' attitude towards activity-tracking devices (F1). The computed squared multiple correlation (SMC) coefficient for attitude towards activity-tracking devices is 0.337, which indicates that perceived ease of use and perceived usefulness combined, explain 33.7 percent of the variance in Generation Y students' attitude towards activity-tracking devices. Furthermore, perceived ease of use (F2) (path estimate=0.42,  $p=0.000<0.01$ ) still has a direct positive influence on perceived usefulness (F3). The SMC calculated for perceived usefulness is 0.177, which indicate that perceived ease of use explains 17.7 percent of the variance in Generation Y students' perceived usefulness concerning activity-tracking devices.

Similarly, subjective norm (F5) (path estimate=0.18,  $p=0.000<0.01$ ), perceived importance of brand name (F4) (path estimate=0.20,  $p=0.000<0.01$ ) and attitude towards activity-tracking devices (F1) (path estimate=0.50,  $p=0.000<0.01$ ) continue to have a significant direct positive influence on Generation Y students' intention to use activity-tracking devices (F6). The SMC calculated for intention to use activity-tracking devices is 0.383, which indicates that subjective norm, perceived importance of brand name and attitudes combined explain 38.3 percent of the variance in Generation Y students' intention to use activity-tracking devices. Based on the findings in Structural Model C, the TAM and TRA can be used to explain Generation Y students' adoption behaviour of wearable activity-tracking devices. The findings of the hypotheses testing are summarised in Table 5-19.



**Table 5-19**      **Summary of the findings concerning the hypothesis testing**

Hypotheses	Path	Conclusion
H <sub>a2</sub>	Perceived ease of use → attitude	Supported
H <sub>a3</sub>	Perceived ease of use → perceived usefulness	Supported
H <sub>a4</sub>	Perceived usefulness → attitude	Supported
H <sub>a5</sub>	Perceived usefulness → intention to use	Not supported
H <sub>a6</sub>	Perceived importance of brand name → intention to use	Supported
H <sub>a7</sub>	Subjective norm → intention to use	Supported
H <sub>a8</sub>	Attitude → intention to use	Supported

It is evident from Table 5-19 that the hypotheses formulated in this study were supported at the conventional 0.01 level, with the exclusion of H<sub>a5</sub>, of which there is a lack of evidence to reject H<sub>o5</sub>.

## **5.12**      **CONCLUSION**

This chapter's purpose was to report on the empirical findings of the study, where the outcomes of the pilot study were discussed first, which indicated that the measuring instrument employed in this study was reliable and valid. The data gathering process was discussed as well as the preliminary data analysis, with specific reference to the coding, cleaning and tabulation of the data. Moreover, the demographic and activity-tracking device, background information analysis was discussed and interpreted. Principal components analysis was conducted, thereafter the internal-consistency reliability for each of the factors were computed. The descriptive statistical analysis followed, where the mean, standard deviation, skewness and kurtosis and frequency distributions were computed to summate the data relating to the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices. Correlation analysis was performed and the relationships between the hypothesised factors influencing attitude towards and intention to use activity-tracking devices were significant and the nomological validity of the proposed model was established. In keeping with the observed relationships in the correlation analysis, hypotheses were formulated, which were subsequently tested by means of structural equation modelling and path analysis. In Chapter 6, the empirical findings are interpreted further, where the research objectives will be re-examined to ascertain whether they have been answered. These extended interpretations are based on the findings presented in this current chapter as well as the theoretical background provided in Chapters 2 and 3. Chapter 6 concludes with recommendations and concluding remarks, as well as a discussion of the contribution and limitations of this study.

## CHAPTER 6

### CONCLUSION AND RECOMMENDATIONS

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#### 6.1 INTRODUCTION

The role that technology has played in monitoring human movement and health-related metrics cannot be overstated enough. With the introduction of technological devices that have become more personalised and affordable over the last decade, consumers were enabled to have advanced and real-time information regarding their physical movement and individual health statistics. However, despite the international recognition these devices have received, generating exceptional revenue, awareness and the adoption of these devices in the South African market is trifling.

Despite the global interest in the wearable activity-tracking devices industry, little has been done by local manufacturers to produce products in-house, or local companies to advocate and promote the use of cost-effective alternatives to the expensive devices currently on the market. Moreover, given the health-promoting benefits of these devices, no research has been conducted by the South African Health Department in attempts to establish the use of these devices as a solution or reduction in non-communicable diseases amongst individuals in the country. There is a possibility that some of these factors result in the low adoption rates of wearable activity trackers in South Africa.

Regardless of the current low uptake of activity trackers, it is the youth who dominate the market in terms of adoption. However, only a small portion of the country's population currently own and use these devices and an opportunity to increase the adoption rate is presented. There is an opportunity to appeal to the approximate 20 458 310 or 36.2 percent of the members within the Generation Y cohort, particularly the student portion of this segment. That is, these individuals are accredited with an increased number of career opportunities as well as wealth-generating prospects, that leads to a high future earning potential, high spending power and increased social standing in the community. Given that members of the Generation Y cohort are the pioneers of new technology, they are an appealing segment for role players in the wearable activity tracker market to target.

Understanding consumer behaviour as well as the factors that influence Generation Y students' attitude towards and intention to use wearable activity trackers are likely to contribute to the development of awareness campaigns, promotional activities, appropriate incentives, as well marketing and strategic plans aimed at encouraging the adoption of these devices. Based on this conjecture, this study's primary objective was to propose and empirically test a model that

combined the TRA and the TAM to measure the extent to which perceived ease of use, perceived usefulness, subjective norm, with the addition of the perceived importance of brand name influence Generation Y students' attitude towards and intention to use wearable activity-tracking devices within the South African context.

Chapter 5 reported on the findings of this study and presented and compared two possible models in which the abovementioned factors were tested. Chapter 6 serves as a summary of the study where an overview is provided along with the main findings of the study, after which the now established model of the factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices within the South African context is detailed. From the findings, several recommendations are proposed. This chapter concludes with a discussion pertaining to the limitations identified in this study as well as the consequent future research opportunities that emanate from these limitations. The last section comprises the concluding remarks.

## **6.2 OVERVIEW OF THE STUDY**

This study's primary objective was to propose and empirically test a model of factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices within the South African context. This study focused on wearable activity-tracking devices specifically. To achieve this objective, the study aimed to establish whether attitude towards activity-tracking devices, perceived ease of use, perceived usefulness, subjective norm as well as the perceived importance of brand name influence Generation Y students' attitude towards and intention to use activity-tracking devices to subsequently establish a model of this phenomenon. With the purpose of achieving this objective, a literature review pertaining to wearable activity-tracking technology, along with the various technology adoption theories and models, as well as the factors proposed to influence the target population's attitude and intention towards activity trackers was performed. In order to sustain the main findings (Section 6.3) and the subsequent recommendations (Section 6.5) of this study, the insights acquired from the previous five chapters need to be featured.

The study is introduced in Section 1.1 of Chapter 1, where a background to the research problem was provided and succeeded by the problem statement in Section 1.2, where the insights as to the reasons for conducting this research were stated. From that description, it is evident that there is a gap in the research that explain Generation Y students' adoption behaviour of wearable activity-tracking devices – a market expected to generate excessive potential revenue in the future. Moreover, this chapter highlighted the usefulness of technology adoption theories and models in explaining this adoption behaviour, with particular reference to Generation Y students as the target population. Based on the problem identified, one primary objective, seven theoretical objectives and eight empirical objectives were formulated in Section 1.3. From the empirical

objectives, several hypotheses were formulated and introduced in Chapter 1, Section 1.4, but detailed in Chapter 5. The suggested research design and subsequent methodology employed in the study are detailed in Section 1.5, which comprise the proposed empirical study and statistical analysis used. The ethical considerations were discussed in Section 1.6, followed by the demarcation of the study in Section 1.7 and the contributions of the study in Section 1.8.

Chapter 2 comprised the literature review, which aimed to address the first three theoretical objectives of the study. The concept of consumer behaviour was introduced in Section 2.1 and followed with a discussion regarding the consumer decision-making process in Section 2.2. Within this discussion, the various factors that influence the consumer decision-making process were detailed and comprised various sub-sections, namely external influences, self-concept and lifestyle, as well as internal influences. In Section 2.3 the various structural models of attitude formation were discussed, which serve as the foundation of the technology adoption theories and models detailed in Chapter 3. Then, the strategies towards changing consumer attitudes were discussed in Section 2.4, where it was found that in order for consumers to have a positive attitude toward a product, the functional utility of the product needs to be altered, the brand or product should be associated with a famous personality, the features of the product should be changed in order to be perceived differently by consumers, the belief consumers have of the product should be changed along with consumers' perception of competing products. For the purpose of introducing Chapter 3, Chapter 2 concluded with a discussion regarding consumers' attitude towards new technology (Section 2.5), where it was indicated that it is the youth in particular who show an interest in proactively changing their lifestyle patterns in favour of their well-being and most likely to adopt an activity-tracking device to reach health-related goals.

Chapter 3 aimed to address the study's remaining four theoretical objectives. Per the focus area of this study, namely wearable activity-tracking devices, the chapter started with a discussion of activity-tracking technology and devices in Section 3.2. In order to extend knowledge on the latter topic, activity-tracking devices were defined in Section 3.2.1, the types and respective characteristics detailed in Section 3.2.2 and the benefits of using such devices discussed in Section 3.2.3. Section 3.3 aimed to facilitate an understanding behind the adoption of activity trackers by providing a discussion of the various technology adoption theories and models, from which a model was derived that suited the empirical objectives of this study. That is, from the TRA and the TAM, with the addition of the perceived importance of brand name, a model was proposed that could explain the adoption behaviour of the target population in this study. The target population was then identified as members within the Generation Y cohort, specifically the university student cohort, as discussed in Section 3.4, since they are the individuals most likely to purchase an activity tracker. Section 3.4.1 detailed the impact that technology has had on members within this Generation globally, followed by a discussion pertaining to this impact in the

South African context in Section 3.4.2. Based on the literature review in the preceding sections, the several factors proposed to influence Generation Y students' attitude towards and intention to use activity-tracking devices were detailed in Section 3.5. The first factor discussed was attitude towards activity trackers (Section 3.5.1), the second was perceived ease of use (Section 3.5.2), the third was perceived usefulness (Section 3.5.3), the fourth was the perceived importance of brand name (Section 3.5.4) and the last factor pertained to subjective norm (Section 3.5.5). This chapter concluded with the discussion of the proposed model of factors proposed to influence Generation Y students' attitude towards and intention to use activity-tracking devices.

Chapter 4 described the research methodology followed in the empirical section of this study. A quantitative research approach (Section 4.3), followed by a descriptive research design (Section 4.4) was utilised in this study. As per the sampling procedure (Section 4.5), the target population was defined as all male and female Generation Y full-time undergraduate students between the ages of 18 and 24 years, enrolled at South African HEIs situated in the Gauteng province during 2017 (Section 4.5.1). Moreover, the sampling frame comprised the 26 registered South African public HEIs, where from the initial sampling frame, a non-probability judgement sampling method limited the frame to three HEI campuses of which one was a traditional university, one comprehensive university and one university of technology located in the Gauteng province (Section 4.5.2). Thereafter, a single cross-sectional, non-probability, convenience sample of 600 full-time undergraduate Generation Y students was drawn from the sample frame (Section 4.5.3 & 4.5.4). The data collection method dictated the implementation of a standardised self-administered questionnaire via the survey approach, using the group self-administered questionnaire survey method to gather the required data for this study (Section 4.6). Moreover, the questionnaire comprised the existing scales of previously published research (Section 4.6.2). The questionnaire was subjected to a pilot test (Section 4.6.4), before the final administration of the corrected questionnaire (Section 4.7). The statistical analysis implemented in this study were detailed in Section 4.9, which comprised of a frequency analysis (Section 4.9.1), exploratory principal components analysis (Section 4.9.2), reliability analysis (Section 4.9.3), validity analysis (Section 4.9.4), descriptive statistical analysis (Section 4.9.5), correlation analysis (Section 4.9.6), multicollinearity diagnostics (Section 4.9.7) as well as structural equation modelling (Section 4.9.8).

With Chapter 4 serving as a guideline and input to the empirical testing conducted for this study, Chapter 5 provides the findings by reporting on the statistical analysis and interpretation of the empirical portion of the study. The findings shown in Chapter 5 are in agreement with the empirical objectives devised in Chapter 1, Section 1.3.3.

## **6.3 MAIN FINDINGS OF THE STUDY**

As stated in Chapter 1, the empirical objectives formulated for this study were as follows:

- Determine Generation Y students' attitude towards activity-tracking devices.
- Determine Generation Y students' perceived ease of use concerning activity-tracking devices.
- Determine Generation Y students' perceived usefulness concerning activity-tracking devices.
- Determine Generation Y students' perceived importance of brand name concerning activity-tracking devices.
- Determine Generation Y students' subjective norm concerning activity-tracking devices.
- Determine Generation Y students' intention to use activity-tracking devices.
- Determine if Generation Y students' attitude towards activity-tracking devices and consequent behavioural intentions is a six-factor model.
- Empirically test a proposed model of the extent to which perceived ease of use, perceived usefulness, perceived importance of brand name and subjective norm influence Generation Y students' attitudes and intention to use activity-tracking devices.

In keeping with the literature review, an exploratory principal components analysis, a type of factor analysis (refer to Section 5.6) was conducted on the C-scale. This analysis resulted in the extraction of six factors that were identified as possible factors influencing Generation Y students' attitude towards and intention to use activity-tracking devices. These factors were attitude towards activity-tracking devices, perceived ease of use of these devices, the perceived usefulness of these devices, the perceived importance of a device's brand name, subjective norm as well as intention to use such devices. These six factors explained 76.09 percent of the total variance in Generation Y students' attitude towards and intention to use activity-tracking devices.

The internal-consistency reliability of the measuring instrument used in this study was determined by computing the coefficient alpha and inter-item correlation values for the entire scale, where the coefficient alpha was computed for each of the six individual constructs (refer to Section 5.11.2). The results indicate that all constructs exceeded the recommended Cronbach alpha value of 0.60, thereby indicating satisfactory internal-consistency reliability. The Cronbach alpha value computed for the entire scale equalled 0.893, which is indicative of an exceptional internal-consistency reliability.

The first six empirical objectives set out in Chapter 1 were addressed by performing a descriptive statistical analysis. The means of all the scaled items, as measured by a six-point Likert scale, were computed and the majority fell within the agreement range (refer to Section 5.7). This

concludes that in South Africa, Generation Y students have an overwhelmingly positive attitude towards activity-tracking devices, perceive these devices as relatively easy to use, despite the majority of these students not owning such a device. Furthermore, South African Generation Y students perceived activity trackers as useful devices to track their health-related metrics as well as their activity levels and strongly believe a device's brand name to be important when deciding to acquire an activity tracker. Moreover, these individuals show strong intentions to purchase an activity tracker in the near future, where it might take time for these devices to become a social norm, given the findings of a lower subjective norm. That is, despite the novelty of activity trackers, Generation Y students somewhat perceive that their significant others, whether it is friends, family members or peers, believe they should use these devices.

Correlation analysis (refer to Section 5.8) was conducted in order to establish the causal relationships amongst the six factors. This, in turn, served as the input and guidance of the structural equation modelling analysis, where both the measurement model and the structural models were established. The results of the correlation analysis provided proof of the nomological validity of the factors since there was a significant positive correlation between each of the pairs of factors. In addition, the multicollinearity diagnostics performed on the data set (refer to Section 5.9) showed merely a small, therefore, insignificant degree of multicollinearity. As such, it was appropriate to commence with structural equation modelling.

Structural equation modelling (SEM – refer to Section 5.11) was performed to address the last two empirical objectives, which was to empirically test a proposed model of the extent to which perceived ease of use, perceived usefulness, perceived importance of brand name and subjective norm influence Generation Y students' attitudes and intention to use activity-tracking devices and whether this is a six-factor model. The measurement model comprised six latent factors, namely attitude towards activity-tracking devices, perceived ease of use, perceived usefulness, perceived importance of brand name, subjective norm as well as intention to use activity-tracking devices. The measurement model indicated acceptable levels of model fit after the calculation of the fit indices, as discussed in Section 5.11.1. Furthermore, the measurement model showed evidence of composite reliability, convergent validity and discriminant validity (refer to Section 5.11.2). From the measurement model, a structural model (Structural Model A) was tested. As depicted in Section 5.11.3, perceived ease of use (F2) and perceived usefulness (F3) both have significant positive influence on attitude towards activity-tracking devices (F1), where perceived ease of use (F2) also has a significant positive influence on perceived usefulness (F3). These findings are in line with previous research utilising the TAM to investigate new technology adoption (Choi & Kim, 2016:784; Chuah *et al.*, 2016:281; Chun *et al.*, 2012:476; Cyr *et al.*, 2006:957; Gao & Bai, 2014:222; Kim & Shin, 2015:534; Nikou & Economides, 2017:91; Park, 2016:726; Taylor & Todd, 1995:149; Venkatesh, 2000:357; Wu *et al.*, 2016:388). Moreover, perceived importance of brand

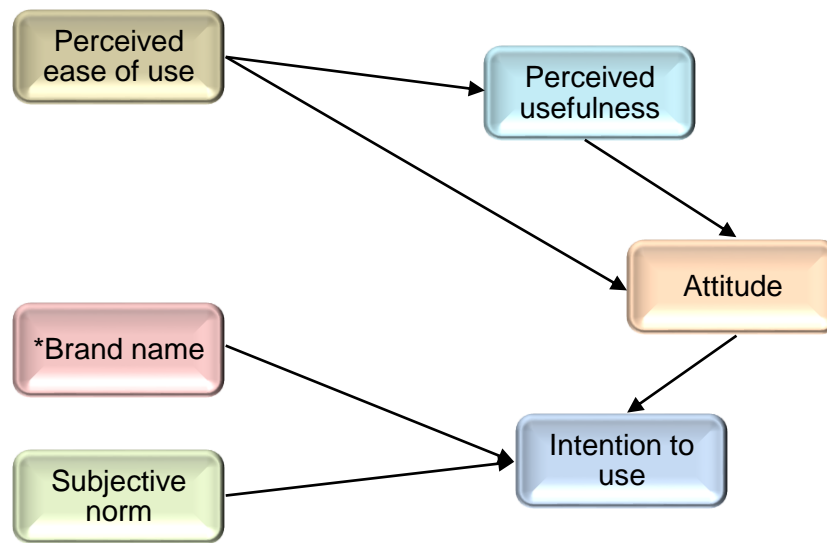
name (F4), subjective norm (F5), as well as attitude towards activity-tracking devices (F1) all have a significant positive influence on intention to use activity-tracking devices (F6). The findings related to the TRA, namely subjective norm (F5), attitude towards activity-tracking devices (F1) and their influence on intention to use activity-tracking devices (F6) are in line with previous research (Adams *et al.*, 2017; Khalil & Abdallah, 2013; Teo, 2013).

However, Structural Model A failed to find a significant influence of perceived usefulness (F3) on intention to use activity-tracking devices (F6), which is in line with research based on novel technology such as smart watch intention (Kim & Shin, 2015:534). As such, a second model, Structural Model B, was tested based on the measurement model. In Structural Model B, the path from perceived usefulness (F3) to intention to use (F6) was removed and the paths between subjective norm (F5) and perceived importance of brand name (F4) was moved from intention to use (F6) to attitude (F1), to ascertain whether acceptable model fit indices could be achieved. Based on the model fit indices produced by Structural Model B, it was rejected and a third model proposed. Structural Model C maintained the hypothesised paths of Structural Model A, but the problematic path between perceived usefulness (F3) and intention to use (F6) was removed.

With the removal of the path between perceived usefulness (F3) and intention to use activity-tracking devices (F6), the model fit indices changed slightly from Structural Model A. Despite a slight increase in the chi-square value and degrees of freedom by 4.547 and one respectively, the IFI, TLI and CFI remained almost the same, where the RMSEA value improved. Additionally, the path estimates between the majority of the factors improved, with the most significant improvement recorded between attitudes towards activity trackers (F1) and intention to use activity trackers (F6). The major difference between Structural Model A and Model C, was that all the paths between the latent factors indicated in Model C were significant at the conventional 0.01 level. Therefore, with the establishment of the significant positive influence of perceived ease of use (F2) and perceived usefulness (F3) on attitude towards activity-tracking devices (F1); perceived ease of use (F2) on perceived usefulness (F3); perceived importance of brand name (F4), subjective norm (F5) and attitude towards activity-tracking devices (F1) on intention to use activity-tracking devices (F6), Structural Model C was accepted.

These findings conclude that the TRA and the TAM can be combined and implemented to predict the adoption of wearable activity-tracking devices amongst South African Generation Y students. By extending the combination of these the underlying theories with the inclusion of perceived importance of brand name concerning activity trackers, the model illustrated in Figure 6-1 explains South African Generation Y students' attitude towards and intention to use wearable activity-tracking devices.





\*Perceived importance of brand name

**Figure 6-1: Factors influencing South African Generation Y students' attitude towards and intention to use wearable activity-tracking devices**

Given the nature and purpose of this study, a model was established, which contributes significantly to the literature regarding wearable activity trackers – which is profoundly under researched, both internationally and in South Africa. The following section elaborates on the contributions made by this research study.

## 6.4 CONTRIBUTION OF THE STUDY

From the literature review, it is evident that the wearable activity-tracking device market has significant revenue generating probabilities for South Africa. Moreover, the benefits of these devices are underappreciated. Therefore, it is the responsibility of product manufacturers, South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, universities as well as policy makers towards sustained healthy living for all South African citizens to create awareness of activity trackers amongst members of the Generation Y cohort. Therefore, this study provides these stakeholders with the necessary information to base their awareness campaigns on.

Research, regarding the fitness industry in South Africa, with specific reference to wearable activity trackers, is overwhelmingly under-researched. However, this study is a first of its kind in South Africa and, therefore, is pioneer research. This study's findings contribute toward the body of knowledge regarding South African Generation Y students' attitude towards and intention to use wearable activity-tracking devices. This is accomplished by empirically testing a model of factors, predominantly perceived ease of use, perceived ease of use, perceived importance of brand name as well as subjective norm influencing Generation Y students' attitude towards and

intention to use wearable activity-tracking devices. The subsequent result of this process reveals the factors that are most likely to predict their future adoption behaviour of these devices. Therefore, the stakeholders identified previously can apply this model to determine as well as gain a better understanding of Generation Y students' attitude and behaviour across products of a similar nature in South Africa.

Additionally, the findings of this study, with particular reference to the populations' device feature preference, will enable local businesses, including retailers to import the desired devices in order to optimise sales. Moreover, these findings can be used by product developers to design and manufacture devices according to the target populations' needs and desires. The results of this study will allow marketing practitioners to focus on promoting the correct, appealing features to attract new users, as well as increase Generation Y consumers' intent to use these devices.

This study has an indirect contribution to sustaining health and the encouragement of health-related behaviours. That is, this study aimed to create awareness of the various benefits of using an activity tracker so that more consumers can live proactively. This also creates a unique opportunity for other medical aid schemes to foster a rewards programme so that their members can save health-care costs by living a healthier lifestyle.

An additional contribution of this study is its contribution to the literature on and the subsequent expansion of a profile of South African Generation Y students' consumer behaviour. This is in keeping with the objectives of a larger research project at the North-West University (Vaal Triangle Campus) namely ProGenY. The recommendations detailed in the succeeding section will enable the aforementioned stakeholders targeting the Generation Y cohort to act accordingly in creating awareness of these devices, making these devices easily available as well as promoting it appropriately to increase the adoption of wearable activity-tracking devices.

## **6.5 RECOMMENDATIONS**

The insights obtained from the preceding chapters, namely from the literature review and the findings of this study, has shown that consumers perceived behaviour, consumer attitude as well as consumers' actual behaviour is critical to investigate as well as monitor in order for businesses to become and remain successful. The marketing practitioners in collaboration with the owners or managing partners of the business need to understand their target market, or in this case, discover which market is most appropriate to target regarding specific products and then design an offer that suits the needs and preferences of this target market. Once they are equipped with the information, they are able to proceed with marketing strategies to reach not only their target market effectively, but also maximise their profits.

Thus, in keeping with this study's findings, the ensuing recommendations are aimed to assist product manufacturers, South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, as well as policy makers towards sustained healthy living for all South African citizens in targeting Generation Y students effectively.

### **6.5.1 Continue to monitor Generation Y students' attitude towards wearable activity-tracking devices**

Given that wearable activity-tracking devices, amongst other wearable technology devices, have the highest anticipated household future purchase intent (Sarason-Kahn, 2016) and are considered a prosperous market (Dolan, 2014), it is crucial for businesses and their marketing practitioners to differentiate themselves from their competitors. To achieve this, they need to understand that consumers' attitude significantly influences their adoption behaviour (Ajzen, 1991; Ajzen & Fishbein, 2005:208) including the adoption of new technology such as activity trackers. As soon as these practitioners understand their target market, namely Generation Y students' attitude towards wearable activity trackers, they will be in a position to reach these consumers effectively by developing targeted strategies to attract their attention.

This study's findings indicate that Generation Y students have an overwhelmingly positive attitude towards wearable activity trackers. Regardless, this study merely provides a snapshot in time, where the factors influencing Generation Y students' attitude towards and intention to use wearable activity trackers may change over time. For this reason, device manufacturers, retailers and e-commerce stores and their marketing practitioners should incessantly monitor Generation Y students' overall attitude towards wearable activity-tracking devices. In order to achieve this, they are advised to do annual research given the rapid growth of the wearable activity tracker market and the continued technological innovation and improvement of these devices.

### **6.5.2 Create awareness of activity-tracking devices amongst members of the Generation Y cohort by means of appropriate channels**

The majority of current marketing communication in the form of advertisements for activity trackers in South Africa is limited to retailer's paper brochures that are distributed by means of newspapers, on their websites, or available in-store. In actuality, Generation Y students seldom purchase and read newspapers and even if they search the web, as they often do (refer to Section 3.4.1), they do not necessarily purposefully search for activity trackers, since they are not specifically made aware of the existence and use of such devices. Furthermore, some of the manufacturers and businesses advertise activity trackers on social media sites such as Facebook

and YouTube. The limitation of these efforts, however, is that the advertisements are only visible if the individual actively likes or follows the businesses' social media page or specific groups that sell activity trackers. Moreover, the consumer will only see activity tracker advertisements and promotions when they actively search for the devices themselves, which, if they are not yet aware of their existence and uses, will not search for these offerings. Therefore, local retailers, who mostly stock these devices, are challenged to adapt their marketing and awareness campaigns using channels that will reach Generation Y students.

Businesses and their marketers should remain up to date of the platforms and channels by which they can effectively reach Generation Y consumers. As discussed in Section 3.4.1, marketers in the wearable activity-tracking market are faced with developing more innovative approaches to connect with, communicate to and deliver information pertaining to fitness- and health-related solutions, of which activity-tracking devices form part. Moreover, members of the Generation Y cohort are characterised by their computer-oriented purchasing habits and the implementation of digital media may result in an appealing image of activity trackers (Malarchy, 2006) and consequently improve their purchase behaviour of these devices (Wolburg & Pokrywczynski, 2001:35). Therefore, any business, including local retailers and e-commerce sites are encouraged to have a strong online and digital presence when promoting activity trackers across the various channels that Generation Y students frequent. This will not only result in cultivating a positive image of activity trackers, but also increase the adoption rates thereof.

Given that Generation Y consumers frequent numerous multimedia platforms, namely computer-generated social media platforms such as Facebook, Twitter and YouTube from birth (Schlitzkus *et al.*, 2010:108; Shaw & Fairhurst, 2008:366), businesses are advised to have a strong presence on these sites and promote activity trackers via these channels. In order to effectively create awareness and promote activity trackers on these sites, businesses and their marketing practitioners are advised to implement paid-for advertising offered by these sites. All of the abovementioned social-media sites offer in-house marketing services whereby any entity can advertise a given product for a specific time at a specific price point. The business can also tailor their marketing needs to a specific gender, age range, geographical location and general interests of the preferred consumer. The price point and time-span will generate a guaranteed number of consumers reached in a specified geographical location. Therefore, any business in South Africa can utilise this service to maximise their promotional efforts to reach their intended target effectively. The advantage provided by the use of these services is the analytic properties, whereby the success of each marketing effort can be analysed in terms of number of people reached and the best time of the day or year to promote.

Businesses can also create awareness of activity trackers by placing promotional material at the places most frequented by Generation Y students. For example, billboards across all campuses,

advertising in the campus communication such as the university's social media pages or newspapers, as well as gymnasiums.

### **6.5.3 Create awareness of activity trackers amongst Generation Y students by means of all HEI campuses' sports degree students and members of the student representative council (SRC)**

Students can easily relate to peers, more so opinion leaders to whom they look up to for guidance. As discussed in Section 3.5.5 and established by the findings of this study, subjective norm signifies direct or indirect normative influence applied by perceived significant individuals such as friends, family or peers, which significantly influence Generation Y students' intention to use activity-tracking devices. Therefore, apart from using the correct channels to communicate to Generation Y students, businesses should appeal to peers and opinion leaders within the HEI campuses in South Africa to create awareness and endorse the use of activity trackers.

Students studying towards a sports or sport-related degree are the probable future managers of professional athletes, sports teams and sports clubs, where these athletes are most likely to purchase activity trackers to monitor and measure their performance. As such, sports degree students need basic knowledge of activity-tracking devices. It is the responsibility of the HEI campuses that offer sports degrees to expose these students to knowledge regarding activity trackers and their uses, by incorporating them into coursework. By empowering these sports degree students with this first-hand knowledge, they can become opinion leaders amongst their fellow university peers and friends. Through this process and associations, an increasing number of students will become aware of activity trackers, thereby strengthening the relationship between subjective norm and Generation Y students' intention to purchase activity trackers.

Another method to create awareness and endorse the use of activity trackers is by equipping the members of the student representative council (SRC) of all the HEI campuses with either the knowledge of these devices or the encouragement to purchase such as device. Alternatively, when these select individuals are elected as members of the student representative body, they can be awarded with an activity tracker. In this regard, South African retailers can collaborate with HEI campuses and reach a sponsorship agreement by which the retailers sponsor the devices to these members in turn for marketing and publicity rights. These retailers, consequently, will increase their sales as well as effectively reach their target market. The purpose of SRC members to own and advocate the use of activity trackers is to encourage the entire student body to follow suit. Members of the SRC are looked upon for guidance and are crucial opinion leaders since students resonate easier with individuals with whom they can relate and have their best interest

at heart. Based on the relationship and influence of subjective norm and Generation Y students' intention to use activity trackers, it is believed that more students are likely to purchase a device when they believe peers and friends think they should.

#### **6.5.4 South African retailers and local businesses should collaborate with HEI campuses' sport department to effectively reach Generation Y students and increase the adoption rate of activity-tracking devices**

According to Reid (2017), collaborations between companies on marketing strategies can be extremely beneficial. Hence, similar to the sponsorship agreement with HEI campuses' SRC, South African retailers that want to gain a competitive advantage should enter into collaborative agreements with HEI campuses across South Africa. One suggestion is to sponsor an activity tracker to each individual who represents the university's first sports team or A-team, whether it is the first rugby, netball, cricket, field hockey, squash, tennis, or any team performing at a similar level. Alternatively, the business who seeks the advantage can offer the devices at a discount, or the university can subsidise a portion of the price as a reward for participating in the first team. The students who represent a university's first sports team exert a degree of influence over the general student population due to their increased status. As such, having these individuals equipped with activity trackers might improve their athletic performance as well as encourage the use of such a device amongst the general student population.

The sponsorship or collaborative agreement is contracted based on the discretion, terms and conditions set by the collaborating parties. For example, the retailers can claim exclusivity on sales to their store by students registered at the university with which they have an agreement. For example, should these individuals be interested in purchasing a device, they are encouraged to acquire it exclusively from the store with which the university has an agreement. In turn, by providing a student discount to the individuals from the specific university, more students might purchase an activity tracker from this specific retailer. There are several approaches retailers can use to collaborate with HEI campuses, for example, incorporating special offers and discounts, running a contest together (Reid, 2017), where the retailer sponsors the devices as prizes. Other methods include cross-promotions with coupons and offers, where the universities can reward students with coupons to obtain discounts from the specific retailer and co-market the service offerings of the collaborative partners, for example, the university advertising the retailer's offerings on activity trackers and vice versa (Monhollon, 2013).

Regardless of the nature of the collaborative agreement, the adoption rates of activity trackers amongst the student population will increase and the retailers or businesses will increase their

sales and revenues. Furthermore, the collaboration can improve exposure for both parties and result in more leads and overall success compared to individualistic marketing approaches.

### **6.5.5        Communicate the benefits of activity trackers to Generation Y students in order to increase adoption rates**

As per the literature review, it is the youth who are foremost inclined to purchase new technology such as activity trackers. Owing to the youth becoming more health conscious, self-aware and willing to pay premium prices for healthier food alternatives, communicating the benefits of activity trackers might lead to an increase in the adoption rate thereof. As such, businesses are encouraged to use the channels discussed in Section 6.5.2 to communicate the benefits of using activity trackers. For instance, Generation Y students should be informed that using an activity tracker encourages physical activity, healthy eating habits as well as holds them accountable for meeting pre-set goals (Hadfield, 2014; Nick, 2018). They should also be informed that living an inactive lifestyle may lead to multitude of health and personal difficulties, including unnecessary weight gain, the onset of chronic and acute illnesses and lowered performance in school, work and everyday life (Health Fitness Revolution, 2015).

In order to prevent and possibly reverse many of these occurrences, businesses and device manufacturers have the task of advocating the use of activity trackers. Businesses and device manufacturers can design this communication in the form of posters that contain interesting facts regarding health statistics and how to prevent the aforementioned complications by being more active, whether they are hard copies or digital and distribute them by means of the appropriate channels. The information communicated to Generation Y students can also be communicated by means of interesting infographics, which allow for easy and chronological reading. It is important that the information contained within the communication efforts by businesses and marketer are factual and derived from accredited sources, such as medical professionals and reviewed research studies.

### **6.5.6        Encourage the HEIs health and wellness centre to develop and facilitate competitions and challenges for students to monitor their activity levels using activity trackers**

All of the HEI campuses in South Africa comprise a campus health and wellness centre for both students and staff members with the general purpose of promoting, amongst others, a healthy lifestyle, sensible eating, early stress management, as well as exercise and participation in the various sports. With this objective in mind, these centres across all HEI campuses can facilitate competitions for students to monitor their activity levels using activity trackers. A typical

competition to launch would be to challenge the students to monitor and keep record of the steps they take as well as the distance they travel daily. The competition would span over a two-month period where students would participate in teams and send in their weekly statistics to the organiser. The top three to five teams (depending on the number of entries) would then stand to win a prize including a one-month free campus gym membership. Alternatively, the health and wellness centre can encourage students who do not yet own an activity tracker to participate in a competition to be known as “A tracker for a day”, where these participants will be provided with an activity tracker for a day to be as active as possible. The three individuals who record the most steps, distance, active minutes and calories expended in the 24-hour period, get to keep the activity trackers as the reward. These types of competitions would occur less frequently until there are enough funds available for it to become sustainable.

The funds to acquire these devices can either be sponsored by the health and wellness centres of the campuses or partly subsidised by these centres and a competition entry fee applicable. Alternatively, these competitions provide a unique opportunity for the collaborative agreements discussed in Section 6.5.4. The businesses in the vicinity of the campuses can be approached to sponsor these devices in order to guarantee exposure to their activity tracker offerings. Given that 76.5 percent of Generation Y students indicated their interest in tracking their daily activity (Table 5-12); these competitions will provide them with the opportunity to do so. The purpose of these competitions is to create awareness of the uses and benefits of using an activity tracker as a student and young adult, to create awareness of the range of activity trackers available on the market and for students to be educated on their current health status and how to live a healthier lifestyle by being more active and exercising more often.

The nature of these competitions and their rules, terms and conditions, entry fees and eligible participants will be established by the organisers on each of the campus health and wellness centres. It is important to inform students in advance of these competitions. The competitions should be advertised on the respected campus’s student communication portal, by means of their preferred social media channels as well as on billboards and notices boards on the campuses.

### **6.5.7 Implement trial use and other payment options of activity trackers to encourage large scale acquisition**

Activity trackers are currently sold like many other durables in various retail outlets as well as by means of electronic commerce. That is, all of the devices, regardless of the brand, are sold as a long-term purchase with either a 6-month, 1-year or a 2-year warranty, depending on the manufacturer. Owing to the novelty of these devices, which cultivates uncertainty of performance and quality, paired with the high price tags, many students as well as general consumers who want to acquire an activity tracker are discouraged by these factors. As such, it is advised that



the manufacturers, retailers and e-commerce sites offer these devices on a trial bases or by means of alternative payment options.

Given that activity trackers are novel technology to the majority of Generation Y students, a trial use could encourage large-scale acquisition of these devices. Wood (2013) opines that consumer trials are fundamental to the success of a new brand and its products. Therefore, any device over a specific price point should be subject to trial use with the necessary rules in place. The terms and conditions are developed based on the manufacturer-, retail outlet- and e-commerce stores' discretion. According to Maverick (2018), offering products by means of free trials can be an exceptional marketing strategy that results in increased sales of the product, increased revenues to the business, a significant increase in the number of customers as well as an improvement in their customer retention rates. However, businesses should be careful when implementing a trial use of activity trackers. A clear set of terms and conditions, understood by the consumer, should be in place to avoid a high return rate of devices that lead to a decrease in revenue and profit. One method to overcome consumers bringing back devices due to simple indecision, the aforementioned entities can charge a fee for the trial use of the chosen device. Alternatively, they can retain 10 percent of the total fee of the device should the consumer return the device within a specified time frame.

An additional, more cost effective method to induce trial use of activity trackers is by developing demo models of all the devices available on the market. The demo models, with the exact features and monitoring abilities, should be available to consumers to test for a specific time frame before making a final purchase decision as to which device is more suitable for their lifestyle needs. The manufacturers, retailers and e-commerce sites will develop the terms and conditions of this service.

In addition to offering these devices on a trial bases, manufacturers, retailers and e-commerce sites should offer alternative payment options so that the devices become more affordable and subsequently benefit all South Africans. The majority of these devices, depending on the manufacturers, retailers and e-commerce sites, are offered to purchase on credit over a 24-month period. The drawback, however, is that when consumers purchase products on credit they can expect interest rates between 21 and 23.2 percent and as high as 25.4 percent (LoanFinder SA, 2015; Wood, 2016). Therefore, the interest rates are too high for consumers to perceive value-for-money regarding the acquisition of these devices. Therefore, these entities are encouraged to provide wearable activity trackers either on a lower interest rate (10%) or on an interest-free basis, payable over the 24-month period. The entities mentioned above decide which devices are subject to lower interest or interest free purchase.

An international firm that implemented interest free credit to their customers reported higher average order values and well as increased conversion rates (Iconography, 2018). As such, there is substantial basis of the success of offering specific products, such as wearable activity trackers, on a lower interest or an interest-free basis in order to encourage large-scale acquisition thereof.

### **6.5.8          Manufacture an activity-tracking device based on Generation Y students' feature preference**

In an effort to increase local revenues, derived from selling wearable activity trackers and subsequently boosting the South African economy, South African device manufacturers should design and construct wearable activity trackers based on Generation Y students' feature preferences. As indicated in Section 5.5.2 (Figure 5-3), the target population indicated their five most favoured activity-tracking device features. From a pool of 15 possible features, namely tracking steps and distance travelled, tracking sleep patterns, measuring heart rate and blood pressure, calculating daily calories burnt, GPS tracking, inactivity alert, waterproof/water resistant, multi-sport tracking, perspiration levels, 24/7 activity tracking, interchangeable bands, smart notifications, on-screen workout programme, food logging and active time, Generation Y students chose the five most desired features in an activity tracker. The results from this study indicate that students prefer a device that measures their heart rate and blood pressure, tracks the number of daily steps and distance travelled, can calculate their daily calories expended, is able to track their sleep patterns and the device should be waterproof or water resistant.

As such, South African product manufacturers can follow these guidelines to design and manufacture a device comprising these features. The availability of a device that was tailored to the needs of the target market will lead to increased sales and market penetration rate.

### **6.5.9          Generation Y students' favourite brands should manufacture activity trackers based on their feature preference to overcome uncertainty of using these devices and increase adoption rates**

According to Aaker (1991), an effective brand name can increase awareness of the brand's offerings as well as produce a constructive image for a particular innovation. The findings of this study indicate that the perceived importance of a device's brand name significantly influence Generation Y students' intention to use activity-tracking devices. Therefore, a familiar and trustworthy brand is of great importance to Generation Y students.

Many of the activity-tracking device brands, which are predominantly international brands, are unfamiliar to Generation Y students, which may cultivate uncertainty and a lack of awareness of these devices. Moreover, many of these individuals purchase products from familiar brands as well as their preferred brands since they have become brand loyal. According to Gözükara and Çolakoğlu (2016:603), a brands increased innovation, for example the continuous introduction of innovative products and services, significantly impacts Generation Y students trust of the brand, which in turn positively influences their brand loyalty. Based on this notion, the brands that are known to and preferred by Generation Y students should manufacture their own activity trackers. That is, according to Chaudhuri and Holbrook (2001) as well as Lau and Lee (2009), consumers' brand trust significantly minimises the uncertainty when deciding between competing brands' products, especially when there is limited information about new products.

According to the 2018 Sunday Times Generation Next youth survey (Bizcommunity, 2018), the South African youths' ten overall favourite brands, as in 2018, were documented as Nike, Samsung, Adidas, Apple, Coca-Cola, BMW, Lacoste, Vans, Versace and Puma. These brands, that have not yet produced an activity tracker, should manufacture a device based on the feature preference of Generation Y students, as indicated in Section 6.5.8. In doing so, these brands will not only increase their net worth and customer base, but more activity trackers will be sold amongst the target population based on their trust and loyalty to these brands.

#### **6.5.10 Existing activity-tracking device manufacturers and brands should adapt their brand personality and marketing strategies to appeal to Generation Y students**

In Section 2.2.1, it was highlighted that in order for businesses to be successful, it is imperative for marketers to design and employ promotional techniques to communicate both a relevant and favourable product, or brand image, in the consumers' minds (Schiffman *et al.*, 2010:489; Schiffman & Kanuk, 2014:419). However, in 2018, activity-tracking device manufacturers or brands, especially the market leaders, appeal to older Generation Y to Generation X consumers due to their seemingly high spending power, such as corporate individuals and avid athletes. These manufacturers or brands currently focus their marketing strategies on consumers with the constant promotion of their top-of-the-range, more expensive devices, mostly on the part of local retailers. Whether it is done purposefully or based on the local retailers' discretion, this results in the general population, especially Generation Y students' perception that these devices are too expensive, cultivating a negative brand personality and image. According to Seimiene and Kamarauskaite (2014:431), brand personality is built with every advertisement. Based on this notion, the constant promotion of expensive devices will enigmatically result in a negative brand personality, especially amongst Generation Y students.

Therefore, the device manufacturers or brands should collaborate with South African retailers as well as e-commerce sites to adapt their offerings and promotions of their devices to change the personality of the market leaders to appeal to Generation Y students. In other words, the manufacturers' brand personality should match that of Generation Y students in order for the target market to relate to the brands that produce activity trackers. In doing so, students will have an enhanced relationship with these brands, establish rapport and consequently perceive these brands and devices as affordable and useful as opposed to exclusively available to higher income individuals.

To achieve this change in brand personality and consumer perception of both the brands and activity trackers in general, South African retailers should advertise and promote a wider range of available activity trackers on the market, from entry level devices, to intermediate and more affordable devices, to the top-of-the-range devices.

#### **6.5.11 Activity-tracking device manufacturers and brands should use celebrity endorsements to reach Generation Y members**

From the literature review (Section 2.2.2) it is evident that certain role models, such as entertainers or favourite athletes (Martin & Bush, 2000) and celebrities (De Run *et al.*, 2010:70), play a vital role in consumers' decision making and consequent buying behaviour. Seimiene and Kamarauskaite (2014:431) maintain that one of the most successful ways to reach and influence Generation Y members, is by incorporating celebrity endorsers in advertisements. Moreover, anonymous people and actors, as opposed to celebrities, can communicate demographic information such as age, gender and status, where celebrities have the ability to transfer connotations to a brand's lifestyle and personality that these actors are unable to do (Pringle & Binet, 2005). As such, advertisements of activity trackers should incorporate celebrity endorsements to reach Generation Y student consumers since it will attract their attention, match with their personalities as well as increase sales of these devices.

Activity-tracking device manufacturers and brands should incorporate a brand ambassador for their products to which Generation Y individuals can relate. These celebrities should also share the interests of the target population to increase the brands' personality and image. Therefore, the advertisements of activity trackers should use celebrities as the face of the product, incorporate their names and images when advertising the products, have footage of them wearing these products in real life or produce videos in which these celebrities, be it athletes, actors or entertainers, demonstrate how to use the device, subsequently advocating the use of activity trackers.

### **6.5.12 Simplify the ease of use of activity trackers**

Perceived ease of use (PEOU) is defined as the “degree to which an individual perceives that using a specific system will be free of physical and mental effort” (Davis, 1989:320; Moore & Benbasat, 1991:197). This study (Section 3.5.2) defined perceived ease of use as the degree to which participants perceived the use of activity-tracking devices to be relatively free of effort. Moreover, the participant’s ability over learning how to use activity-tracking devices, remembering how to use these devices as well as the ability to use these devices to track their daily activity were the determinants of how participants perceived activity-tracking devices as easy to use. This study’s findings indicate that Generation Y students perceive activity trackers as relatively easy to use. Furthermore, their perceived ease of use of activity trackers significantly positively influence both their attitude towards as well as the perceived usefulness these devices. For this reason, activity-tracking device manufacturers should simplify the use of these devices, with their smart device application, so that it remains simple and easy to use and the data recorded easy to interpret and that consumers do not perceive these devices and generated data as difficult to use and interpret. Davis (1989:319) asserts that a system that is perceived to be easier to use than an alternative, more complex system, is more likely to be accepted and adopted by consumers.

The simplification of the devices with an interface (Section 3.2.2) can be achieved with a touch-screen interface instead of a device with various buttons that are used to adjust settings. The devices without an interface are relatively effort-free to use, but the user should experience no difficulty interpreting the recorded data. In this case, the layout of the application can be designed in such a way that the user can easily interpret the number of steps and distance they travelled, the calories they expended and so forth. An additional feature that manufacturers could add to the application is a “talk-back” function where, should the user request real-time feedback, a voice can project the data back to the user – similar to Google assistant. Another effort to increase Generation Y consumers’ perceived ease of use of activity trackers is to upload tutorials to the websites and social media channels of the device manufacturers, retailers and e-commerce sites, before devices are purchased as well as post-purchase – a link should be available. Tutorials are easy to follow and Generation Y consumers are tech- and internet-savvy individuals who would grasp the use of these devices in a short time span.

A method to ultimately ensure both the ease of use and usefulness (discussed in the following section), can be by adapting a specific feature on the majority of wearable activity trackers. Currently, charging these devices are cumbersome, requiring elaborate charging cables, charging docks and bulky stations at times, which discourages users from taking these devices on holiday or extensive business trips. Over these trips, users are less active, where reminders to move are handy and the users miss benefits such as points from schemes if they do not wear the device or

reach their daily goals – resulting in a significant physical and monetary disadvantage. Device manufacturers are encouraged to design the devices with a travel-friendly charging feature or provide the user with a travel-friendly charging alternative. In doing so, more users will use their devices at all times, leading to a simpler, more useful device. One possible solution is for these device manufacturers to incorporate wireless charging technology. An international company, Humavox offers their ETERNA wireless charging solution, described as a minimal-size solution comprising a small receiver that effectively integrated with any smart devices with a rechargeable battery (Humavox, 2018), therefore, suitable for wearable activity-tracking devices. With this technology integration, the user will be able to charge their tracker comfortably without struggling with cords and docking stations.

### **6.5.13      Ensure that activity trackers remain useful to the Generation Y consumer**

Davis (1989:320) defines perceived usefulness as the degree to which an individual believes that utilising a specific system would improve their job performance. In this study, perceived usefulness referred to the degree to which participants perceived that an activity tracker is useful to their lives in general, provides them with useful information about their physical activity, improves their quality of physical activity, increases their level of activity as well as enhances the effectiveness of their activity. This study's findings indicate that Generation Y students perceive activity trackers as tremendously useful (Section 5.8) and this perception significantly positively influence their attitude towards activity trackers. As such, the usefulness of activity trackers is vital to maintain their positive attitude and subsequent adoption behaviour of these devices.

Device manufacturers should ensure that these devices remain useful to the Generation Y consumer to ensure the sustainability and growth of the activity-tracking device market. Given that activity-tracking devices comprise numerous different characteristics, uses and features (Section 3.2.2), it is no wonder that Generation Y consumers perceive it as highly useful. However, as their lifestyles and needs change, so will their perception if these devices no longer serve a purpose or assist them in reaching their goals. Suggestions to overcome this possible barrier, is to constantly improve these devices and introduce new, innovative models on a regular basis. Alternatively, devices should be manufactured similar to smart phones where constant software updates can take place. For example, if the rudimentary purpose of using an activity-tracking device is to become aware of sedentary behaviour, become more active daily, increasing previous levels of physical activity or fitness levels as well as making lifestyle changes in order to lose weight (Mercola, 2016; Phillips, 2013). Hence, a device will remain useful if it continuously encourages the user to reach their pre-set goals.

There are improvements that device manufacturers can consider and incorporate in future devices to ensure that these devices remain useful. For example, to achieve the abovementioned goals, the devices can have eating-plans or diet plans embedded in the device itself. The user can then have quick and easy access of what to consume at any given time and guide them with their healthy eating regimens. The devices should also have a wider variety of sport profiles so that users can track the sports in which they participate. A few of the devices available on the market incorporate South African sports such as field hockey, netball, cricket, rugby and dance and consequently fail to serve the market that participate in these types of sports. Additional suggestions include remaining up to date with smart phone technology. An activity tracker that cannot synchronise to the latest smart devices will not remain competitive in the market. Furthermore, additional, health-related features should be incorporated with these devices such as blood pressure and glucose measurements.

In late 2018, a market leader of smart watches introduced a new function in their device, namely fall detection (Clover, 2018), which utilises a next-generation gyroscope and accelerometer to detect when the user falls and then provides options to contact emergency services if needed. However, the feature is in its infancy and lacks accuracy, activates with “fake” falls and should be switched on manually by users under the age of 65 (Miller, 2018). Despite this, the introduction of these innovative features drives sales and the continued interest in activity trackers. An additional safety feature that can be incorporated into devices, especially in a country with high crime rates, is a silent panic button. The user wearing the device can press this button in case of emergencies, the signal transmits to the user’s smart device, alerts authorities and pins the user’s location for emergency responders or the police service to locate them.

#### **6.5.14 Businesses should implement marketing strategies that appeal to Generation Y students’ parents and family members**

The influence of subjective norm on consumers’ behavioural and purchase intention has been established by various research (Blut *et al.*, 2016; Gao & Bai 2014; Hsu & Lu (2004); Lee, 2009; Nor & Pearson 2008; Pavlou & Fygenson (2006); Taylor and Todd 1995; Venkatesh & Davis 2000). As recommended in Section 6.5.3, businesses should collaborate with HEIs to empower both sports degree students and members of the SRC to endorse the use of activity trackers to influence Generation Y students to acquire such a device. Based on the same direct or indirect normative influence applied by perceived significant individuals, businesses should target their marketing efforts towards Generation Y students’ parents. Once an authority figure or parent is convinced of the usefulness and benefits of activity trackers, they directly or indirectly will endorse their use to their children – Generation Y students.

In order for businesses to increase the adoption rate of activity trackers as well as their sales and market share, they should focus their marketing efforts on the parents of Generation Y consumers. There are several reasons for this strategy besides increasing the influence of subjective norm. According to Tani (2017), parents are the perfect target audience because they represent a very large demographic and they purchase products for themselves and their children. The important element in the strategy is to highlight the benefits that the activity trackers have for their children. Additional efforts to reach parents as well as family members are through interaction on social media (Gurley, 2015). The latter author advises businesses to encourage families to share their positive experiences on their preferred social media channels. Furthermore, in order for businesses to successfully appeal to Generation Y consumers' family members, they should ensure that their marketing strategies adhere to specific elements of the activity tracker including advocating the safety, affordability, enjoyment derived from using such a device, the educational aspect of the device as well as its ability to promote exercise.

#### **6.5.15 Continue to monitor and influence Generation Y students' intention to use activity-tracking devices**

This study's findings indicate that Generation Y students have a significant positive intention to use an activity tracker in the near future. At the time of the data collection in 2017, a mere 29 individuals or 6.1 percent of the sample owned an activity tracker (Table 5-11), where 93.3 percent did not. Moreover, 76.5 percent indicated their interest in tracking their daily activity (Table 5-12), which is evident of their future pursuit of an activity tracker to fulfil this need. For this reason, device manufacturers, retail outlets and e-commerce sites should continuously monitor Generation Y students' intention to use and subsequently purchase an activity tracker.

With the knowledge of the target populations' interest in these devices, the aforementioned entities can stay updated with promotional offerings and targeted marketing strategies to engage with Generation Y members. In doing so, they will not only increase their own revenues and sales, but also expand their market share and remain the market leaders with their competitive advantage. These entities should also understand and influence Generation Y consumers' intention to use and purchase activity trackers. One method to achieve this is by manufacturing a device that matches the needs of these consumers and constantly introducing new and innovative models.



### **6.5.16 Incentivise Generation Y consumers for using activity trackers sustainably**

The following recommendation could benefit not only Generation Y consumers but also the entire South African population who belong to a medical aid scheme, take out life insurance policies or health benefits from insurance companies and subscribe to a gym membership. In South Africa, there are currently (2018) only two medical aid scheme providers with speciality programmes, namely Discovery's Vitality Health™ programme and Momentum Health's Multiply wellness and rewards programme that incentivise their members with rewards for being active (Discovery, 2018; Multiply, 2018). These initiatives work on a points-based system where the member generates a certain amount of points for executing certain activities, for example reaching their daily goal and going to a partnered gym regularly. With these points, they are eligible for discounts from the partners collaborating with these medical aid scheme providers and include various retail outlets, fuel stations as well as certain local gymnasiums. In order to gain a competitive advantage in the market, the other 23 publically registered medical aid schemes in South Africa (Le Roux Attorneys Inc., 2014) are encouraged to initiate similar incentive schemes for their members.

In addition, South African insurance companies are encouraged to offer similar incentives than that of US-based insurance providers, who incentivise physically active living using activity trackers (Shin *et al.*, 2016:121). One example is of a health insurer that provides a specific brand activity tracker to their members and pays them one USD per day if they meet their personalised fitness goals, where a maximum of 20 USD per month and an annual 240 USD is permitted (Bertoni, 2014). South African health insurers can follow suit and tailor a similar offering to their members. This can encourage more individuals to obtain life insurance and health benefits if they are rewarded. Another example is of an international life insurance company that offers discounts of up to 15 percent off the member's monthly premium or points that can be used to spend on other services if they wear a complimentary activity tracker produced by a specific manufacturer with which they have a partnership (Pagliery, 2015).

South African medical aid scheme providers as well as insurance companies that offer life insurance and health benefits should consider incentivising their members for the sustainable use of activity trackers. Not only will members be rewarded with discounts on their fees and points to spend at other stores, but they will also become healthier individuals, consequently saving the insurance companies a lot of money on health-care costs.

South African gymnasiums are encouraged to offer similar incentives to their members for using an activity tracker. Incentives can include discounts on monthly fees should they take out a contract over a 24-month period and visit the gym at least four times a week. The aforementioned programmes offered in South Africa by Discovery and Momentum are currently in partnership with

a specific gymnasium, where discounts are applicable. However, not all of the gym members are members of these medical aid programmes. Moreover, other gymnasiums do not have this partnership and do not offer similar incentives. Therefore, the gymnasiums should offer in-house incentives to their members for the sustainable use of activity trackers.

The following section comprises an examination regarding this study's limitations as well as the future research opportunities.

## **6.6 LIMITATIONS AND FUTURE RESEARCH OPPORTUNITIES**

This study's purpose was to propose a model of the factors that influence Generation Y students' attitudes towards and intention to use activity-tracking devices in the South African context. As with most studies, this study is also subject to certain limitations, subsequently presenting abundant potential research opportunities.

The first limitation is evident from Section 4.5.3, where it was indicated that a non-probability convenience sampling method was to be used to collect the data from the study's participants. Consequently, the findings should be interpreted with caution and great care taken in generalising the results to the population. Secondly, this study utilised a single cross-sectional research design (refer to Section 4.4.3). Future research, using a multi cross-sectional, better yet, a longitudinal research design, could provide valuable findings regarding any changes in the factors that influence South African Generation Y students' attitudes towards and intention to use activity-tracking devices.

Furthermore, it was not established whether the participant in the study had previous exposure to activity trackers in terms of their level of awareness of these devices before measuring their attitude towards and intention to use these devices. It is believed that better, more accurate results can be derived from a sample that is pre-exposed to the devices by means of awareness. On this basis, clear inferences can be made on actual attitude and intentional behaviour, instead of merely their perceptions thereof.

The locality of the sample and the study can be regarded as a limitation given that only Generation Y students were approached that were registered at three HEIs in various regions within the Gauteng province of South Africa (refer to Section 4.5.1). For this reason, there is an opportunity to conduct this research on a broader scale, particularly at HEI campuses across all nine South African provinces. This will perhaps provide a broader view of the participants' attitude towards and intention to use activity trackers.

The population included in this study was limited to full-time undergraduate Generation Y students attending HEIs. This inclusion was based on the notion that these individuals are most likely to

have a higher future earning and spending capacity after obtaining a tertiary qualification and subsequently improving their employability. Therefore, an opportunity arises for researchers to target their studies toward the non-student population within the South African Generation Y cohort. This comparative research might reveal crucial differences in the attitude towards and intention to use activity trackers between these two groups. It will also possibly reveal a gap in the market to appeal to non-students.

An additional limitation identified is that the study focused on individuals aged between 18 and 24 years, which in relation to the entire population as well as the Generation Y cohort – of which the age group falls under – are significantly small. There is thus an opportunity for future research to include the entire Generation Y cohort (as defined in Section 3.4) as well as conducting comparative research between other generations to discover their members' attitude towards and intention to use activity trackers.

A final limitation is the number of factors tested in the model of factors influencing Generation Y students' attitude towards and intention to use activity-tracking devices. The six factors merely explained 76.09 percent of the variance in this model (refer to Section 5.6), which indicate that there are other potential factors explaining this phenomenon. As such, there is an opportunity to investigate other variables, such as perceived cost of these devices, perceived value of these devices, awareness of these devices, perceived risk and performance risk of using such devices, as well as the perceived sustainability of these devices, that might also have an influence on the samples' attitude towards and intention to use activity trackers.

## **6.7 CONCLUDING REMARKS**

The use of activity-tracking devices may improve individual health behaviour that leads to a healthier nation overall, reduce health-care costs and, most importantly boost the South African economy by generating increased revenues. However, despite these opportunities, there is a low adoption rate of activity trackers amongst South African consumers as opposed to their international counterparts. As such, the prosperity of this industry lies in the hands of local product manufacturers, South African businesses including retailers, e-commerce sites, marketing practitioners and universities to create awareness of these devices and endorse their use, especially amongst the youth.

This study is pioneering research in this field, particularly in the South African context and expands on the knowledge on consumer behaviour as well as consumer attitude and intention to use novel technology – in this case wearable activity trackers – by investigating the Generation Y cohort in South Africa. Owing to Generation Y consumers, especially the student portion thereof, being the future opinion leaders with high spending power in society, it is crucial for device

manufacturers, South African product developers, local businesses including retailers, marketing practitioners, possibly medical professionals, policy makers and universities to understand Generation Y students' attitude towards and intention to use activity-tracking devices in order to develop appropriate and targeted marketing strategies to endorse the use of these devices and subsequently increase their adoption rate.

This study established a model of the factors influencing South African Generation Y students' attitude towards and intention to use activity-tracking devices. The model was established where attitude towards activity trackers, perceived ease of use, perceived usefulness, subjective norm and perceived importance of brand name emerged as factors that influence Generation Y students' attitude towards and intention to use activity-tracking devices. This model may be applied to predict Generation Y students' attitude and behavioural intention across a wide variety of technological products and services. The entities addressed in each of the recommendations formulated in this chapter are encouraged to use the advice in order to remain competitive as well as increase their sales and market share.

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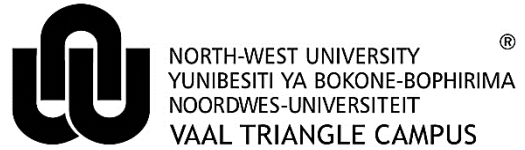
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# ANNEXURE A

## QUESTIONNAIRE



### Generation Y students' attitude towards and intention to use activity-tracking devices

Dear participant,

I am currently working towards my thesis under the supervision of Prof. Natasha de Klerk and co-supervision of Prof. Ayesha Bevan-Dye as part of the requirements for completing my PhD in Marketing Management at the North-West University (Vaal Triangle Campus).

The purpose of my research project is to determine Generation Y students' attitude towards and intention to use activity-tracking devices.

Please assist me by completing the attached questionnaire. The questionnaire is user-friendly and should take approximately 15 minutes to complete on a voluntary basis only. All responses are confidential and the results will only be used for research purposes, outlined in the form of statistical data.

Thank you most sincerely - your assistance and contribution is highly appreciated.

Chantel Muller  
23488042@nwu.ac.za  
Faculty of Economic Sciences & IT

### SECTION A: Demographical Information

Please mark the appropriate box with a cross (X) or write down your answer.

A1	<b>Name of your institution:</b>	Traditional University	University of Technology	Comprehensive University	
A2	<b>Country of origin:</b>	South Africa	Other (Please specify):		
A3	<b>Province of origin:</b>	Eastern Cape	Free State	Gauteng	KwaZulu-Natal
		Limpopo	Mpumalanga	Northern Cape	North West
		Western Cape			
		Other (please specify):			
A4	<b>Registered:</b>	Full-time	Part-time		
A5	<b>Current year of study:</b>	1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year	4 <sup>th</sup> year
		Post graduate			
A6	<b>Gender:</b>	Male	Female		
A7	<b>Ethnic group:</b>	Black/African	Coloured	Indian/Asian	White
		Other (please specify):			

A8	<b>Please indicate your home language:</b>				Afrikaans	English	IsiNdebele	IsiXhosa
	IsiZulu	Sepedi	Sesotho	Setswana	SiSwati	Tshivenda	Xitsonga	
	Other (please specify):							

A9	<b>Age at your last birthday:</b>	<18	18	19	20	21	22	23	24	25	>25
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## SECTION B: Background information

**AN ACTIVITY-TRACKING DEVICE IS A DEVICE THAT HAS SENSING TECHNOLOGY CAPABLE OF TRACKING YOUR MOVEMENT IN REAL TIME**

**(STEPS TAKEN, DISTANCE TRAVELLED, CYCLING, RUNNING, SWIMMING, HEART RATE, SLEEP PATTERNS, CALORIC BURN, ETC.)**

**E.G: Bracelet, clip on device and a watch, fitness watch or fitness bracelet**



Please mark the appropriate box with a cross (X).

B1	Do you have an activity-tracking device?				Yes	No
B2	Are you interested in tracking your daily activity?				Yes	No
B3	Do you have a smartphone?				Yes	No
B3a	If yes, do you have an activity-tracking app on your smartphone?				Yes	No

B4	To me, the <b>most important</b> feature(s) of an activity-tracking device are ( <b>max 5</b> ):				
	Tracking steps and distance travelled	Tracking sleep patterns	Measuring heart rate and blood pressure	Calculating daily calories burnt	GPS tracking
	Inactivity alert	Waterproof / water resistant	Multi-sport tracking (swimming, running, cycling, gym, etc.)	Perspiration (sweat) levels	24/7 activity tracking
	Interchangeable bands	Smart notifications	On-screen workout programme	Food logging	Active time
	Other (please specify):				

## SECTION C: Attitude towards activity-tracking devices

Please indicate the extent to which you disagree/agree with each of the following statements by placing a mark in the appropriate box; 1 being strongly disagree and 6 strongly agree.

Perceptions of an activity-tracking device:		Strongly Disagree	Disagree	Disagree Somewhat	Agree Somewhat	Agree	Strongly Agree
C1	Using an activity-tracking device is a good idea.	1	2	3	4	5	6
C2	Generally, I have a favourable attitude towards using an activity-tracking device.	1	2	3	4	5	6
C3	I like the idea of using an activity-tracking device.	1	2	3	4	5	6
C4	Overall, I think using an activity-tracking device is beneficial.	1	2	3	4	5	6
C5	Learning how to use an activity-tracking device is easy.	1	2	3	4	5	6
C6	It is easy to use an activity-tracking device to track your daily activity.	1	2	3	4	5	6
C7	It is easy to remember how to use an activity-tracking device.	1	2	3	4	5	6
C8	An activity-tracking device is useful to your life in general.	1	2	3	4	5	6
C9	An activity-tracking device provides you with useful information about your physical activity.	1	2	3	4	5	6
C10	An activity-tracking device improves the quality of your physical activity.	1	2	3	4	5	6
C11	An activity-tracking device increases your level of physical activity.	1	2	3	4	5	6
C12	An activity-tracking device enhances the effectiveness of your physical activity.	1	2	3	4	5	6
C13	A reliable brand name is one of the key factors when choosing an activity-tracking device.	1	2	3	4	5	6
C14	A reliable brand name reflects the quality of an activity-tracking device.	1	2	3	4	5	6
C15	There is less risk of being disappointed if you buy an activity-tracking device with a reliable brand name.	1	2	3	4	5	6

<b>Perceptions of an activity-tracking device:</b>		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Disagree Somewhat</b>	<b>Agree Somewhat</b>	<b>Agree</b>	<b>Strongly Agree</b>
C16	People who are important to me think I should use an activity-tracking device.	1	2	3	4	5	6
C17	People whose opinions I value think I should use an activity-tracking device.	1	2	3	4	5	6
C18	People who influence my decisions think that I should use an activity-tracking device.	1	2	3	4	5	6
C19	I intend to use an activity-tracking device in the future.	1	2	3	4	5	6
C20	I predict I will use an activity-tracking device in the future.	1	2	3	4	5	6
C21	I plan to use an activity-tracking device in the future.	1	2	3	4	5	6

**Thank you very much for your valuable contribution!**

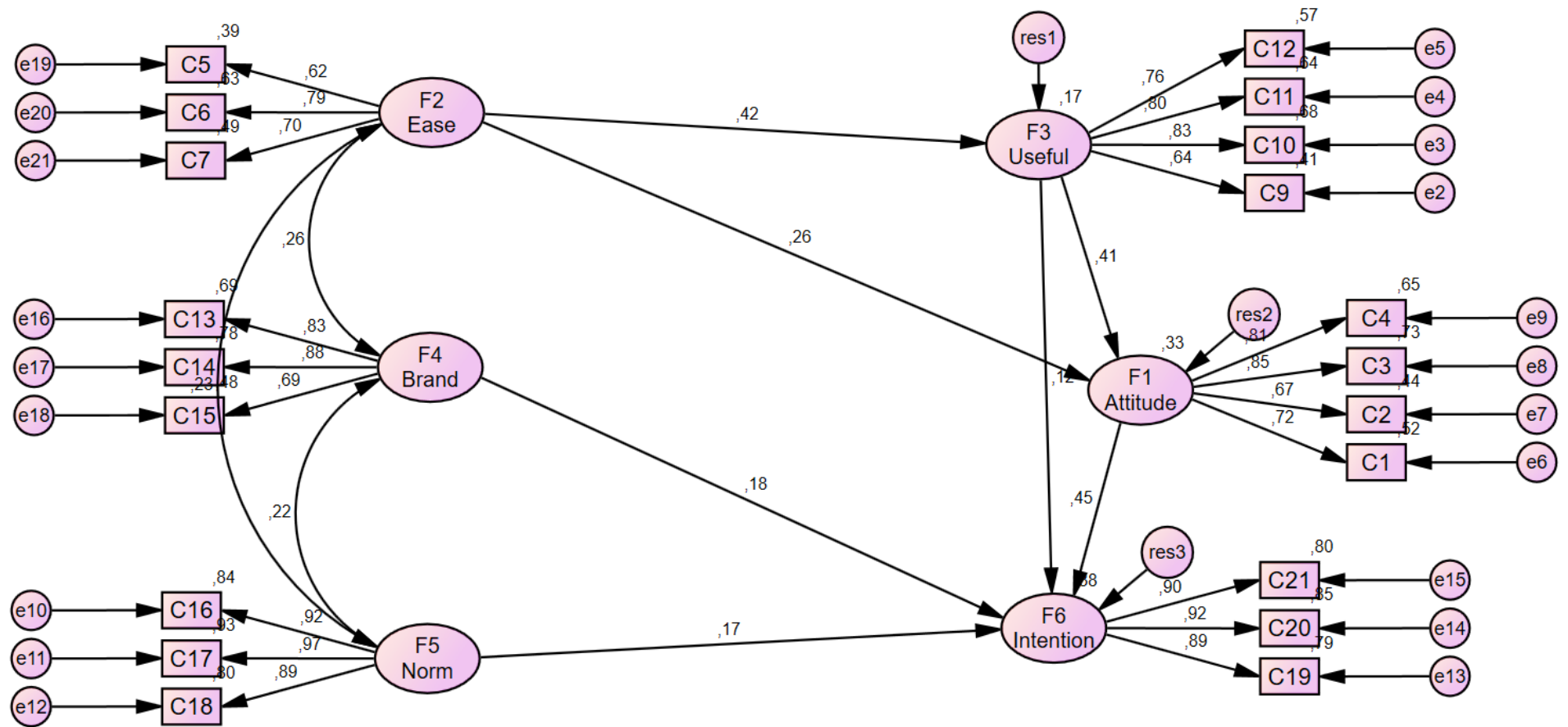
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**ANNEXURE B**

**STRUCTURAL MODELS**

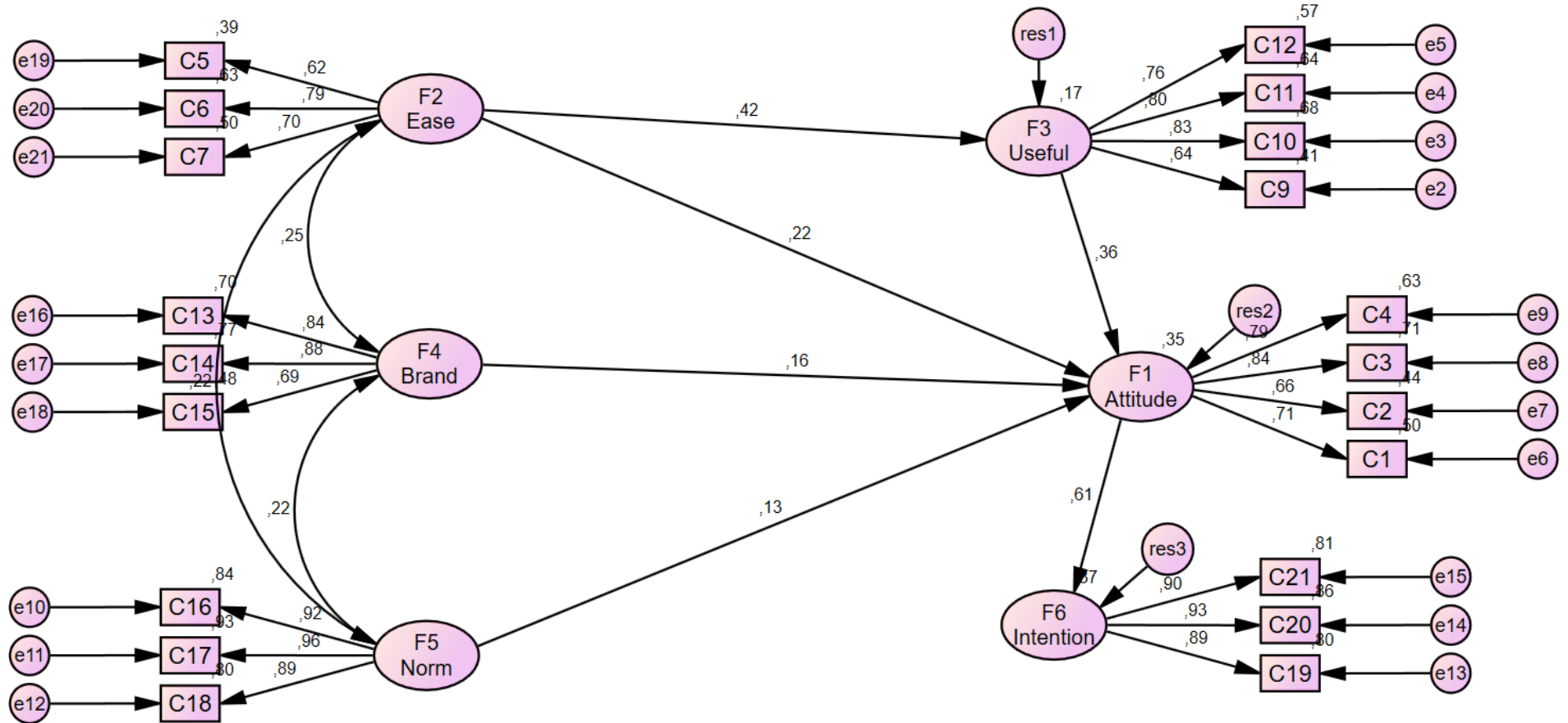
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## STRUCTURAL MODEL A





## STRUCTURAL MODEL B



## STRUCTURAL MODEL C

