



From health data to healthy lifestyle:
An analysis of the perceptions and drivers
leading to the consistent and continuous use
of wearable fitness trackers in Portugal.

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Abstract

In a world where health and fitness are increasingly prioritized, wearable fitness trackers have emerged as personal health management tools assisting millions of individuals in monitoring and enhancing their well-being. This growing trend has motivated an investigation of the consumer profile within the Portuguese market and an analysis of the motivating factors driving the consistent and continuous use of such devices. Through a quantitative research approach, an online survey with 155 participants was conducted to assess the hypothesized device characteristics and user perceptions associated with the use of wearable fitness trackers.

The findings from this research suggest that demographic aspects do not significantly influence adoption, highlighting the importance of user motivations and psychographic factors. Additionally, device characteristics such as comfort, data quality, and goal-setting features have been identified as key drivers for regular device usage. Furthermore, perceived usefulness, ease of use, enjoyment, and privacy significantly influence sustained device usage.

Overall, this study makes two major contributions. From a managerial perspective, it emphasizes the importance of a customer-centric approach for companies operating in this market. This suggests prioritizing the most influential characteristics and offering an easy and intuitive experience that provides accurate, actionable, and understandable insights into user health and fitness levels. Also, from a theoretical standpoint, this research enhances the understanding of consumer behaviour concerning wearable fitness trackers in Portugal, particularly regarding the motivating factors for frequent and continuous usage.

Keywords: Wearable Fitness Trackers; Device Characteristics; User Perceptions; Frequent Usage; Continuous Usage; Portuguese Market.

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Resumo

Nos dias de hoje, onde a saúde e o desporto são cada vez mais priorizados, os dispositivos de monitorização desportiva ajudam milhões de pessoas a acompanhar e melhorar o seu bem-estar. Esta crescente tendência motivou a investigação do perfil do consumidor no mercado português, assim como uma análise dos factores que impulsionam a utilização frequente e contínua destas tecnologias. Através de uma abordagem quantitativa, foi realizado um questionário online com 155 participantes com o objectivo de avaliar quais as funcionalidades e as perceções dos utilizadores associadas à utilização destes dispositivos.

Os resultados obtidos sugerem que os aspectos demográficos não influenciam significativamente a adopção, destacando a importância dos objectivos pessoais e outros factores psicográficos. Características como o conforto, qualidade dos dados e funcionalidades de definição de objectivos foram identificadas como impulsionadores-chave para o uso regular dos dispositivos. Além disso, as perceções associadas à utilidade, facilidade de uso, prazer e privacidade, demonstraram uma influência significativa no uso contínuo.

Em suma, este estudo faz duas principais contribuições. Numa perspectiva de gestão, destaca a importância de uma abordagem centrada no cliente para empresas que operam neste mercado. Esta abordagem consiste em priorizar as características mais influentes e oferecer uma experiência fácil e intuitiva que forneça uma visão precisa, acionável e compreensível da saúde do utilizador. Além disso, numa perspectiva teórica, este artigo contribui para uma melhor compreensão do comportamento do consumidor relativamente aos dispositivos de monitorização desportiva, particularmente em relação aos factores motivadores para o uso frequente e contínuo no mercado português.

Palavras-chave: Dispositivos de Monitorização Desportiva; Funcionalidades; Perceções dos Utilizadores; Utilização Frequente; Utilização Contínua; Mercado Português.

Título: Dos dados de saúde ao estilo de vida saudável: Uma análise das perceções e dos factores que conduzem à utilização frequente e contínua de dispositivos de monitorização desportiva em Portugal.

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CHAPTER 1 - INTRODUCTION

1.1. Contextualization

In a world characterized by globalization and continuous change, the rhythm of our lives has undergone a profound transformation. Consequently, our daily routines have been significantly affected, with our physical well-being assuming an important role. The evolving understanding of health as a complete state of physical, mental, and social well-being, and not merely the absence of disease, has prompted individuals to take a proactive approach towards achieving and maintaining their wellness (World Health Organization, 2023). This shift in perception is simultaneously supported by a growing body of scientific research emphasizing the holistic nature of health, where physical activity, nutrition and mental well-being are the fundamentals of a healthy lifestyle. Hence, despite being relegated for many years, health is gaining a pivotal role in the routines of millions.

Simultaneously, we have witnessed a profound technological revolution throughout the last decades. During this time, the proliferation of the internet and the global adoption of smart devices have become important aspects of our lives, influencing various human behaviours, from work habits to communication patterns, and physical activity routines. In the context of health and fitness, technology has enabled access to extensive information and advanced tools, promoting a wave of personalized health management driven by informed decisions. The use of wearable technology by consumers is part of this contemporary technological revolution (Ferreira et al., 2021). These devices have been around for years, and they can be described as smart computers that are integrated into everyday items and can be worn comfortably on the body (Wright and Keith, 2014). They feature a combination of sensors and computing devices embedded in clothing and fashion accessories such as smart bands or smartwatches (Nieroda et al., 2018). However, besides carrying out many of the same tasks as smartphones or laptop computers, wearable technology can surpass them in performance, having the greatest impact in the areas of health, medicine, and fitness (Wright and Keith, 2014).

Given their predominant relevance in the previous domains, the study of fitness trackers emerges as a pertinent topic of investigation. These devices offer guidance and support for fitness and health-related tracking through continuous monitoring and recording of physiological and physical activity data (Mercer et al., 2016). Additionally, they have been increasingly associated with the promotion of healthy habits through their incorporated

behavioural change techniques such as goal setting, self-monitoring, feedback, social influence and rewarding systems (Mahloko and Adebesein, 2020). Therefore, they are perceived as an emerging solution for motivating people to improve their well-being.

Besides the global popularity of these wearables, within the Portuguese landscape, the research by Lopes and Sá (2019), revealed that nearly half of the participants (41%) who exercise regularly, are using or have used an activity tracker during their practice. The most used devices were wearables, such as smartwatches and smart bands, but smartphones are also often used. Moreover, this study has also revealed that most participants (72%) who exercise regularly without a fitness tracker have shown to be interested in using one, which suggests a general interest towards using these devices to monitor exercise. All things considered, the growing trend of monitoring and engaging in physical activity paves the way for the exploration of fitness trackers among Portuguese consumers.

1.2. Problem Statement

This study aims to analyse the demographic and psychographic profile of wearable fitness tracker users and examine the motivations behind the adoption and sustained usage of these devices in the Portuguese market. Within this context, the research seeks to identify the specific product characteristics that are most valued by consumers and motivate them to utilize these devices regularly. Further, it also investigates the factors that both motivate and hinder the continuous usage of wearable fitness trackers. Overall, the goal of this analysis is twofold: to contribute to the understanding of consumer behaviour in the context of wearable fitness trackers and to provide actionable recommendations for companies looking to enhance their strategic position and market presence in Portugal.

1.3. Research Questions

Research Question 1: What is the demographic and psychographic profile of wearable fitness tracker users in Portugal?

Research Question 2: What are the product characteristics that motivate individuals to use wearable fitness trackers?

Research Question 3: What are the main factors driving individuals to continuously use wearable fitness trackers in Portugal?

CHAPTER 2 - LITERATURE REVIEW

2.1. Wearable Technology Overview

The concept of wearables has evolved significantly over the years. What was once primarily associated with clothing or accessories is now deeply connected to technology and product functionalities that go far beyond fashion. The ever-increasing consumer acceptance of technology and its developments has allowed this market to continuously grow over the years. Overall, the biggest growth in the industry has been noticed over the last 10 years with the proliferation of smartwatches and smart bands from major players in the consumer electronics industry. Hence, wearable technology has become one of the most promising areas of the Internet of Things (IoT) which has evolved and become increasingly pervasive in consumers' lives (Marakhimov and Joo, 2017).

While we acknowledge their significant growth in today's world, it is important to understand what wearable technology is and how it fits into modern society. The existing literature on this matter has proposed multiple definitions where authors have seemed to reach a consensus. "Wearable technology" or "wearables" are technology-based products that can be worn on the body and have the capability of communicating autonomously and processing information on the go (Park and Jayaraman, 2021). Hence, these devices assign the attributes of mobility and connectivity to users, and they provide them with a seamless and integrated experience that has long been expected of computers (Lee et al., 2016; Kalantari, 2019). As of today, wearables cover various devices such as smartwatches, smart bands, smart glasses, activity trackers, smart clothing, contact lenses, and various other categories which continue to evolve alongside technology.

Regardless of the product category, the primary function of wearables is to assist consumers in achieving a state of connected self through the utilization of sensors and software that facilitate data exchange, communication, and information access in real time (Kalantari, 2019). According to Park and Jayaraman (2021), these devices are designed to perform five basic functions: sense, process, store, transmit, and apply. While the specifics of these functions may vary from product to product, all these devices rely on mobile information processing, which transforms sensory data into information and knowledge that will be of value to the user. Consequently, wearables have the potential to improve users' well-being, decision-making, and behaviours (Kalantari, 2019). These devices have been distinguished as of particular

importance in the health sector, where their features and capabilities could provide solutions to reduce medical costs (Ferreira et al., 2021).

2.2. Wearable Fitness Trackers

2.2.1. Product Characterization

Within the context of healthcare, wearable devices range from fitness trackers (e.g., smartwatches and smart bands) to more sophisticated healthcare devices used to manage and predict diseases, and where the market is still at an early age (Casselman et al., 2017; Marakhimov and Joo, 2017; Lee and Lee, 2018). Looking specifically into the fitness landscape, fitness trackers enable consumers to continuously monitor physiological parameters and manage their health and well-being on a personal basis (Marakhimov and Joo, 2017). Thus, they can be used to track the number of steps and calories burned and to monitor other sophisticated data such as heart rate or skin temperature. These devices are mostly worn as wristbands and the analysis of a user's data is usually done on a mobile application. Consequently, fitness trackers allow users to receive personalized, immediate, and goal-oriented feedback concerning their personal health information, without the need for health professionals (Becker et al., 2017).

While fitness trackers are mostly associated with smartwatches, it is crucial to understand they are simply one of the various device categories. Despite their different characteristics, smartwatches, smart bands, and heart rate monitors are the three most common devices in the wearable fitness tracking literature. In this context, product functionality arises as a key differentiating factor which categorizes a device based on the number of tasks it can perform (Nieroda et al., 2018; Park and Jayaraman, 2021). On the one hand, mono-functional products are specifically designed to perform a singular task, such as smart bands or heart rate monitors, which are specialized in tracking health and fitness metrics (Nieroda et al., 2018). These devices are often worn as chest or wristbands and tend to rely on paired utilization with a mobile application. On the other hand, multi-functional products extend beyond singular purposes and provide users with various capabilities (Nieroda et al., 2018). This is the case with smartwatches, which incorporate features such as answering calls, organizing tasks, and monitoring physical activity simultaneously. When it comes to fitness data, these devices differentiate from the previous due to their independence from a smartphone.

Considering this product differentiation, it is essential to clarify that throughout this research, the term “fitness tracker” or “wearable fitness tracker” refers to both mono-functional and multi-functional wearable devices, offering a range of fitness and health monitoring functions.

2.2.2. The Global and Portuguese Markets

The global wearable fitness tracker market has been experiencing significant growth due to increasing customer preferences for wearable technology and health monitoring devices. As of 2023, there were more than 480 million users worldwide and the market was estimated at USD 63.67 billion (Statista, 2023). Throughout the upcoming years, the market is expected to maintain its upward trend, resulting in a projected market volume of USD 98.30 billion and 579 million users by 2028 (Statista, 2023).

In Portugal, the wearable fitness tracker market has also been showing an upward trajectory even if on a smaller scale. As of 2023, there were a total of 1.04 million users and the market was estimated at USD 126.96 million (Statista, 2023). In this context, the biggest growth has been verified after the COVID-19 pandemic due to a generalized increase in health monitoring and physical activity. According to the report published by Direção-Geral da Saúde (DGS), in 2022, 54.3% of the Portuguese population showed adequate levels of physical activity compared to the 46% registered in the pre-pandemic period (Direção-Geral da Saúde, 2022). Also, this study concluded that the most popular practices among the Portuguese population were strength training and running/walking. In terms of future projections, the Portuguese market is expected to continue growing until 2028. While the total revenue is expected to reach USD 149.14 million, the total number of users is only projected to increase slightly, reaching 1.07 million (Statista, 2023). These numbers suggest that, on average, Portuguese consumers will spend more money on wearable fitness trackers.

Looking at device manufacturers, there are mainly two types of brands operating in this market: specialized brands and non-specialized brands. Specialized brands are those dedicated exclusively to the development and production of health and fitness tracking devices. Contrastingly, non-specialized brands are typically large consumer electronics companies that have expanded their product offerings into the wearable fitness tracking market. Overall, the top-selling specialized brands are consistent across the globe, including Fitbit and Garmin. However, the non-specialized brands tend to vary based on geography, being Apple, Samsung, Huawei and Xiaomi the most used brands (Statista, 2023).

Starting with the specialized brands, Fitbit was founded in 2007 as a pioneer in the wearable fitness tracking market. The company has established itself as a prominent player in the health and fitness monitoring sector and has become known for its user-friendly devices and comprehensive fitness tracking capabilities. Further, Fitbit was acquired by Google which has successfully positioned itself as a global market leader, offering a range of products (e.g. smartwatches, smart bands, and smart scales) to various customer segments with different preferences and needs. Overall, Fitbit has been a major contributor to the expansion of fitness trackers, and it has empowered millions of users to take control of their health and fitness.

Additionally, Garmin was founded in 1989 and was a reference in the navigation and outdoor activity sector before making a noteworthy entry into the fitness tracking market. By leveraging its expertise in GPS technology, Garmin has developed a range of fitness tracking devices that go beyond basic health monitoring, incorporating advanced features and modes for specific sports (e.g. running, cycling, swimming/diving, hiking, and much more). This emphasis on performance and advanced outdoor functionalities is what sets the brand apart in the market, attracting users who engage in activities beyond traditional gym workouts. Hence, its commitment to providing in-depth fitness metrics and analysis specific to the user's favourite practice, is what has allowed the brand to create a dedicated user base globally.

Among the non-specialized brands, Apple stands out as a key market player. In line with its notable presence in other consumer electronics markets, such as smartphones or computers, Apple entered the wearable fitness tracking market in 2015. The Apple Watch offers seamless integration with the Apple ecosystem, providing users with an easy and comprehensive experience in both fitness pursuits and day-to-day life. Thus, Apple focuses exclusively on multifunctional devices that incorporate fitness capabilities alongside other features. Despite not specializing in fitness tracking devices, Apple's commitment to innovation and user experience has been a determining factor in maintaining its market competitiveness.

Lastly, Xiaomi is a consumer electronics and smart manufacturing company that is mostly known for its affordability. The brand has recently entered the fitness tracking market, and its devices are often considered a good option for budget-conscious individuals who want the essential functionalities. Therefore, Xiaomi devices are accessible to a broad user base seeking physical activity tracking, but also health and sleep monitoring. Overall, the brand's global presence and strategic pricing have contributed to its success in capturing a substantial market share in the fitness tracking segment, while bridging the gap between affordability and

functionality. However, due to its mainstream user approach, Xiaomi is mostly competing with other consumer electronics brands, such as Huawei or Samsung, but also contends for Fitbit's market share.

2.2.3. Users and Features

Several reasons are driving the adoption and engagement with fitness trackers. Beyond demographic considerations, which will be explored further, users of fitness trackers can be broadly classified into distinct segments based on their motivations and engagement levels (Asimakopoulos et al., 2017). On one hand, there are fitness enthusiasts who routinely utilize these devices as performance tools. This group, generally comprising high-level runners, cyclists, swimmers, or sports players, tend to take the most advantage of the devices by valuing detailed and advanced metrics, which help them to enhance their fitness outcomes. On the other hand, casual users, such as regular gym-goers or those engaging in sports for health and leisure, tend to rely on the basic features of these devices. Their primary objective is to gain awareness of their overall health status and to maintain accountability for their fitness objectives (Vooris et al., 2019).

When considering the physiological data collected by wearable fitness trackers, it typically falls into one of four main categories: physical activity (e.g., exercise duration and intensity, calorie expenditure, heart rate), health and wellness (e.g., skin temperature, heart rate variability, and stress levels), sleep (e.g., resting heart rate, sleep quality, and duration), and location (e.g., GPS tracking for speed or distance covered). Consequently, the features offered by these devices are crucial, as users prioritize them based on their fitness goals and preferences. According to Becker et al. (2017), it is the individual trade-off decision between the advantageous and adverse properties of fitness trackers that influences consumers to adopt and consistently use these devices in the long run. Thus, understanding the consumer profile and the factors contributing to a positive balance is key.

Despite the existing variety of products and features, ensuring the sustained usage of wearable technology remains a major challenge within this sector. As identified by Lee et al. (2016), a third of American consumers stop using their wearable devices within six months of purchase. Accordingly, companies must understand that acquiring new customers is simply the first step (Nascimento et al., 2018). Therefore, this study aims to identify the key factors in retaining and promoting the consistent and continuous use of wearable fitness trackers, while utilizing a six-month timeframe to characterize "continuous use", as suggested by Lewis et al. (2020).

2.3. Motivations for Adoption and Use

The adoption and use of wearable fitness trackers is a multifaceted process influenced by several key factors. Beyond local circumstances, such as a strong fitness culture, or macroeconomic factors, such as disposable income and consumer spending patterns (Statista, 2023), various technology acceptance models have been used to comprehensively study the underlying motivations driving individuals to use these devices. Despite the diverse perspectives presented by different authors, three main domains must be covered: User Characteristics, Device Characteristics and Perceived Benefits and Risks associated with these technologies. Hence, this study will delve into these three focal areas while trying to provide a total understanding of the reasons behind the integration of such devices into individuals' lives.

2.3.1. User Characteristics

2.3.1.1. Socio-Demographics

The use of technology varies among individuals, and not everyone shares the same tendency for it. Socio-demographic variables such as gender and age are the most studied variables concerning user characteristics of technology devices. In the context of wearable fitness trackers, most of the existing literature reports a negligible effect of gender in terms of the adoption and usage of these devices (Canhoto and Arp, 2016). Thus, mainly age has been identified as a differentiating factor in the adoption process. A study conducted in Germany by Wiesner et al. (2018), concluded that young (16 to 29 years old) and middle-aged (30 to 49 years old) runners, were more likely to use fitness tracking devices than older runners (50 or more years). Additionally, Rupp et al. (2018), found that older people are less likely to use these devices due to their low perceived usability of such technologies.

Overall, the existing literature has shown that, when compared with younger adults, the senior population may be more resistant to embracing new technologies due to cultural factors, education, and experience (Röcker et al., 2014). In contrast, young users are generally more receptive to embracing innovation, more susceptible to peer influence, and more willing to adopt technology that facilitates the accomplishment of their tasks or goals (Canhoto and Arp, 2016).

2.3.1.2. Personality Traits

Previous studies have suggested that personality traits play a crucial role in shaping individuals' tendency to adopt technologies. Specifically, the Five-Factor Model of personality (openness, conscientiousness, extraversion, agreeableness, and neuroticism), has been linked to differences in individuals' interactions with technology. Yet, there is very limited research on the influence these five traits have on the adoption of fitness trackers.

On one side, Rupp et al. (2018) concluded that certain personality traits (agreeableness, conscientiousness, and extraversion) influence the perceived usefulness and motivational ability of the devices. According to the research, individuals who identified as extroverted, conscientious, or agreeable have a high intention to use fitness trackers, as they perceived these devices to be highly usable and motivating. However, contrary results have also been published. According to Attig and Franke (2019), there is no significant direct effect of the five personality traits on individuals' motivation to use fitness trackers. Hence, despite the results shown on other smart devices, there is no consensus on the impact that personality traits have on the adoption of fitness trackers.

2.3.1.3. Personal Involvement

Personal involvement is another user characteristic that has been considered an important driver of fitness-tracking technology adoption (Jin et al., 2022). According to Kalantari, (2019), personal involvement refers to the inherent interest an individual has in a product, and it depends on the degree to which the consumer perceives the product to be personally relevant to them. Hence, in the context of fitness trackers, this personal interest assesses an individual's interest in the domains of technology and health/fitness.

On one side, the systematic review conducted by Jin et al. (2022) concluded that the adoption of wearable fitness trackers is closely linked to an individual's general interest in technology or curiosity about personal data. This curiosity often extends to a desire to manage their health, making the technology a significant driver for adoption. On the other side, the analysis by Lee and Lee (2018) concluded that consumers' health interests play an important role in predicting the adoption intention of fitness trackers. Hence, those who prioritize their health and fitness are more likely to embrace fitness-tracking technologies, as these devices align with their goals of achieving and maintaining optimal health conditions.

2.3.1.4. Personal Innovativeness

Personal and technology innovativeness emerges as a critical determinant in the adoption and use of innovative technologies. Innovativeness can be described as the extent to which a user adopts a particular new product earlier than other people (Kalantari, 2019). As a result, highly innovative individuals are characterized as active information seekers, whose receptivity towards taking chances or trying new things should indicate their desire for innovativeness about a specific technology (Kao et al., 2019).

Amongst the technology acceptance literature, researchers have consistently found that higher levels of technology innovation are positively associated with perceived usefulness, perceived ease of use, attitude towards technology, and intention of use (Kalantari, 2019). When considering wearable technology adoption, Choi and Kim (2016) found a positive effect of Information Technology innovativeness on perceived usefulness and perceived ease of use. Also, the study by Attig and Franke (2019) has shown that individuals' tendency to actively explore new technologies is positively related to their motivation to use a fitness tracker.

2.3.1.5. Technology Self-Efficacy

Several researchers have investigated the impact of technology self-efficacy in the adoption of wearable devices (Kalantari, 2019). As defined by Bandura (1978), self-efficacy refers to the conviction that one can successfully execute a particular behaviour. Hence, when an individual has a positive belief about his ability to accomplish a task, he is more likely to participate in it (Kalantari, 2019). Contrastingly, a low degree of self-efficacy leads people to avoid tasks.

Moreover, self-efficacy has also been shown to be positively influenced by personal involvement and technology affinity (Jin et al., 2022). According to Kalantari (2019), consumers who are more interested in new technologies are more likely to have a better judgement of their abilities to use these technologies. This is supported by other researchers (Gao et al., 2015; Rupp et al., 2018; Attig and Franke, 2019) who have also confirmed the positive relationship between technology self-efficacy and fitness tracker usage.

2.3.1.6. Individual Status

An individual's adoption of a fitness tracker is also influenced by his personal objectives, such as health goals, exercise goals, or self-improvement goals (Canhoto and Arp, 2016; Jin et al., 2022). According to Harrison et al. (2015), people are more likely to use a fitness tracker when

they have a goal or a relatively strong motivation to become more active. However, after adopting such a device, failure to meet personal goals can cause feelings of discouragement and guilt in some individuals, leading them to stop using the device (Razon et al., 2019).

Moreover, Rupp et al. (2018) concluded that people who practice physical activity more often have a higher desire to adopt fitness trackers, as they are more likely to find such a device motivating. Contrastingly, Coskun (2019) has verified that people who become physically inactive for a long period, tend to abandon these devices.

2.3.2. Device Characteristics

2.3.2.1. Motivational Ability

The motivational ability of a fitness tracker represents its ability to motivate and sustain individuals' engagement in physical activity through device features. This ability may be explained according to the Self-Determination Theory (Rupp et al., 2018), which suggests that humans have three main psychological needs: autonomy, competence, and relatedness. In previous studies, this framework has been used to describe the human desire to engage in exercise (Edmunds et al., 2006; Wilson et al., 2008) and more recently it has also been successfully applied to the human acceptance and use of technology (Lee et al., 2015). Considering the three concepts behind the theory, fitness trackers may support autonomy by allowing individuals to choose how and when they engage in physical activity; they may support competence by providing feedback regarding activity levels and progress toward goals; and lastly, they may also support relatedness by connecting friends and family to observe and encourage user progress or by posting fitness statistics online (Rupp et al., 2018).

Furthermore, the motivational ability of fitness trackers has been shown to have a direct impact on individuals' intentions to use these devices, mainly through gamification elements such as goal setting, activity feedback, and rewards (Lunney et al., 2016; Sullivan and Lachman, 2017; Rupp et al., 2018). In simple terms, Song and Yao (2022) define gamification as the integration of game design elements in non-game environments to enhance user experience, sustain motivation, and increase engagement. Accordingly, Vooris et al. (2019) proposed that gamification plays an essential role in the adoption and continuous use of fitness wearables, where devices with these characteristics are perceived as more motivating.

2.3.2.2. Device Quality

Like most products, consumers' perception of the overall quality of a technological device is a determinant factor in their decision to adopt or purchase it (Kalantari, 2019). This includes device attributes such as comfort, compatibility, or durability. Users tend to reject fitness trackers with insufficient quality, technical issues, frequent maintenance, or discomfort (Jin et al., 2022). In many cases, consumers' perception of quality is closely associated with their perception of the manufacturer's brand image (Keller, 1993). In this context, Yang et al. (2016) concluded that the brand name of wearable technologies has a positive influence on enhancing the social image of users and consequently is a driver for adoption.

2.3.2.3. Data Quality

Given that data is the foundation of fitness-tracking technologies, it is expected that the quality of this personal information impacts consumers' decisions (Jin et al., 2022). Prior research has shown that users abandon fitness trackers due to poor data accuracy and reliability (Coorevits and Coenen, 2016; Harrison et al., 2015; Shih et al., 2015). The quality of this information is highly relevant to users since they want to access a precise representation of their health. Additionally, Preusse et al. (2014) concluded that inaccurate data decreases the perceived usefulness of these devices. Hence, it has been considered one of the main barriers to the continuous use of fitness trackers.

2.3.2.4. Device Aesthetics

Wearable technologies are oftentimes considered fashion accessories and therefore, consumers choose these technologies based on their aesthetic attributes such as design, colour or material. According to Kalantari (2019), aesthetic attributes are effective in consumers' decision-making since they influence both cognitive attention and emotions which in turn affect the consumption pattern. Accordingly, it has been found that consumers are influenced by the design, style and appearance of fitness trackers (Canhoto and Arp, 2016; Coorevits and Coenen, 2016), and they would not use an aesthetically displeasing device (Harrison et al., 2015; Shih et al., 2015).

Moreover, Yang et al. (2016) indicated that the visual attractiveness of wearable devices strongly affects users' perceived enjoyment and social image. These findings reinforce the importance of device visibility and social influence, which are particularly relevant because fitness trackers are worn on the body and can be seen and recognised by others. In this context,

Hein and Rauschnabel (2016) suggested that social cues have a stronger influence on fashion-oriented users (fashionistas) compared to technologically oriented ones (technologists).

2.3.3. Perceived Benefits and Risks

2.3.3.1. Perceived Ease of Use

Perceived ease of use (PEOU) is one of two determinants proposed in the Technology Acceptance Model (TAM). As suggested by Davis (1989), perceived ease of use describes the degree to which a person believes that using a technology will be free of effort. Some models refer to this determinant as "technology usability", however, a user's evaluation of the necessary effort in using technology is associated with his ability to use its functional components (Kao et al., 2019). Hence, when it comes to adopting a new technology, PEOU is the major technical factor that affects users' attitudes towards usage (Kalantari, 2019).

The effect of PEOU on users' intention to use fitness-tracking technologies has been widely studied and confirmed in the literature (Lunney et al., 2016; Kao et al., 2019). As suggested by Rupp et al. (2018), the more usable a device appears to be, the more it motivates individuals to achieve their fitness goals, and consequently trust the information provided. These findings are also supported by Lee et al. (2015), who proposed that poor product usability may negatively impact the motivational ability of the device and thereby the user's intention to continue using it.

2.3.3.2. Perceived Usefulness

Perceived usefulness (PU) is the second determinant of the Technology Acceptance Model (TAM). According to Davis (1989), perceived usefulness is defined as the extent to which an individual believes that using some specific technology will enhance his performance. This concept is featured in various technology acceptance models, as it refers to an individual's perception or belief that technology is supportive of his desired goals (Kao et al., 2019). Therefore, PU is critical to the acceptance of fitness trackers since they transform invisible biological data into accurate, actionable, and understandable depictions of user health and fitness (Rupp et al., 2018).

Amongst the existing literature, PU has repeatedly been shown to have a significant effect on consumers' attitudes towards wearable technologies and their behavioural intention to use them (Kalantari, 2019; Lunney et al., 2016; Kao et al., 2019). According to Jin et al. (2022), people

show low levels of interest in using fitness tracking devices when their utility is perceived as insufficient or when they do not deliver what is expected. Additionally, PU has also been shown to impact the motivational ability of wearable devices (Rupp et al., 2018). Hence, to believe that using a fitness tracker will motivate individuals to become more active, users need to believe that the information provided by the device is trustworthy which includes being both valid and reliable (Rupp et al., 2018).

2.3.3.3. Perceived Value

Beyond the TAM, there are several other models, which consider different determinants and are used to study the adoption of innovative devices. One of these determinants is perceived value. This concept refers to an individual's assessment of a product's utility based on his perception of what is received as a benefit and what is given as a cost (Kalantari, 2019). Hence, when the benefits outperform the costs, the technology's price value is positive.

Amongst the existing literature, perceived value has been shown to drive favourable intention to the use of fitness trackers (Jin et al., 2022). The research by Gualtieri et al. (2016) concluded that the perceived value of fitness trackers is positively linked to product acceptability or usage. However, other studies have identified price as a discouraging factor since many consumers are not convinced that wearables offer value above what they get from their smartphones (Kalantari, 2019). Nonetheless, as this market becomes more saturated, several market players are focusing on lower price points that still have distinct advantages over smartphones in terms of their utilitarian benefits.

2.3.3.4. Perceived Enjoyment

Within the technology adoption process, the concept of perceived enjoyment is often studied as the hedonic motivation that conveys the fun and pleasure resulting from the use of a device (Kalantari, 2019). As fitness is often seen as a leisure activity that allows people to have fun, previous literature has categorized fitness trackers as a hedonic technology, which aims to provide self-fulfilling value to the user. Therefore, while PU and PEOU are known to be extrinsic motives focused on performance outcomes, perceived enjoyment represents an intrinsic motive that could also affect the adoption behaviour. Hence, it is defined as the extent to which the technology can be enjoyable regardless of its performance (Davis et al., 2006) and is considered a driver of hedonic technology usage (Rheingans et al., 2016).

Furthermore, prior research has shown that intrinsic motivation can have a stronger effect on consumer behaviour than extrinsic one (Nascimento et al., 2018). In the context of wearable fitness trackers, Jin et al. (2022) concluded that the pleasure associated with using the device affects an individual intention to continue using it. Also, Nascimento et al. (2018) suggest that perceived enjoyment affects user satisfaction as technology is often used for fun and pleasure rather than performance enhancement. Overall, previous literature has concluded that the enjoyment aspect of wearable fitness trackers is a determinant of continuance intention.

2.3.3.5. Perceived Privacy Risk

In the context of technology adoption and continuous usage, perceived risks can represent notable barriers. According to Kalantari (2019), perceived risks can be defined as an individual's uncertainty about the potential positive and negative consequences associated with their purchase. While various types of risks may impact consumers, in the context of wearable fitness trackers, privacy threats are particularly relevant. Considering that today's consumers are concerned about privacy breaches and the loss of control over their personal information, privacy risks emphasize the importance of safe and secure data handling and storage (Kalantari, 2019).

Previous research has consistently highlighted privacy concerns as among the most frequently mentioned risks associated with the use of fitness trackers (Jin et al., 2022). Studies by Epstein et al. (2016) and Gao et al. (2015) have concluded that perceived privacy risks have a negative impact on individuals' intention to use fitness trackers, while Rheingans et al. (2016) have noted their influence on Perceived Enjoyment, leading to device abandonment. From a different perspective, Becker et al. (2017) have highlighted the potential of a transparent privacy policy. According to their research, users value companies that are transparent about privacy and do not use personal health information for purposes other than those agreed. Therefore, the authors suggest this proactive approach impacts perceived privacy by building trust and enhancing customer satisfaction, which ultimately plays a key role in the adoption and continuous use of wearable fitness trackers (Becker et al., 2017).

CHAPTER 3 – METHODOLOGY

3.1. Hypotheses Formulation

Hypothesis 1.1: Men and women are equally likely to use wearable fitness trackers.

Hypothesis 1.2: Young (16 to 29 years old) and middle-aged populations (30 to 49 years old) are more likely to use wearable fitness trackers than older populations (50 or more years old).

Hypothesis 1.3: Personal innovativeness is positively associated with the use of wearable fitness trackers.

Hypothesis 1.4: Technology self-efficacy is positively associated with the use of wearable fitness trackers.

Hypothesis 1.5: The frequency of physical activity practice is positively associated with the use of wearable fitness trackers.

Hypothesis 2.1: Devices that are comfortable to wear are used more often by consumers.

Hypothesis 2.2: Devices that provide accurate and reliable data are used more often by consumers.

Hypothesis 2.3: Devices that are aesthetically pleasing in terms of design, colour and material, are used more often by consumers.

Hypothesis 2.4: Devices that include gamification elements such as goals, feedback and rewards are used more often by consumers.

Hypothesis 3.1: Perceived Usefulness is positively related to users' intention to continue using wearable fitness trackers.

Hypothesis 3.2: Perceived Ease of Use is positively related to users' intention to continue using wearable fitness trackers.

Hypothesis 3.3: Perceived Enjoyment is positively related to users' intention to continue using wearable fitness trackers.

Hypothesis 3.4: Perceived Privacy is positively related to users' intention to continue using wearable fitness trackers.

3.2. Research Approach

Following the analysis of secondary data, a quantitative research approach was employed to characterize the wearable fitness tracker user in Portugal and investigate the product characteristics and key drivers motivating the regular and continuous usage of these devices. Therefore, an online survey was selected due to its capability to provide measurable and statistically significant insights into consumer profiles and preferences associated with the study object. Overall, this research approach offered several advantages, such as efficiently reaching participants and collecting data from a targeted sample across a wide geographical area - Portugal. Moreover, it also facilitated data collection while utilizing a standardized process.

Nonetheless, this quantitative approach also introduced potential drawbacks, particularly concerning response bias. Respondents may have provided inaccurate or biased answers due to social desirability or misunderstanding of survey questions. Therefore, to mitigate this risk, the questionnaire was meticulously designed to feature clear and concise questions with response options that minimized ambiguity. Additionally, before sharing it online, a pre-test was conducted with a sample of 5 participants who completed the survey individually, without any intervention from the researcher. As a result, insights from this pre-test were utilized to refine the survey structure and improve its clarity, while aiming to ensure the reliability and validity of the gathered data, and consequently this study's findings.

3.3. Data Collection

Qualtrics was the selected platform to develop and distribute the online survey. It was designed based on the selected research questions and hypotheses to ensure the necessary variables for the analyses were generated. Accordingly, the questions were divided into six blocks: survey introduction, screening questions, interest in fitness and technology, usage patterns regarding wearable fitness trackers, user experience/satisfaction, and demographics. The survey was published on the 17th of February 2024, and answers were collected until the 5th of March 2024. It was primarily distributed through social media platforms such as Instagram and WhatsApp, enabling the rapid collection of data within a short timeframe.

Looking at the structure, the survey started with a brief introduction to the study, followed by two screening questions that aimed to select participants who were eligible for the study. Based on these questions, two possible display logics would apply. Firstly, respondents who were not living in Portugal or did not own a wearable fitness tracking device were only questioned

regarding their interest in fitness and technology (Block 3) and demographics (Block 6). This approach was chosen while trying to examine possible differences in terms of demographics and psychographics among users and non-users of wearable fitness trackers. Secondly, respondents who owned a wearable fitness tracker and lived in Portugal were presented with the whole survey in regular order (Appendix 1).

The third section of the survey aimed to characterize the user profile of wearable fitness tracker users in Portugal. Therefore, participants were questioned regarding their engagement with sports and technology while assessing the variables of sports frequency, technology self-efficacy, and personal innovativeness. To measure sports practice frequency, a weekly scale was utilized, while the technology-related variables were assessed using a 5-point Likert scale adapted from previous literature.

Moving forward, the fourth and fifth sections of the survey were only displayed to participants living in Portugal who owned a wearable fitness tracking device. The fourth section focused on understanding participants' usage patterns concerning their fitness-tracking devices, thereby contributing to the development of a comprehensive user profile and addressing the remaining research questions. Within this section, participants were asked how long they have been using wearable fitness trackers, employing the scale presented by Lewis et al. (2020) to characterize continuous use. Additionally, to ensure clarity in the results, participants were provided with clear definitions of the three types of wearable fitness trackers - smartwatches, smart bands, and heart rate monitors. These definitions were adapted from the literature review, where the concepts of multi-functional and mono-functional devices by Nieroda et al. (2018) were utilized to explain the differences.

Furthermore, the fifth section of the survey delves into the characteristics and perceptions motivating the frequent and continued usage of wearable fitness trackers over time. This section began by assessing participants' overall satisfaction with their current devices and their behavioural intention to continue using them in the future, utilizing a 5-point Likert scale with items adapted from the research of Gao et al. (2015) and Nascimento et al. (2018). Additionally, participants rated their satisfaction level with various device characteristics and features under study, including comfort, durability, aesthetics, data quality, and gamification elements, which were evaluated using a 5-point Likert scale. Moreover, respondents were asked to express their agreement with several statements regarding their perceived usefulness, perceived ease of use, perceived enjoyment, and perceived privacy of using wearable fitness trackers. Once again,

these items were adapted from previous literature and measured on a 5-point Likert scale to better understand the drivers influencing consumers' decisions to either continue using or abandon these devices. Lastly, in the final section of the survey, participants were asked about their demographics to ensure a more comprehensive consumer profile and a clear understanding of the sample.

3.4. Measurement

Starting with user characteristics, respondents were presented with four items assessing their levels of self-efficacy and innovativeness regarding technology. These constructs were measured using a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree". Furthermore, to investigate the level of satisfaction with device characteristics and features, seven factors identified in the secondary data were evaluated using a 5-point Likert scale ranging from "Extremely Dissatisfied" to "Extremely Satisfied". Lastly, perceived benefits and risks were assessed through ten items encompassing the four main drivers covered in the hypothesis. Again, a 5-point Likert scale was utilized, ranging from "Strongly Disagree" to "Strongly Agree". Table 1 provides an overview of these constructs, their scales, and the scientific papers they were adapted from.

Table 1: Measurement of Constructs

<i>Construct</i>	<i>Items</i>	<i>Scale</i>	<i>Adapted from</i>
Personal Innovativeness	2	5-Point Likert Scale	(Kao et al., 2019)
Technology Self-Efficacy	2	5-Point Likert Scale	(Gao et al., 2015; Lee and Lee, 2018)
Satisfaction	1	5-Point Likert Scale	(Nascimento et al., 2018)
Continuance Intention	1	5-Point Likert Scale	(Gao et al., 2015; Nascimento et al., 2018)
Perceived Usefulness	3	5-Point Likert Scale	(Davis, 1989; Nascimento et al., 2018)
Perceived Ease of Use	3	5-Point Likert Scale	(Davis, 1989; Nascimento et al., 2018)
Perceived Enjoyment	2	5-Point Likert Scale	(Gao et al., 2015; Nascimento et al., 2018)
Perceived Privacy	2	5-Point Likert Scale	(Gao et al., 2015; Rupp et al., 2018)

3.5. Data Analysis

The data collected from the survey was further analysed using SPSS Statistics. Firstly, the sample was characterized using descriptive statistics about the demographics, sports behaviours, and wearable fitness tracker usage patterns. Thus, frequency tables were plotted for the relevant variables to gain a better understanding of the whole sample (Appendix 2).

Moving forward, some Chi-Square tests were employed to explore significant differences between users and non-users and consequently get an overview of the user profile. Additionally, to evaluate the associations between device usage and other user characteristics such as personal innovativeness, self-efficacy, and frequency of physical activity, the non-parametric test of Mann-Whitney U was utilized.

Furthermore, to investigate product characteristics and perceptions associated with regular and continuous usage of wearable fitness trackers, various Spearman correlations were performed. These correlations provided an understanding of both the direction and strength of relationships, assisting in the understanding of the motivating factors for sustained device usage. Throughout the entire analysis, a significance level of 5% was applied to statistically support the hypothesized variables.

CHAPTER 4 - ANALYSIS AND RESULTS

4.1. Data Preparation Process

The total pool of respondents included 176 individuals who initiated the questionnaire. However, only 155 completed the entire survey, resulting in the elimination of 21 incomplete responses to maintain the integrity of the results. Consequently, a response rate of 88% was achieved. Furthermore, among the 155 registered responses, the screening process led to the exclusion of an additional 5 respondents who did not meet the criteria of residing in Portugal. Although these responses were recorded and could potentially be useful in further analysis, they were not utilized in addressing the research questions or testing the hypotheses which were focused on the Portuguese market. Therefore, the final analysis utilized a total of 150 valid responses.

4.2. Sample Characterization

A total of 150 valid responses were collected from individuals residing in Portugal. The demographic analysis (Appendix 2) revealed that most respondents fell within the age bracket of 16 to 29 years (78.7%), with females constituting 57.3% of the sample, while males accounted for 42.7%. In terms of current occupations, the results revealed that the greatest portion of participants were engaged in a full-time job (48.0%), while the second largest group consisted of students (37.3%). Regarding income distribution, approximately half of the respondents (49.3%) reported a gross monthly income of up to 1500€, while 29.3% stated no income.

Further, the analysis of sports practices revealed the great majority of participants (98.7%) engaged in sports activities every week. Among these, the most common frequencies were "4-6 times a week" (40.7%) and "2-3 times a week" (40.0%). Accordingly, running (68.0%), strength training (66.0%), and cycling (25.3%) were the most common sports among respondents.

Finally, concerning the utilization of wearable fitness trackers, it was concluded that 83.3% of the survey population were users of wearable fitness tracking devices. Amongst this group, the majority owned smartwatches (79.2%), followed by smart bands (19.2%) and heart rate monitors (1.6%). Within these devices, Apple (40.8%) emerged as the leading brand, followed by Xiaomi (14.4%) and Garmin (13.6%). The duration of device usage revealed that most users

(71.2%) had been utilizing their devices for more than six months, primarily during sports practice (87.2%), daily tasks (68.8%), and sleep (34.4%). Additionally, all users reported to utilize their devices weekly, with approximately half (51.2%) utilizing them daily. The full results of the sample characterization can be analysed in Appendix 2.

4.3. Measures Reliability

As mentioned previously, the constructs utilized in this study were drawn from existing literature and, in some cases, adapted to suit the specific context of this research. While the original constructs had been previously validated in their studies, it was imperative to assess the reliability of the adjusted ones within the scope of this research. Hence, the Cronbach's alpha coefficient was employed to assess the internal consistency of the items. According to George and Mallery (2019), this coefficient ranges between 0 and 1, with values of 0.70 or higher generally considered indicative of a reliable scale.

The analysis demonstrated that all constructs were reliable ($\alpha > .70$), which ensured their internal consistency and suitability for this study. Consequently, to simplify the interpretation of data during the research, new variables were created by computing the mean value of participants' responses across the respective sets of items within each construct. The results of Cronbach's alpha coefficients are summarized in Table 2. Additional data regarding the reliability analysis can be observed in Appendix 4, while the descriptive statistics from the newly derived variables can be found in Appendix 5.

Table 2: Reliability Analysis

<i>Construct</i>	<i>Number of Items</i>	<i>Scale</i>	<i>Cronbach's Alpha</i>
Personal Innovativeness	2	5-Point Likert Scale	0.750
Technology Self-Efficacy	2	5-Point Likert Scale	0.821
Perceived Usefulness	3	5-Point Likert Scale	0.828
Perceived Ease of Use	3	5-Point Likert Scale	0.708
Perceived Enjoyment	2	5-Point Likert Scale	0.740
Perceived Privacy	2	5-Point Likert Scale	0.821

4.4. Hypotheses Testing

4.4.1. User Profile

Hypothesis 1.1: Men and women are equally likely to use wearable fitness trackers.

To test if men and women were equally likely to use wearable fitness tracking devices, a cross-tabulation analysis was performed between gender and device usage. The analysis revealed that a higher percentage of women within the sample (86.0%) were using fitness trackers compared to men (79.7%).

*Table 3: Crosstabulation (Gender*Fitness Tracker Usage)*

			User	Non-User	Total
Gender	Male	Count	51	13	64
		% within Gender	79,7%	20,3%	100%
	Female	Count	74	12	86
		% within Gender	86,0%	14,0%	100%
Total	Count	125	25	150	
	% within Gender	83,3%	16,7%	100%	

Considering that both gender and device usage are categorical variables with nominal measurement scales, a Chi-square test of independence was the chosen method to evaluate the relationship between the two variables. Looking at the results, a non-significant association between gender and device usage was verified, $\chi^2 (1, N = 150) = 1.068, p = .301 > .05$, indicating that men and women do not differ significantly in their propensity to utilize wearable fitness trackers. Therefore, it is possible to support Hypothesis 1.1., suggesting that men and women are equally likely to use wearable fitness trackers.

Table 4: Chi-Square Tests (Gender*Fitness Tracker Usage)

	Value	df	Asymptotic Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,068*	1	0,301		
Continuity Correction**	0,66	1	0,417		
Likelihood Ratio	1,058	1	0,304		
Fisher's Exact Test				0,377	0,208
Linear-by-Linear Association	1,061	1	0,303		
N of Valid Cases	150				

* 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.67.

** Computed only for a 2x2 table

Hypothesis 1.2: Young (16 to 29 years old) and middle-aged populations (30 to 49 years old) are more likely to use wearable fitness trackers than older populations (50 or more years old).

To investigate whether young and middle-aged individuals were more likely to use wearable fitness trackers compared to older individuals, a cross-tabulation analysis was performed between age groups and device usage. A new variable was created by categorizing individuals aged between 16 and 49 years as "Young & Middle-aged" and those aged 50 or above as "Old". The analysis revealed that a higher percentage of older individuals (100%) utilized wearable fitness trackers compared to younger and middle-aged ones (82.3%), conflicting with the hypothesis. However, it is crucial to note that the sample size among older individuals was substantially smaller, which impacted the lack of variability in results.

Table 5: Crosstabulation (Age Groups*Fitness Tracker Usage)

			User	Non-User	Total
Age Groups	Young & Middle-aged	Count	116	25	141
		% within Age Group	82,3%	17,7%	100%
	Old	Count	9	0	9
		% within Age Group	100,0%	0,0%	100%
Total	Count	125	25	150	
	% within Age Group	83,3%	16,7%	100%	

Considering both variables were categorical, a Chi-square test was performed to assess the significance of the results. The obtained p-value was non-significant, $\chi^2 (1, N = 150) = 1.915$, $p = .166 > .05$, suggesting no association between age groups and device usage. However, as the assumption of the expected value of cell counts was not at least 5 in 80% of the cells, the

reliability of this test was questioned. Thus, a Fisher exact test was performed, yielding a non-statistically significant result ($p = .357 > .05$). In conclusion, Hypothesis 1.2. was not supported as it was not possible to confirm that age is a significant factor influencing the use of wearable fitness trackers.

*Table 6: Chi-Square Tests (Age Groups*Fitness Tracker Usage)*

	Value	df	Asymptotic Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,915*	1	0,166		
Continuity Correction**	0,851	1	0,356		
Likelihood Ratio	3,395	1	0,065		
Fisher's Exact Test				0,357	0,184
Linear-by-Linear Association	1,902	1	0,168		
N of Valid Cases	150				

* 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.50.

** Computed only for a 2x2 table

Hypothesis 1.3: Personal innovativeness is positively associated with the use of wearable fitness trackers.

To assess if personal innovativeness was positively related to the use of wearable fitness trackers, an analysis was conducted between device usage and the previously grouped items of personal innovativeness. Since the non-users group contained less than 30 individuals, it was necessary to test the normality of this sample before selecting the appropriate analysis. Based on the results, it was concluded that personal innovativeness among the non-user group had a non-normal distribution ($p = .035 < .05$), suggesting the use of a non-parametric test.

Table 7: Tests of Normality (Personal Innovativeness)

	Fitness Tracker User	Kolmogorov-Smirnov*			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Personal Innovativeness	Yes	0,191	125	<,001	0,916	125	<,001
	No	0,225	25	0,002	0,912	25	0,035

* Lilliefors Significance Correction

Following the results obtained in the normality test, the non-parametric test of Mann-Whitney U was chosen as the most appropriate to understand if personal innovativeness would differ amongst the two usage groups. This analysis revealed that wearable fitness tracker users scored higher mean values ($M = 3.932$, $SD = 0.776$) compared to non-users ($M = 3.660$, $SD = 0.800$).

Table 8: Descriptive Statistics (Personal Innovativeness)

	Fitness Tracker User	Count	Mean	Std. Deviation
Personal Innovativeness	Yes	125	3,932	0,776
	No	25	3,660	0,800

Moreover, the mean rank values showed the same trend, with users (77.95) scoring higher than non-users (63.26). However, it is crucial to note that the obtained p-value was not statistically significant ($U = 1256.50$, $p = .114 > .05$), suggesting that personal innovativeness does not differ depending on device usage. Thus, Hypothesis 1.3. was not supported, as there is insufficient statistical evidence to sustain this positive association.

Table 9: Mann-Whitney Test Ranks

	Fitness Tracker User	N	Mean Rank	Sum of Ranks
Personal Innovativeness	Yes	125	77,95	9743,50
	No	25	63,26	1581,50

Table 10: Mann-Whitney Test Statistics

	Personal Innovativeness
Mann-Whitney U	1256,500
Wilcoxon W	1581,500
Z	-1,580
Asymp. Sig. (2-tailed)	0,114

* Grouping Variable: Fitness Tracker User

Hypothesis 1.4: Technology self-efficacy is positively associated with the use of wearable fitness trackers.

Similar to what was performed on the previous hypothesis, to assess if technology self-efficacy was positively related to the use of wearable fitness trackers, it was necessary to test the normality within the non-users sample. The results indicated that technology self-efficacy among the non-user group had a non-normal distribution ($p < .001$), which led to the use of a non-parametric test between two independent samples.

Table 11: Tests of Normality (Technology Self-Efficacy)

	Fitness Tracker User	Kolmogorov-Smirnov*			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Technology Self-Efficacy	Yes	0,251	125	<,001	0,746	125	<,001
	No	0,197	25	0,013	0,828	25	<,001

* Lilliefors Significance Correction

After performing the Mann-Whitney U test, it was verified that users ($M = 4.436$, $SD = 0.735$) and non-users ($M = 4.420$, $SD = 0.589$) had almost identical mean values, with mean ranks also similar but slightly higher among users (76.33) than non-users (71.34).

Table 12: Descriptive Statistics (Technology Self-Efficacy)

	Fitness Tracker User	Count	Mean	Std. Deviation
Technology Self-Efficacy	Yes	125	4,436	0,735
	No	25	4,420	0,589

Table 13: Mann-Whitney Test Ranks

	Fitness Tracker User	N	Mean Rank	Sum of Ranks
Technology Self-Efficacy	Yes	125	76,33	9541,50
	No	25	71,34	1783,50

However, the obtained p-value was not statistically significant ($U = 1458.50$, $p = .577 > .05$), indicating that technology self-efficacy does not differ based on device usage. Hence, Hypothesis 1.4 was also not supported as there was not enough statistical evidence to sustain a positive association.

Table 14: Mann-Whitney Test Statistics

	Technology Self-Efficacy
Mann-Whitney U	1458,500
Wilcoxon W	1783,500
Z	-0,558
Asymp. Sig. (2-tailed)	0,577

* Grouping Variable: Fitness Tracker User

Hypothesis 1.5: The frequency of physical activity practice is positively associated with the use of wearable fitness trackers.

To investigate whether the frequency of physical activity was positively associated with the use of wearable fitness trackers, an analysis was conducted between device usage and sports frequency. Considering the independent variable “Sports Frequency” is ordinal, it was not necessary to assess the normality of the non-users group to choose between parametric or non-parametric tests. Instead, the non-parametric test of Mann-Whitney U was chosen as the appropriate analysis between the two independent samples.

After proceeding with the test, the output suggested a higher mean rank among users (76.87) compared to the non-users (68.66) counterparts. However, the p-value obtained was not statistically significant, suggesting that device usage does not differ based on sports frequency ($U = 1391.50, p = .354 > .05$). Therefore, Hypothesis 1.5 is not supported, since there is no statistical evidence confirming a positive relation between the frequency of physical activity and the use of wearable fitness trackers.

Table 15: Mann-Whitney Test Ranks

	Fitness Tracker User	N	Mean Rank	Sum of Ranks
Sports Frequency	Yes	125	76,87	9608,50
	No	25	68,66	1716,50

Table 16: Mann-Whitney Test Statistics

	Sports_Frequency
Mann-Whitney U	1391,500
Wilcoxon W	1716,500
Z	-0,926
Asymp. Sig. (2-tailed)	0,354

* Grouping Variable: Fitness Tracker User

4.4.2. Product Characteristics

When considering product characteristics, hypotheses 2.1 through 2.4, aimed to investigate whether the aspects of comfort, data quality, aesthetics, and gamification elements were associated with the frequent use of wearable fitness trackers. Therefore, as all these variables were measured on ordinal scales, the Spearman’s correlation test was conducted.

Table 17: Spearman's Correlation Coefficients (Product Characteristics)

		Comfort	Aesthetics	Data Quality	Goals	Feedback	Rewards	
Spearman's rho	Usage	Coefficient	.255**	.093	.205*	.256**	.123	-.029
	Frequency	Sig. (2-tailed)	.004	.305	.022	.004	.171	.745
	Comfort	Coefficient		.191*	.227*	.204*	.234**	.077
		Sig. (2-tailed)		.033	.011	.022	.009	.392
	Aesthetics	Coefficient			-.001	.178*	.142	.049
		Sig. (2-tailed)			.992	.047	.113	.587
	Data Quality	Coefficient				.124	.143	-.019
		Sig. (2-tailed)				.168	.111	.830
	Goals	Coefficient					.252**	.163
		Sig. (2-tailed)					.005	.069
	Feedback	Coefficient						.334**
		Sig. (2-tailed)						<.001

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

* Correlation is significant at the 0.05 level (2-tailed).

Hypothesis 2.1: Devices that are comfortable to wear are used more often by consumers.

The results above indicated a positive correlation between comfort and usage frequency, with a statistically significant p-value confirming that comfort promotes the usage of wearable fitness trackers, $r_s(123) = .255, p = .004 < .05$. Therefore, despite the moderately weak correlation, Hypothesis 2.1 can be supported, as the results suggest that individuals who perceive higher comfort levels with their wearable fitness trackers tend to use them more often.

Hypothesis 2.2: Devices that provide accurate and reliable data are used more often by consumers.

The results from Table 17 indicated a positive correlation between the two variables, with a significant p-value confirming that reliable and accurate data promote the usage of wearable fitness trackers, $r_s(123) = .205, p = .022 < .05$. Again, a slightly weak correlation was obtained, however, it supported Hypothesis 2.2, as the results suggest that individuals who perceive their device data as accurate and reliable tend to use them more often.

Hypothesis 2.3: Devices that are aesthetically pleasing in terms of design, colour, and material, are used more often by consumers.

Contrary to what was observed above, a positive correlation coefficient was obtained, but the p-value was not statistically significant, suggesting no correlation between device aesthetics and usage frequency, $r_s(123) = .093, p = .305 > .05$. Therefore, Hypothesis 2.3 was not

supported, as there was not statistically significant evidence to suggest that aesthetically pleasing wearable fitness trackers tend to be used more often by consumers.

Hypothesis 2.4: Devices that include gamification elements such as goals, feedback, and rewards are used more often by consumers.

The three gamification elements of goals, feedback and rewards were analysed individually. Looking at the results, only the presence of goal-setting elements showed a statistically significant positive correlation with usage frequency, $r_s(123) = .256, p = .004 < .05$. Contrastingly, the results for activity feedback and rewards were non-significant, as indicated by their correlation coefficients and p-values. Feedback obtained a result of $r_s(123) = .123, p = .171 > .05$, and rewards obtained, $r_s(123) = -.029, p = .745 > .05$. Therefore, while the presence of goal-setting elements is associated with increased device usage frequency, there is no statistically significant evidence to support that activity feedback and rewards have an impact on usage frequency. Thus, Hypothesis 2.4 is only supported for goal-setting features, as it was revealed to be associated with a more frequent use of wearable fitness trackers.

4.4.3. User Perceptions

When considering user perceptions, hypotheses 3.1 through 3.4, aimed to investigate if these factors were associated with the continuance intention of using wearable fitness trackers. To proceed with the analysis, the newly created variables assessing perceived usefulness, perceived ease of use, perceived enjoyment, and perceived privacy were utilized. Due to the scale and ordinal nature of the variables, another Spearman correlation matrix was plotted.

Table 18: Spearman's Correlation Coefficients (User Perceptions)

		Perceived Ease of Use	Perceived Usefulness	Perceived Enjoyment	Perceived Privacy	Satisfaction Level	
Spearman's rho	Continuance Intention	Coefficient	.397**	.379**	.410**	.190*	.574**
		Sig. (2-tailed)	<.001	<.001	<.001	.034	<.001
	Perceived Ease of Use	Coefficient		.306**	.500**	.170	.316**
		Sig. (2-tailed)		<.001	<.001	.057	<.001
	Perceived Usefulness	Coefficient			.486**	.339**	.358**
		Sig. (2-tailed)			<.001	<.001	<.001
	Perceived Enjoyment	Coefficient				.165	.453**
		Sig. (2-tailed)				.066	<.001
Perceived Privacy	Coefficient					.234**	
	Sig. (2-tailed)					.009	

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

* Correlation is significant at the 0.05 level (2-tailed).

Hypothesis 3.1: Perceived Usefulness is positively related to users' intention to continue using wearable fitness trackers.

After proceeding with the non-parametric test, the results revealed a significant positive correlation between the two variables, $r_s(123) = .379, p < .001$. Therefore, it can be concluded that individuals who perceive wearable fitness trackers as useful tend to express higher intentions to continue using their devices, which supports Hypothesis 3.1.

Hypothesis 3.2: Perceived Ease of Use is positively related to users' intention to continue using wearable fitness trackers.

Following the same process, a positive correlation coefficient was obtained between perceived ease of use and users' intention to continue using their devices, with a statistically significant p-value, $r_s(123) = .397, p < .001$. Hence, Hypothesis 3.2 was supported, as it was verified that devices perceived as easy to use tend to be associated with higher continuance intentions.

Hypothesis 3.3: Perceived Enjoyment is positively related to users' intention to continue using wearable fitness trackers.

Similar to what was obtained above, the results indicated a significant positive correlation between perceived enjoyment and continuance intention, $r_s(123) = .410, p < .001$. Thus, Hypothesis 3.3 was supported, as the analysis verified that individuals who expressed higher levels of perceived enjoyment were positively correlated with stronger intentions to continue using the devices.

Hypothesis 3.4: Perceived Privacy is positively related to users' intention to continue using wearable fitness trackers.

The results between perceived privacy and continuance intention also revealed a significant positive correlation, $r_s (123) = .190, p = .034 < .05$. Therefore, despite the weak correlation, Hypothesis 3.4 was supported, as it was possible to verify that higher levels of perceived privacy were correlated with stronger intentions to continue using the wearable fitness tracker.

4.5. Further Analysis

Beyond the hypothesized assumptions, which were the central point of this research, further analysis was conducted while trying to obtain additional insights regarding the usage of wearable fitness trackers in Portugal. Considering the importance of data within fitness-tracking technologies, this study also investigated its relationship, as well as other features, with perceived usefulness. Based on the results from Spearman's test (Table 19), it was possible to observe significant positive correlations between perceived usefulness and data quality, goals and feedback. Amongst these coefficients, especially the association between data quality and perceived usefulness should be noted, $r_s (123) = .191, p = .033 < .05$, as it aligns with what has previously been highlighted by Preusse et al. (2014). Therefore, despite the fairly weak correlations, it was concluded that higher levels of perceived usefulness were associated with accurate and reliable data, as well as goal-setting and activity feedback features.

Table 19: Spearman's Correlation Coefficients (Perceived Usefulness*Characteristics)

		Data Quality	Goals	Feedback	Rewards	
Spearman's rho	Perceived Usefulness	Coefficient	.191*	.250**	.251**	.143
		Sig. (2-tailed)	.033	.005	.005	.111
	Data Quality	Coefficient		.124	.143	-.019
		Sig. (2-tailed)		.168	.111	.830
	Goals	Coefficient			.252**	.163
		Sig. (2-tailed)			.005	.069
	Feedback	Coefficient				.334**
		Sig. (2-tailed)				<.001

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

* Correlation is significant at the 0.05 level (2-tailed).

Also, the relationship between device aesthetics and perceived enjoyment was analysed to verify what had previously been highlighted by Yang et al. (2016). The results of the Spearman

correlation indicated almost no association between the two variables, with a non-significant p-value, $r_s (123) = .045, p = .618 > .05$. Thus, contrary to what had been suggested in the literature, our research could not confirm a significant relationship between perceived enjoyment and the aesthetic appeal of wearable fitness trackers.

*Table 200: Spearman's Correlation Coefficients (Perceived Enjoyment*Aesthetics)*

		Perceived Enjoyment	Aesthetics
Spearman's rho	Perceived Enjoyment	Coefficient	.045
		Sig. (2-tailed)	.618
		N	125
	Aesthetics	Coefficient	
		Sig. (2-tailed)	
		N	

Moreover, this study also investigated the relationship between user perceptions and overall satisfaction level, while aiming to understand which benefits or risks had the most significant impact. Looking at Table 18, the results revealed the strongest association between satisfaction level and continuance intention, $r_s (123) = .574, p < .001$. As expected, the higher the level of overall satisfaction, the higher the user's intention to continue using their device. Additionally, when analysing the associations between satisfaction level and the remaining user perceptions, all coefficients returned significant positive values, suggesting weak to moderate correlations. However, the relationships between perceived enjoyment and perceived privacy with user satisfaction should be noted as they support what had previously been observed by other authors.

On the one hand, perceived enjoyment is positively associated the overall satisfaction, supporting what had been noted by Nascimento et al. (2018), $r_s (123) = .453, p > .001$. On the other hand, perceived privacy is also positively associated with satisfaction, $r_s (123) = .234, p = .009 < .05$, which aligns with the findings by Becker et al. (2017). Overall, the results allow us to conclude that higher levels of perceived privacy, usefulness, ease of use and enjoyment, are all associated with higher satisfaction levels, which ultimately is correlated with continuance intention.

4.6. Hypothesis Testing Overview

Table 221: Hypothesis Testing Overview

<i>Hypotheses</i>	<i>Description</i>	<i>Results</i>
H1.1	Men and women are equally likely to use wearable fitness trackers.	Supported
H1.2	Young (16 to 29 years old) and middle-aged populations (30 to 49 years old) are more likely to use wearable fitness trackers than older populations (50 or more years old).	Not Supported
H1.3	Personal innovativeness is positively associated with the use of wearable fitness trackers.	Not Supported
H1.4	Technology self-efficacy is positively associated with the use of wearable fitness trackers	Not Supported
H1.5	The frequency of physical activity practice is positively associated with the use of wearable fitness trackers.	Not Supported
H2.1	Devices that are comfortable to wear are used more often by consumers.	Supported
H2.2	Devices that provide accurate and reliable data are used more often by consumers.	Supported
H2.3	Devices that are aesthetically pleasing in terms of design, colour and material are used more often by consumers.	Not Supported
H2.4	Devices that include gamification elements such as goals, feedback and rewards are used more often by consumers.	Supported
H3.1	Perceived Usefulness is positively related to users' intention to continue using wearable fitness trackers.	Supported
H3.2	Perceived Ease of Use is positively related to users' intention to continue using wearable fitness trackers.	Supported
H3.3	Perceived Enjoyment is positively related to users' intention to continue using wearable fitness trackers	Supported
H3.4	Perceived Privacy is positively related to users' intention to continue using wearable fitness trackers.	Supported

CHAPTER 5 - GENERAL DISCUSSION

This chapter aims to answer the research questions of this study by highlighting the main findings and comparing them with the previously reviewed literature. Additionally, both managerial and academic implications are identified, while also acknowledging the limitations of the study and providing guidance for further research.

5.1. Main Findings

Research Question 1: What is the demographic and psychographic profile of wearable fitness tracker users in Portugal?

The analysis of the demographic profile of wearable fitness tracker users in Portugal focused primarily on two aspects: gender and age. Starting with gender, our findings align with previous research by Canhoto and Arp (2016), who reported a negligible gender effect on the usage of wearable fitness trackers. Through the analysis, it was not possible to confirm a significant association between gender and device usage (**H1.1**, $p = .301 > .05$), suggesting that in the Portuguese context, men and women are equally likely to use wearable fitness trackers. However, regarding age, the results obtained in this study diverged from previous literature. Despite the observations by Wiesner et al. (2018) and Rupp et al. (2018) indicating that older populations were more resistant to adopting these technologies, this study did not confirm age as a significant factor influencing the use of wearable fitness trackers in the Portuguese market (**H1.2**, $p = .357 > .05$). Curiously, the results showed a higher percentage of use amongst the older generations. However, it is important to note that this age group represented only 6% of the entire sample, which may have influenced the results.

Furthermore, the analysis of psychographic factors focused on characteristics and behaviours that have previously been predictive of fitness tracker usage. In this case, contrary to what was outlined in the literature, the obtained results did not support the hypothesized positive associations between personal innovativeness, technology self-efficacy, and the use of wearable fitness trackers (**H1.3**, $p = .114 > .05$; **H1.4**, $p = .577 > .05$). While users registered higher mean values for personal innovativeness compared to non-users, this difference was not statistically significant. Similarly, mean values for technology self-efficacy were almost identical between both groups, with non-significant results suggesting no difference in device usage based on self-efficacy levels. However, as highlighted by Rupp et al. (2018), device usability is influenced by age, with older populations generally scoring lower on self-efficacy

due to their difficulty in using technology. Therefore, the results of the self-efficacy analysis may have also been impacted by the age distribution of our sample. Nonetheless, these findings bring attention to other personal characteristics beyond self-efficacy and innovativeness, which may also have a fundamental role in determining the use of wearable fitness trackers in Portugal.

Additionally, despite the hypothesized positive association between the frequency of physical activity and wearable fitness tracker usage, our analysis could not sustain this assumption. Although it was verified that users engaged in physical activity more often, the difference between the two groups was not statistically significant, indicating that sports frequency is not a determining factor for device usage (*H1.5*, $p = .354 > .05$). This conclusion challenges the idea that fitness trackers are especially used by individuals with active lifestyles, highlighting the importance of further research on other motivations that have been previously studied in different markets, such as personal goals (Harrison et al., 2015). Also, as devices are increasingly switching from mono-functional to multi-functional, factors outside the health and fitness domain may be gaining more importance.

Research Question 2: What are the product characteristics that motivate individuals to use wearable fitness trackers more often?

The analysis of product characteristics focused on four main aspects identified in previous literature to have a positive effect on the adoption and frequent use of wearable fitness trackers. The aspects of comfort, data quality, aesthetics, and gamification elements were tested within the Portuguese context to understand their impact on consumer behaviour concerning usage frequency. Starting with comfort, the findings from this research aligned with what was previously highlighted by Kalantari (2019) and Jin et al. (2022), indicating that comfortable devices are more likely to be adopted and used regularly (*H2.1*, $p = .004 < .05$). This supports the idea that device quality plays a key role in usage frequency, especially when it comes to comfort, where 89.6% of the users revealed to use their devices multiple times a week. With such frequent use, either during the day, exercise or sleep, manufacturing companies must ensure comfort to promote the ongoing use of such devices.

Secondly, when analysing the impact of data quality on the use of wearable fitness trackers, our results reaffirmed the pivotal role of this characteristic highlighted by Jin et al. (2022). Through the analysis, it was possible to confirm a positive significant correlation between accurate and reliable data and the frequency of wearable fitness tracker usage (*H2.2*, $p = .022 < .05$).

Additionally, the relationship between data quality and perceived usefulness was also explored while trying to verify the results obtained by Preusse et al. (2014). A positive significant correlation was verified, supporting the analysis that was previously referenced. These findings reinforce the idea that users seek a precise representation of their health and fitness level and raise awareness of how this feature is critical to promoting the consistent use of wearable fitness trackers.

Despite the reassurance provided regarding comfort and data quality, this study was not able to support previous claims regarding device aesthetics. Our analysis did not establish a significant correlation between device aesthetics and usage frequency (*H2.3*, $p = .305 > .05$), and contrary to what was concluded by Yang et al. (2016), it was also not possible to prove a significant correlation between the aesthetic appeal of fitness trackers and perceived enjoyment. Therefore, our findings suggest that while product design, colour, and material may contribute to an initial consumer attraction, they may not necessarily translate into regular and sustained usage behaviour within the Portuguese context.

Moreover, three gamification elements were assessed within our study. The results suggest that goal-setting features were considered the most important gamification elements within our sample, followed by activity feedback and rewards (Appendix 3). However, when analysing the association of these features with usage frequency, only goal-setting elements showed a significant positive correlation (*H2.4.1*, $p = .004 < .05$). Contrarily, activity feedback and rewards were not found to be significant drivers of usage frequency (*H2.4.2*, $p = .171 > .05$; *H2.4.3*, $p = .745 > .05$). Thus, following what was suggested by Vooris et al. (2019), gamification elements, and more precisely goal-setting features, act as motivating factors in the daily use of wearable fitness trackers within the Portuguese context.

Research Question 3: What are the main factors driving individuals to continuously use wearable fitness trackers in Portugal?

This study investigated user perceptions associated with wearable fitness trackers, aiming to understand their influence on users' intentions to continuously use these devices. Starting with the two determinants of the Technology Acceptance Model (F. D. Davis, 1989), both perceived usefulness and perceived ease of use were shown to have significant positive correlations with the sustained usage of fitness trackers (*H3.1*, $p < .001$; *H3.2*, $p < .001$). Our findings suggest that useful and easy-to-use devices are not only associated with stronger intentions of adoption (Kalantari, 2019) but also stronger intentions of continuous usage. Accordingly, this study

reinforces the importance of effortless technology that seamlessly integrates into users' lives and helps them obtain an accurate, actionable, and understandable definition of their health and fitness (Rupp et al., 2018).

Moreover, the analysis of perceived enjoyment and the hedonic motivation associated with wearable fitness trackers emerged as another key factor motivating the continuous usage of these devices within the Portuguese context. Our findings support what had been previously highlighted by Jin et al. (2022), where the pleasure associated with using the device influences an individual's intention to continue using it (**H3.3**, $p < .001$). Also, our analysis verified that perceived enjoyment had the strongest correlation with the intention of continuous usage among the studied factors. These results also align with the observations from Jin et al. (2022), suggesting that intrinsic motivation can have a stronger effect on consumer behaviour than extrinsic one. Thus, while product utility and ease of use are key drivers within the manufacturer's control, user enjoyment and interest in health/fitness monitoring emerge as influential factors beyond the company's control.

Lastly, this study strengthens the importance of privacy protection in influencing users' intentions to continue using wearable fitness trackers. As highlighted in previous literature, privacy concerns represent a notable barrier to technology adoption, particularly in the context of wearable fitness trackers, which collect sensitive health data (Jin et al., 2022). This analysis explored what was previously highlighted by Becker et al. (2017), and confirmed the assumption that higher levels of perceived privacy protection were positively correlated with stronger user satisfaction and intentions to continue using these devices (**H3.4**, $p = .034 < .05$). Therefore, our findings reinforce the importance of transparent privacy policies in building trust and enhancing user satisfaction while confirming that it positively influences users' intentions to continue using wearable fitness trackers within the Portuguese context.

5.2. Managerial Implications

From a managerial perspective, this research contributes at three different levels. Firstly, concerning the user profile, our findings suggest that demographics such as age and gender may not significantly influence the adoption of wearable fitness trackers. Additionally, while psychographic factors of personal innovativeness and self-efficacy may play a significant role in shaping user perceptions and behaviours, they may not be determinants of adoption. Also, our findings challenge the idea that fitness trackers are predominantly used by individuals with active lifestyles and bring awareness to the increased multifunctionality of devices, where

aspects beyond the fitness and health domain may be gaining more importance. However, further research is needed to ensure that managers and marketers leverage adequate psychographic insights and tailor product features and communication strategies according to user profiles.

Secondly, in terms of device characteristics, this study emphasizes the importance of comfort, data quality, and gamification elements, in driving the systematic and continuous use of wearable fitness trackers. For companies aiming to thrive in the Portuguese context, it is essential to prioritize comfortable devices and to invest in technology that ensures an accurate and reliable collection of data. Additionally, developing gamification elements, particularly those engaging with user goals and the motivational ability of the device, will promote regular and long-term use of wearable fitness trackers. Thus, product managers could utilize this information to align their product offerings with customers' needs, while marketers may use it to tailor product positioning and elaborate marketing strategies that are specifically targeted at fulfilling users' goals.

Finally, this research emphasizes the impact of perceived usefulness, perceived ease of use, perceived enjoyment, and perceived privacy on the continuous use of wearable fitness trackers. As these perceptions are mostly associated with product characteristics and consumers' experience with them, companies looking to promote continuous use of wearable fitness trackers should prioritize easy and intuitive interfaces that deliver accurate, actionable, and understandable health and fitness insights. Additionally, it is crucial for manufacturers to transparently communicate their privacy policies, as users do not want their data to be used for purposes other than the agreed ones. This plays an important role in building a positive privacy perception which has been shown to be associated with increased user satisfaction and retention.

5.3. Academic Implications

From a theoretical standpoint, this research extends the current literature on the adoption and continuous use of wearable fitness trackers. The findings regarding the demographic and psychographic profile of users challenge assumptions made in previous studies and contribute to an understanding of the adoption behaviour within the Portuguese context. While the studied factors have shown not to predict device usage, this study draws attention to other psychographic characteristics previously highlighted in the literature, such as personal involvement or individual status. As a result, it paves the way for further investigations into

user characteristics such as motivations or preferences that may influence fitness tracker adoption.

Furthermore, the examination of product characteristics and consumer perceptions provided valuable insights into factors motivating user engagement and retention. Hence, this research contributes to the body of knowledge by exploring an existing gap in the literature, which often relies on theoretical frameworks focused on technology acceptance and adoption rather than sustained usage. Consequently, this study underscores the importance of utilizing customer-centric strategies and transparent privacy policies to promote the continuous use of wearable fitness trackers.

5.4. Limitations and Future Research

Despite the various contributions this study has made, it is crucial to recognize its limitations and points of improvement for future research. Firstly, the reliance on a quantitative approach may have limited the characterization of the user profile. While this methodology facilitated data collection and hypothesis testing, it limited the analysis in the understanding of underlying motivations and drivers within the Portuguese market. Thus, future research should utilize qualitative methods to further explore the psychographic characteristics associated with device adoption.

Secondly, the obtained results may not be representative of the entire population since they were collected through a convenience sampling technique. This approach led to a random distribution of demographics, where most of the respondents were young fitness tracker users. This limitation may have impacted the analyses of demographics and the comparisons between users and non-users. Also, there was an unequal distribution of the sample among the different device types, which impacted the individual analysis for smartwatches, smart bands, and heart rate monitors. Therefore, to ensure more reliable insights, future research should consider a larger sample size with an even distribution of demographics, device usage and device type, which could potentially provide a more comprehensive representation of the user profile in the Portuguese market.

Lastly, the cross-sectional nature of this study represents a limitation in the establishment of causal relationships between variables. While correlations were tested between the hypothesized factors and user behaviours, significant coefficients may not imply causality. Therefore, to overcome this limitation, future research in the Portuguese context should adopt

either experimental or longitudinal approaches, where the data collection process is more controlled or done through multiple points in time. Nonetheless, this research provides insights that pave the way for further analysis of the factors that motivate the adoption and continuous use of wearable fitness trackers in Portugal.

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Appendices

Appendix 1 – Online Survey

Block 1 – Introduction

Dear participant, this research study is being conducted as part of my dissertation at Católica Lisbon School of Business & Economics. The objective is to characterize the users of wearable fitness trackers in Portugal and identify the factors that motivate their adoption and continued usage of these devices.

Your participation in this survey is voluntary, and it will take approximately 5 minutes. All responses will be kept in the strictest confidence and the results will be treated anonymously. Therefore, please answer the questions honestly and without interruption.

Should you have any questions or comments regarding the research study, please contact me at: s-bmaymone@ucp.pt

I appreciate your time and cooperation!

Block 2 – Screening Questions

Q1 Do you currently live in Portugal?

- Yes (1)
- No (2)

Q2 Do you use a fitness tracking device? (e.g. smartwatch, smart band, heart rate monitor)

- Yes (1)
- No (2)

Block 3 – Fitness & Technology

Let's begin by understanding your interest in fitness and technology.

Q3 How often do you practice sports throughout the week?

- Never (1)
- Once a week (2)

- 2-3 times a week (3)
- 4-6 times a week (4)
- Daily (5)

Q4 Which sports do you regularly practice? (select all that apply)

- Strength Training (1)
- Running (2)
- Cycling (3)
- Swimming (4)
- Football (5)
- Basketball (6)
- Tennis (7)
- Padel (8)
- Golf (9)
- Surf (10)
- Martial Arts (11)
- Other (12) _____

Q5 Please indicate how much you identify with the following statements.

Likert Scale (*Strongly disagree; Somewhat disagree; Neither agree nor disagree; Somewhat agree; Strongly agree*)

- I keep up with the latest technology trends. (1)
- I find joy in using and playing around with new technology. (2)
- I feel comfortable using technology on my own. (3)
- I quickly learn how to use new technology devices and features. (4)

Block 4 – Device Usage

For the following sections, it's crucial to clarify the differences between smartwatches, smart bands, and heart rate monitors:

- Smartwatches are multifunctional devices offering a wide range of features beyond health and fitness tracking. These devices allow users to receive notifications, answer calls, listen to music, and use various apps.
- Smart bands are simpler devices dedicated to health and fitness functionalities. While providing fewer features than smartwatches, they offer valuable data on physical activity and health metrics, often accessible through mobile apps.
- Heart rate monitors are specialized devices focused on measuring and monitoring heart rate, offering greater precision compared to other wearables. They are typically worn as chest or wristbands, lack a display and require integration with a mobile app.

Q6 What type of fitness tracking device do you own?

- Smartwatch (1)
- Smartband (2)
- Heart Rate Monitor (3)

Q7 What is the manufacturing company of your fitness tracking device?

- Apple (1)
- Samsung (2)
- Fitbit (3)
- Garmin (4)
- Polar (5)
- Amazfit (6)
- Xiaomi (7)
- Other (8)

Q8 How long have you been using a fitness tracking device?

- Less than 3 months (1)
- 3 to 6 months (2)
- 6 to 12 months (3)
- 1 to 2 years (4)
- More than 2 years (5)

Q9 How often do you use your fitness tracking device throughout the week?

- Never (1)
- Once a week (2)
- 2-3 times a week (3)
- 4-6 times a week (4)
- Daily (5)

Q10 When do you generally use your fitness tracking device? (select all that apply)

- While sleeping (1)
- While practising sports (2)
- While performing daily tasks (working, studying, etc...) (3)

Block 5 – User Perceptions

Let's review your experience with your fitness tracking device.

Q11 How satisfied are you with the overall experience of using your fitness tracking device?

- Extremely dissatisfied (1)
- Somewhat dissatisfied (2)
- Neither satisfied nor dissatisfied (3)
- Somewhat satisfied (4)
- Extremely satisfied (5)

Q12 How likely are you to continue using your fitness tracking device throughout the next six months?

- Extremely unlikely (1)
- Somewhat unlikely (2)
- Neither likely nor unlikely (3)
- Somewhat likely (4)
- Extremely likely (5)

Q13 Please indicate your level of satisfaction with the following device characteristics or features.

Likert Scale (Extremely dissatisfied; Somewhat dissatisfied; Neither satisfied nor dissatisfied; Somewhat satisfied; Extremely satisfied)

- Comfort (1)
- Durability (2)
- Aesthetics (e.g. colour, design and material) (3)
- Quality of data (e.g. data accuracy and reliability) (4)
- Goals and challenges (e.g. steps, calories and distance) (5)
- Activity feedback (e.g. insights, advice and coaching) (6)
- Rewards (e.g. virtual medals, badges and prizes) (7)

Q14 Please indicate how much you agree with the following statements.

Likert Scale (Strongly disagree; Somewhat disagree; Neither agree nor disagree; Somewhat agree; Strongly agree)

- I find it simple to navigate through the features and functions of my fitness tracker. (1)
- Using my fitness tracker is straightforward and intuitive. (2)
- I find it easy to learn how to use my fitness tracker. (3)
- My fitness tracker helps me achieve my health and fitness goals. (4)
- I believe my fitness tracker provides valuable insights into my physical activity. (5)
- The insights provided by my fitness tracker help me enhance my physical performance. (6)
- Using my fitness tracker adds a sense of fun and enjoyment to my physical activity. (7)
- I find the experience of using my fitness tracker to be satisfying. (8)
- I believe my privacy is protected when using my fitness tracker. (9)
- I trust the manufacturing company of my device to handle my personal data securely. (10)

Block 6 – Demographics

Q15 Please indicate your age.

- Under 16 (1)
- 16 - 29 years old (2)

- 30 - 39 years old (3)
- 40 - 49 years old (4)
- 50 - 59 years old (5)
- 60+ years old (6)

Q16 Please indicate your gender.

- Male (1)
- Female (2)
- Non-binary/third gender (3)
- Prefer not to say (4)

Q17 What is your current occupation?

- Student (1)
- Working Student (2)
- Full-time Employed (3)
- Part-time Employed (4)
- Unemployed (5)
- Retired (6)

Q18 What is your monthly gross income?

- No income (1)
- Less than 500€ (2)
- 500€ - 1000€ (3)
- 1001€ - 1500€ (4)
- 1501€ - 2000€ (5)
- 2001€ - 2500€ (6)
- More than 2500€ (7)
- Prefer not to say (8)

Appendix 2 – Sample Characteristics (Descriptive Statistics)

Demographics - Descriptive Statistics

<i>Variable</i>	<i>Answer</i>	<i>Frequency</i>	<i>Percent</i>
Age	16 - 29 years old	118	78,7%
	30 - 39 years old	15	10,0%
	40 - 49 years old	8	5,3%
	50 - 59 years old	8	5,3%
	60+ years old	1	0,7%
Gender	Male	64	42,7%
	Female	86	57,3%
Occupation	Student	56	37,3%
	Working Student	18	12,0%
	Full-time Employed	72	48,0%
	Part-time Employed	2	1,3%
	Unemployed	2	1,3%
Income	No income	44	29,3%
	Less than 500€	8	5,3%
	500€ - 1000€	21	14,0%
	1001€ - 1500€	45	30,0%
	1501€ - 2000€	13	8,7%
	2001€ - 2500€	5	3,3%
	More than 2500€	7	4,7%
	Prefer not to say	7	4,7%

Wearable Fitness Trackers - Descriptive Statistics

<i>Variable</i>	<i>Answer</i>	<i>Frequency</i>	<i>Percent</i>
User	Yes	125	83,3%
	No	25	16,7%
Device Type	Smartwatch	99	79,2%
	Smartband	24	19,2%
	Heart Rate Monitor	2	1,6%
Manufacturing Company	Apple	51	40,8%
	Samsung	11	8,8%
	Fitbit	4	3,2%
	Garmin	17	13,6%
	Polar	1	0,8%
	Amazfit	9	7,2%
	Xiaomi	18	14,4%
Usage Duration	Other	14	11,2%
	Less than 3 months	24	19,2%
	3 to 6 months	12	9,6%
	6 to 12 months	16	12,8%
	1 to 2 years	26	20,8%
Usage Frequency	More than 2 years	47	37,6%
	Once a week	13	10,4%
	2-3 times a week	23	18,4%
	4-6 times a week	25	20,0%
Usage Situation	Daily	64	51,2%
	During Sleep	43	34,4%
	During Sports Practice	109	87,2%
	During The Day	86	68,8%

Sports Practice - Descriptive Statistics

<i>Variable</i>	<i>Answer</i>	<i>Frequency</i>	<i>Percent</i>
Frequency	Never	2	1,3%
	Once a week	15	10,0%
	2-3 times a week	60	40,0%
	4-6 times a week	61	40,7%
	Daily	12	8,0%
Sport	Strength_Training	99	66,0%
	Running	102	68,0%
	Cycling	38	25,3%
	Swimming	13	8,7%
	Football	14	9,3%
	Basketball	2	1,3%
	Tennis	4	2,7%
	Padel	27	18,0%
	Golf	0	0,0%
	Surf	2	1,3%
	Martial_Arts	3	2,0%
	Other	11	7,3%

Appendix 3 – Device Characteristics (Descriptive Statistics)

Descriptive Statistics - Device Characteristics

	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>
Comfort	125	4,340	0,740	-1,116	1,348
Aesthetics	125	3,660	1,023	-0,522	0,063
Data_Quality	125	4,550	0,588	-0,929	-0,111
Goals	125	4,100	0,928	-1,116	1,166
Feedback	125	3,700	1,057	-0,488	-0,475
Rewards	125	2,600	1,143	0,178	-0,678

Appendix 4 – Reliability Analysis

Reliability Statistics - Personal Innovativeness

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
0,750	0,753	2

Item-Total Statistics - Personal Innovativeness

	<i>Scale Mean if Item Deleted</i>	<i>Scale Variance if Item Deleted</i>	<i>Corrected Item-Total Correlation</i>	<i>Squared Multiple Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Innovativeness_1	4,13	0,689	0,604	0,364	-
Innovativeness_2	3,65	0,847	0,604	0,364	-

Reliability Statistics - Technology Self-Efficacy

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
0,821	0,824	2

Item-Total Statistics - Technology Self-Efficacy

	<i>Scale Mean if Item Deleted</i>	<i>Scale Variance if Item Deleted</i>	<i>Corrected Item-Total Correlation</i>	<i>Squared Multiple Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Self_Efficacy_1	4,45	0,531	0,701	0,491	-
Self_Efficacy_2	4,42	0,661	0,701	0,491	-

Reliability Statistics - Perceived Ease of Use

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
0,828	0,828	3

Item-Total Statistics - Perceived Ease of Use

	<i>Scale Mean if Item Deleted</i>	<i>Scale Variance if Item Deleted</i>	<i>Corrected Item-Total Correlation</i>	<i>Squared Multiple Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Ease_Of_Use_1	8,87	1,596	0,696	0,504	0,753
Ease_Of_Use_2	8,87	1,79	0,63	0,401	0,815
Ease_Of_Use_3	8,86	1,57	0,734	0,545	0,712

Reliability Statistics - Perceived Usefulness

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
0,708	0,708	3

Item-Total Statistics - Perceived Usefulness

	<i>Scale Mean if Item Deleted</i>	<i>Scale Variance if Item Deleted</i>	<i>Corrected Item- Total Correlation</i>	<i>Squared Multiple Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Usefulness_1	8,61	1,273	0,52	0,298	0,627
Usefulness_2	8,48	1,526	0,459	0,225	0,694
Usefulness_3	8,58	1,262	0,605	0,368	0,515

Reliability Statistics - Perceived Enjoyment

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
0,740	0,742	2

Item-Total Statistics - Perceived Enjoyment

	<i>Scale Mean if Item Deleted</i>	<i>Scale Variance if Item Deleted</i>	<i>Corrected Item- Total Correlation</i>	<i>Squared Multiple Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Enjoyment_1	4,43	0,409	0,59	0,349	-
Enjoyment_2	4,28	0,494	0,59	0,349	-

Reliability Statistics - Perceived Privacy

<i>Cronbach's Alpha</i>	<i>Cronbach's Alpha Based on Standardized Items</i>	<i>N of Items</i>
0,821	0,821	2

Item-Total Statistics - Perceived Privacy

	<i>Scale Mean if Item Deleted</i>	<i>Scale Variance if Item Deleted</i>	<i>Corrected Item- Total Correlation</i>	<i>Squared Multiple Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Privacy_1	3,97	0,741	0,697	0,485	-
Privacy_2	3,74	0,74	0,697	0,485	-

Appendix 5 – User Perceptions (Descriptive Statistics)**Descriptive Statistics - User Perceptions**

	<i>N</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>
Satisfaction Level	125	4,340	0,934	-1,948	4,118
Continuance Intention	125	4,560	0,837	-2,208	4,661
Perceived Ease of Use	125	4,435	0,617	-2,002	6,621
Perceived Usefulness	125	4,277	0,543	-0,621	0,893
Perceived Enjoyment	125	4,356	0,598	-1,030	2,744
Perceived Privacy	125	3,856	0,793	-0,588	0,551