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## **Running involvement, loyalty to running, and subjective well-being: A cluster analysis**

### **Implicación y lealtad en carrera y bienestar subjetivo en corredores: Análisis de clusters**

### **Envolvimento com a corrida, lealdade à corrida e bem-estar subjetivo: Análise de clusters**

Silva, A.<sup>1</sup>, Sobreiro, P.<sup>1</sup>

<sup>1</sup> *Sport Science School of Rio Maior - Polytechnic Institute of Santarém, Portugal, Department of Sport Management; Life Quality Research Center (CIEQV), Santarém, Portugal*

#### **ABSTRACT**

One of the main policy objectives of many Sports and Health Government Departments is to increase sports participation to promote citizens health and well-being. The present study uses cluster analysis with the aim of identifying segments of runners based upon running involvement, loyalty to running and subjective well-being. A sample of 736 runners from one of Portugal's most popular athletics races completed a questionnaire. The number of clusters was determined using the BIC. Four significant clusters were identified. The main result showed that the cluster with the highest level of subjective well-being was not the group of runners with the highest level of loyalty to the race. The results show the need to design strategies focused on the clusters identified to promote sports participation through running, aiming to increase running involvement and subjective well-being.

**Keywords:** involvement, loyalty, running, sports participation, subjective well-being

#### **RESUMEN**

Uno de los principales objetivos de política de muchos departamentos gubernamentales de deporte y salud es aumentar la participación deportiva para promover la salud y el bienestar. El presente estudio utiliza el análisis de clusters con el objetivo de identificar segmentos de corredores basados en la implicación en la carrera, la lealtad a la carrera y el bienestar subjetivo. Una muestra de 736 corredores de Portugal completó un cuestionario. El número de clusters se determinó utilizando el BIC. Se identificaron cuatro clusters significativos. El principal resultado mostró que el clúster con el más alto nivel de bienestar subjetivo no era el grupo de corredores con el más alto nivel de lealtad a la carrera. Los resultados mostraron la necesidad de diseñar estrategias centradas en los clústeres identificados para promover la participación deportiva a través de la práctica de la carrera y aumentar el bienestar subjetivo.

**Palabras clave:** atletismo, bienestar subjetivo, implicación, lealtad, participación deportiva.

## RESUMO

Um dos principais objetivos da política de muitos governos é aumentar a participação desportiva para promover a saúde e o bem-estar. O objetivo do artigo é identificar segmentos de corredores, através da análise de clusters, com base no envolvimento com a corrida, lealdade à corrida e bem-estar subjetivo dos corredores. Uma amostra de 736 corredores de uma das corridas de atletismo mais populares de Portugal respondeu a um questionário. A identificação e o número de clusters foram obtidos usando o BIC. Foram identificados quatro clusters significativos. O resultado principal mostrou que o cluster com o mais elevado nível de bem-estar subjetivo não foi o grupo dos corredores com maior nível de lealdade à corrida. Os resultados permitem tirar uma grande conclusão: A necessidade de desenhar estratégias focadas nos clusters identificados para promover a participação desportiva com o objetivo de elevar o envolvimento com a corrida e o bem-estar subjetivo dos indivíduos.

**Palavras chave:** atletismo, bem-estar subjetivo, envolvimento, lealdade, prática desportiva

## INTRODUCCIÓN

Running as a recreational activity is, after football, perhaps the most popular and convenient physical activity. Surveys indicate that approximately 65 million Americans (Statista, 2017) and 50 million Europeans (Breedveld et al., 2015) run regularly. Each year, more and more organized races appear. The French participation rate in races is 19% (Statista, 2015) while the Spanish is 12% (Diaz, 2021). The Association of International Marathons and Distance Races (AIMS) has 468 member races in over 120 countries across the world. Every year, there are over 1,396 locations in the world where races can be run in various distances: marathon, half marathon, road race (10K, 5K) and ultramarathon (AIMS, 2019). The performance of traditional distance classes, such as the 5K, 10K and half marathon, remains very strong. The running industry saw a record number of 8.9 million registration in 2018, with the most popular distance still the 5K (Running USA, 2019). The most popular distance in Europe is the half marathon (Andersen, 2019).

The industry peaked in 2013, when 19 million runners crossed the finishing line in U.S. running events over all distances, suggesting that running remains a popular leisure-time activity (Running USA, 2019).

Currently in Europe, however, 60% of adults are not meeting the minimum physical activity guidelines, and almost half of Europeans (46%) say that they never exercise or play sport, 4% more than in 2013 (European Commission, 2018). In Spain, the situation is in line with the European average (46%), but in

Portugal, 68% of citizens are sedentary: they never exercise (European Commission, 2018).

The aim of contemporary governments is to focus on the physical, psychological, and social well-being of their populations, articulated into a set of policies and actions that aim to achieve to this end. One of the main policy objectives of many government Sports and Health Departments in Europe is to increase sports participation in order to promote citizens' health and well-being. Kahneman (1999) and Headey (1993) were the first, in the field of economics, to study subjective well-being by focusing on the measurement of an individual's "experienced" utility.

This is relevant for one principal reason: All institutions in Europe, at various levels, highlight the importance of policies to promote physical activity by citizens: a) The European Commission released the EU Physical Activity Guidelines, and the Recommended Policy Actions in Support of Health-Enhancing Physical Activity (European Commission, 2008); b) Sports have been playing a major role in European countries' economies, since 40% of European citizens (>172 million) practise physical activity and sports at least once a week (European Commission, 2018); c) In Portugal, the government has released the National Strategy for the Promotion of Physical Activity, Health and Well-being 2016-2025 (Direção Geral da Saúde, 2016).

Significantly, policy makers have come to recognize the importance of subjective well-being as a political goal. For example, in the United Kingdom, the

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government has asked the English National Statistics Institute to discuss and design appropriate measures for the subjective well-being of individuals (Pawlowski et al., 2011).

This initiative is based on the argument that a country's sporting success can act as a catalyst to promote sports participation, and indirectly, health and subjective well-being, through a trickle-down effect (Frawley & Cush, 2011; Pawlowski et al., 2011). For this reason, it is clear that, for public policy makers, it is necessary to be acquainted with the analyses of the citizen segments relating to the theoretical variables selected for our research: running involvement, loyalty to running and subjective well-being. Through this knowledge, it becomes possible to develop the public policies that stimulate and increase the proportion of citizens who regularly perform physical activity and sport.

However, the effectiveness of public sports policies does not seem to show satisfactory results in terms of physical activity rates. In spite of this, however, millions of citizens across Europe register and conduct regular running in thousands of athletic races. And if citizens are doing long-distance running, it's because they're emotionally involved in running and it gives them a sense of subjective well-being. So, if the policies and programmes to promote physical and sports activity have an influence on running involvement, then we will have citizens motivated to carry out regular physical activity. Getz and McConnell (2014) have shown that individuals with a fairly high level of involvement with their sport tend to participate in a broader portfolio of physical activities, and runners with stronger psychological connections increasingly engage in the frequency, depth and breadth of running-related behaviour (Beaton et al., 2011).

It is precisely the frequency and regularity of physical activity that it is necessary to promote and stimulate. Loyalty to running expresses the behavioural dimension, in which individuals have a commitment to physical activity that is reflected in a persistent attitude that guides behaviour (Funk & James, 2001) that is intended to encourage and promote. However, what are even more important to promote are the types of behaviour that lead to subjective well-being.

Research on citizens' quality of life is an overlapping, multidisciplinary and fundamental issue concerning current society (Rodrigues et al., 2020). Subjective well-being turns quality of life into a value that each citizen gives to their social and individual status, in a society in which people relate and interact in order to satisfy their ambitions, needs and expectations. The notion is based on the concept that global organizations can influence citizens' health determinants, as proposed by the World Health Organization (WHO, 2001).

As is well-established in the literature, physical activity has a great impact on improving health, quality of life, overall well-being, as well as on reducing healthcare costs. A recent meta-analysis showed that sustained engagement in exercise can reduce all-cause mortality by up to 33% (Hupin et al., 2015; Woodcock et al., 2011).

Various researchers have established links between physical activity and sports on an individual's subjective well-being (e.g., Downward & Rasciute 2011; Lechner, 2009; Rasciute & Downward 2010; Ruseski et al., 2014; Salama-Younes, 2018; Silva et al., 2020; Wiese et al., 2017). However, several gaps seem to exist in the literature such as the possible impact of unobserved variables (Dolan et al., 2008). Panza et al. (2019) highlighted the fact that the effect of physical activity intensity on subjective well-being has not been well established. There are contradictory results. For example, Kekäläinen et al. (2020) found that different types of physical activities were related to different dimensions of well-being. For example, walking has positive associations with psychological and social well-being and endurance training with subjective health. Rambling in the countryside is also positively related to subjective health but only among men; Salama-Younes (2018) proved that harmonious passion was a positive predictor of life satisfaction, whereas obsessive passion - extreme loyalty to running - was not a direct negative predictor of life satisfaction. Running activities have not been examined in great depth using subjective well-being frameworks (except: Downward & Rasciute 2011; Silva et al., 2020). Based on these gaps in the running activity literature, research innovation now offers a description of the runner segments based on running involvement, loyalty to running and its contribution to subjective well-being.

Self-determination theory is a highly appropriate conceptual framework with which to study sports persistence and dropout (Calvo et al., 2010). Thus, Self-determination theory (Ryan & Deci, 2000; 2017) and the Psychological Continuum Model (Funk & James, 2001) were used as theoretical references for this study. According to Self-determination theory, social contexts - athletics races and running - that satisfy the psychological needs for competence, autonomy and relatedness, nurture the development of more self-determined relationships, which, in turn, underpin task persistence and psychological well-being (Ryan & Deci, 2000; 2017). In accordance with the Psychological Continuum Model, the connection of sports consumers - runners - to a given sporting activity, reveals four levels of psychological connection and response to a sporting object (e.g., an athletics race), through phases or levels along a continuous vertical psychological scale which is built into allegiance, translated into the frequency with which an individual thinks and develops behaviour related to running (daily, weekly, etc.) (Funk & James, 2001).

Thus, in order to increase physical activity levels in our population sample, there are several research questions that need to be answered:

- 1) Do runners who have a higher level of running involvement belong to the group of runners with the highest level of subjective well-being?
- 2) Do most runners who have the highest levels of running involvement belong to the group that has the highest levels of loyalty to running?
- 3) Do runners who have high levels of running loyalty belong to the group of runners with the highest levels of subjective well-being?

Therefore, through segmentation principles, we expect clusters to emerge as follows: 1) a cluster characterised by runners with high levels of running involvement, high loyalty to running and high subjective well-being, and 2) other clusters where running involvement levels are moderate and low, with moderate or reduced loyalty to running and the lowest level of subjective well-being. In light of the aforementioned theoretical rationale of Self-determination theory and the Psychological Continuum Model, and empirical evidence, we hypothesised that runners with high levels of running

involvement are those who manifest greater loyalty to running and higher levels of subjective well-being.

The objective of this study was to identify and characterise runners segments based on running involvement, loyalty to running and subjective well-being through the use of cluster analysis. This study is of interest not only to race organizers, but also to any sporting organization that relies on runners for their financial performance.

Identifying the subsets of runners provides insights for the ultimate purpose of enabling policy makers to formulate public policies and targeted programmes for each runner segment with the aim of increasing running involvement, loyalty to running and subjective well-being and thus promote a regular and lasting behaviour of physical activity and sport.

### Market segmentation

Sports organizations that include managers of physical activity programmes for populations increasingly face a saturated market with huge competition to attract citizens. This competition has led to the offering of a wide range of physical activities to various groups of citizens, forgetting that among the mass of existing participants it is possible to find smaller subsets of individuals (Ross, 2007). Sports managers cannot afford to stop working to identify characteristics and subdivisions of individuals from among all participants in their sports activities and events.

Therefore, the practice of locating groups within the base of current runners is necessary for success, because a sports organization or a public programme to promote physical activity cannot gain a strong position in the market if these individuals are not properly identified and managed. This process of identifying well-defined groups of individuals is known as market segmentation.

Market segmentation is the process of dividing a large, heterogeneous market into more homogeneous groups of individuals, who have similar needs, motivations, or demographic profiles, to whom a product may be targeted (e.g., Mullin et al., 2000).

It provides a conceptual framework upon which a sports programme manager builds promotional strategies to achieve organizational objectives. The

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segmentation criteria are not limited to demographic and socioeconomic characteristics, values and lifestyle characteristics (psychographics), product usage patterns, or attitudes towards products or benefits sought (Ross, 2007). For the purposes of this research, loyalty to running is held to correspond to product usage patterns, and running involvement is believed to influence positively attitudes towards products.

### Cluster analysis

Cluster analysis through the segmentation process has become a common tool for marketing research in both academia and in the professional sector with the aim of creating homogeneous sets of consumers. The primary purpose of this research is to use cluster analysis to identify segments of runners based upon the level of connection with running. Using the variables of running involvement, loyalty to running and subjective well-being to describe and distinguish the market segments can result in greater effectiveness in managing marketing campaigns.

These campaigns should pursue the objective of raising the level of sports participation. The level of sports participation represents one of the key results of sports systems and policies, obtained by using the criteria of running involvement, loyalty to running and subjective well-being with a cluster analytic approach. In light of the theoretical rationale of Self-determination theory and the Psychological Continuum Model, as well as empirical evidence, we expect to create several clusters composed of runners with high levels of running involvement, loyalty to running and subjective well-being, and other clusters whose levels of running involvement, loyalty to running and subjective well-being are moderate or low.

### Running involvement

A number of studies have examined the motives of marathoners (Funk et al., 2011; Masters et al., 2003), but limited attention has been given to the concept of leisure involvement with running (Cantón, 2016; Ridinger et al., 2012). The concept of 'involvement' was first introduced in psychology as part of social-judgment theory (Sherif & Cantril, 1947; Sherif & Hovland, 1961). Since that time, the generic appeal of involvement in social psychology has resulted in a proliferation of involvement research (Beaton et al.,

2011). However, the notable exception to this proliferation is in the literature of sports management (Beaton et al., 2011).

Activity involvement is an expression of an individual's interest in a specific sports activity and has been defined as "an unobservable state of motivation, arousal or interest toward a recreation activity or associated product" (Havitz & Dimanche, 1997, p. 246).

Sports involvement is conceptualised as a multifaceted construct representing the degree to which participation in a sports activity becomes a central component of a person's life and provides both hedonic and symbolic value (Beaton et al., 2011), or a passion for sport (Méndez-Giménez et al., 2016).

Involvement is an important construct because of its potential influence on people's attitudes and behaviour relevant to a product or activity (Havitz & Dimanche, 1990). Interest in involvement gained strength in consumer behaviour and marketing literature in the area of developing marketing campaigns aimed at increasing intent to buy and purchasing behaviour (Bachleda et al., 2016).

The empirical analysis demonstrates the utility of the sports involvement construct in the context of a marathon event (Beaton et al., 2011). The runner's involvement has been understood as a motivation to process information about the context of the race, and the motivational state is governed by the perceived relevance that the race has for the runner.

Behavioural differences have been found, suggesting that runners with stronger psychological connections are increasingly involved in the frequency, depth and breadth of running-related behaviours (Beaton et al., 2011; López et al., 2017), such that Clevinger et al. (2020) confirmed that sports involvement was related significantly to improvements in physical activity self-efficacy and physical self-concept.

According to Self-determination theory (Ryan & Deci, 2000; 2017), a connection with the social context of an athletics race can satisfy psychological needs for competence, autonomy and relatedness, which in turn, sustain persistence in running practice. The Psychological Continuum Model (Funk & James, 2001) establishes that the second level, 'attraction' -

personal importance and meaning - can adequately express the concept of running involvement, as shown in Figure 1.

Therefore, considering the theoretical references of Self-determination theory and the Psychological Continuum Model, we hypothesise that a cluster can be created that contains the group of runners with the highest levels of running involvement.

### Loyalty to running

Since 1960, the definitions of loyalty have incorporated two dimensions: one of attitude and the other of behaviour (Russell-Bennett et al., 2007). Original and historical consumer loyalty, however, was viewed only in a behavioural and observable way.

The concept was expressed by a variety of types of behaviour, which may involve: the repetition of purchase of a particular product or service, the frequency of consumption, the proportion of purchases or the time dedicated to an activity, recommendation behaviour and the degree of relationship with a brand (Bodet & Bernache-Assollant, 2011). In other words, behavioural loyalty places the emphasis on observable behaviour recorded in the past.

Despite this vision oriented towards the observable component, there is agreement (Bodet & Bernache-Assollant, 2011, Mahony et al., 2000) that sports consumer loyalty is defined as a two-dimensional concept that brings together an attitudinal component and a behavioural component.

Referring to loyalty as the individual's commitment to a sporting activity that is reflected in a persistent attitude that guides behaviour, Funk and James (2001) put forward the Psychological Continuum Model which maintains that this commitment is represented by four levels of psychological connection with, and response by, participants to a sporting object (e.g., an athletics race), through stages or levels along a vertical psychological continuum, as shown in Figure 1.

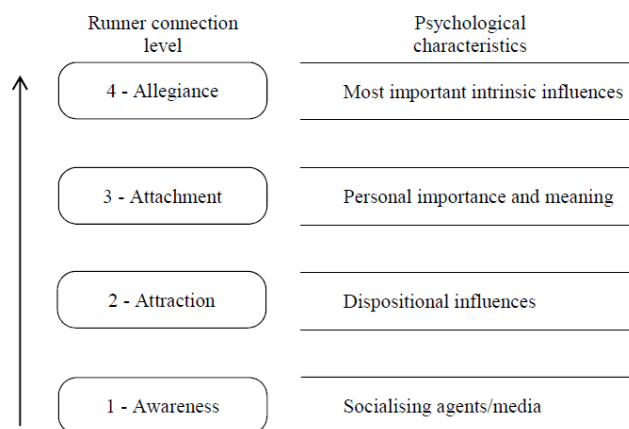


Figure 1. Psychological Continuum Model. Adapted from Funk and James (2001, p. 122)

Levels 2 (Attraction), 3 (Attachment) and 4 (Allegiance), which this study focuses on, culminate in a behaviour of fidelity to the practice of running. The idea of loyalty by participants refers to a process of psychological connection to the sporting object that results in positive, consistent and lasting attitudes, as well as the behaviour that is associated with it (Funk & James 2001).

Self-determination theory (Ryan & Deci, 2000; 2017) argues that behavioural persistence - in running - can be explained by a connection with a social context - running - which ensures the satisfaction of needs competence, autonomy and relatedness, which in turn support persistence. The Psychological Continuum Model (Funk & James, 2001), argues that the fourth level of connection is allegiance, in which individuals express a devotion to some sport - running - translated into a behaviour of loyalty.

Thus, according to Self-determination theory and the Psychological Continuum Model we hypothesise that a cluster may be created that contains the group of runners with the highest levels of loyalty to running.

### Subjective well-being

Quality of life and well-being have been analyzed from different points of view over time. During recent years, several studies have used the most diverse terms such as happiness and life satisfaction when aiming to study the way people evaluate their own lives (Diener & Diener, 1996; Rodríguez-Bravo et al., 2020).

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Definitions of subjective well-being can be grouped into three domains (Diener, 1984). Throughout this study, the adopted definition was the one formulated by social research, according to which subjective well-being depends on how and why individuals positively evaluate their lives, i.e., individual's life satisfaction. This dimension has been attracting sociologists' attention and stands out as the main indicator of well-being (Giacomoni, 2004). In this study "satisfaction with life" and "subjective well-being" are used synonymously.

According to Diener and colleagues (1999), subjective well-being is "a broad category of phenomena that includes people's emotional responses, domain satisfactions, and global judgments of life satisfaction", which expresses an individual's current assessment of their own happiness (Schwartz & Strack, 1999).

It is worth mentioning three characteristics of subjective well-being (Diener, 1984): 1) well-being is subjective, depending on the individual's perception and personal experience; 2) well-being implies not only the absence of negative factors, but also the presence of positive factors; 3) well-being must be seen as an overall measure rather than a measure of a single aspect of life. We include self-rated well-being and symptoms as indicators of subjective well-being.

We agree with the idea of Testoni et al. (2018) that, in spite of all the facts of well-being, only subjective well-being can encapsulate whether running (or anything else) really matters to people. Indeed, subjective well-being is not observed directly; it can only be measured by asking people to report on how well they feel. The very way we live our lives and what we value in it are subjective, and what makes life good or bad is precisely the subjective character of our experiences.

Leisure and physical activity experiences are a crucial part of a balanced lifestyle and are often described as essential to well-being. (e.g., Wiese et al., 2017). Leisure activities, such as running, are held to promote subjective well-being through a variety of psychological and physical mechanisms. For example, Newman et al. (2014) argue that leisure activities improve subjective well-being by allowing individuals to turn off and relax from the stresses of everyday life

as well as by engaging in activities – running - that fulfil several psychological needs.

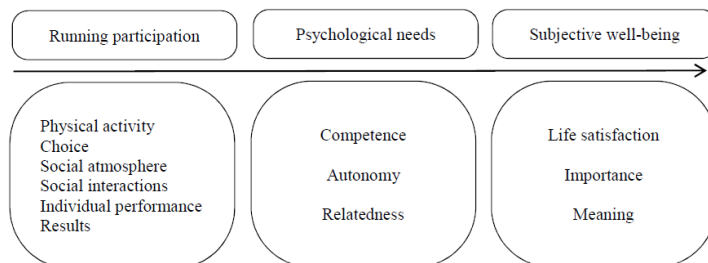


Figure 2. Model of how running enhances subjective well-being via satisfaction of psychological needs

It has been verified that the derived approaches of Self-determination theory (Ryan & Deci, 2000; 2017) promote sustained long-term behavioural changes in diverse areas such as increased physical activity (Flannery, 2017). Central to Self-determination theory is the concept of intrinsic motivation, which is based on the satisfactions of behaving "for its own sake" (Self-Determination Theory, 2017).

Self-determination theory is a highly appropriate conceptual framework from which to study sports persistence and dropout (Calvo et al., 2010), so it was used as the theoretical framework for this study. This theory examines whether sustained participatory involvement, defined as continued participation in a sport throughout the following year, was influenced by individuals' self-determined motivation or by the fulfilment of the three basic psychological needs of autonomy, competence, and relatedness. When the social context facilitates these three basic needs, a person is more likely to engage in intrinsically motivated types of behaviour. If the situational context promotes these three needs, then a person's natural behaviour is more likely to be self-motivated.

Our approach considers subjective well-being perspectives that focus on how people feel (over the short and long term) as a result of their actions and situations (e.g., Kahneman et al., 1999).

Figure 2 below considers running traditionally seen as a widely accessible alternative to physical activity and sport and shows how running (running involvement and loyalty to running) can support subjective well-being.

Self-determination theory (Ryan & Deci, 2000; 2017) holds that psychological well-being can be nourished by social contexts - athletics races - in which individuals satisfy the psychological needs for competence, autonomy, and relatedness.

An important proportion of the literature has focused on identifying the sociodemographic and economic determinants of individuals' subjective well-being (Dolan et al., 2008; Gallagher et al., 2015; Kahneman et al., 1999; Scorsolini-Comin & Santos, 2010) such as income, work situation, academic degree, gender and race.

However, in the sports field, few studies have attempted to examine whether physical and sporting activity impacts individuals' overall well-being. Pawlowski et al. (2011) argue that practising physical activity and sports is a personal and rational decision that maximizes an individual's rational utility, and must therefore, be logically associated with increased subjective well-being.

Some results show convergence of positive and significant effects of sports practice on subjective well-being (Chirivella, 2001; Kim & James, 2019; Ruseski et al., 2014; Wiese et al., 2017) and stress perception (Da Silva et al., 2020); Lechner (2009) observed significant effects of sports participation on men's subjective well-being but not on women's; Rasciute and Downward (2010) concluded that walking and recreational cycling had a positive effect on individuals' happiness; Downward and Rasciute (2011) verified different effects on subjective well-being when sports practice involved a higher level of social interaction (team sports performed with partners) and higher monthly frequency; frequency and intensity of exercise (Moradi et al., 2014) and active lifestyle had positive effects on life satisfaction (Gutiérrez-Caballero et al., 2019); in turn, Silva et al. (2020) showed that sports participation - weekly practising of vigorous physical activity - positively affected an individual's subjective well-being.

Panza et al. (2019) highlighted that the effect of physical activity intensity on subjective well-being has not been well established. There are contradictory results. For example, Kekäläinen et al. (2020) found that different types of physical activities were related to different dimensions of well-being. Walking had positive associations with psychological and social

well-being and endurance training with subjective health. Rambling in the countryside was also positively related to subjective health but only among men; Salama-Younes (2018) proved that harmonious passion was a positive predictor of life satisfaction, whereas obsessive passion - extreme loyalty to running - was not a direct negative predictor of life satisfaction. Wicker and Frick (2017), in a study that assessed the effect of different intensities of physical activity and the recommendations of the World Health Organization (WHO) on the subjective well-being, found that for 18- to 64-year-olds, walking (minutes and days/week) and vigorous activity (minutes/week) significantly added to subjective well-being, while moderate activity (minutes/week) had a negative effect.

Surprisingly, running involvement, frequency and number of runs have been neglected in previous studies. Based on these gaps in the running activity literature, we offer a description of the runner segments based on running involvement, loyalty to running and subjective well-being. Thus, based on empirical evidence and the terms of Self-determination theory and the Psychological Continuum Model, we hypothesise that a cluster can be created containing the group of runners with the highest levels of subjective well-being.

## MATERIAL Y MÉTODOS

### *Research design*

The study was empirical in type, transversal, using an associative strategy in a comparative process (Ato et al., 2013).

### *Participants*

The respondents were selected from the runners of the Scalabis Night Race athletics race, from which was taken a convenience sample. The selection of this race was carried out according to the following criteria: (1) all runners can be considered with leisure and competitive goals, but there are no cash prizes; and (2) the event shows a good participation rate, with more than 4,000 runners, which is necessary to obtain a good sample. The research was conducted in May 2018, after the completion of the race.



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The data was collected by supplying a questionnaire to runners in the "Scalabis Night Race" (<https://scalabisnightrace.pt/>) that has been held for over 12 years. The race has two distances, 10 km, and 5 km. An email containing a link to a self-administered questionnaire was sent to all runners who participated in the 2018 event who provided their email address on the registration form. The questionnaire remained active for two weeks, by which time 567 usable questionnaires were collected, out of a total of 3,305 questionnaires sent, with a response rate of 17.1%.

The sample shows a 98% confidence level and a sampling error of up to 4%. Therefore, the sample was very representative of the runners participating in the race. The questionnaires were supplied only after obtaining informed consent.

The search software allowed only one response to be recorded for each IP address, preventing participants from answering the questionnaire several times. It is

important to highlight that the use of questionnaires commonly posted on web pages allows the collection of large samples in a short period of time, but can limit the representativeness of the sample. Participants consisted of a total of 567 individuals, 267 females (47%) and 300 males (52.9%) aged  $41.21 \pm 9.29$ . One hundred and forty-five took part in the 5km and 422 ran in the 10km. Twenty eight percent were single, 46.38% married, 8.2% divorced, 16% non-marital and 0.88% widowed.

### Measurements

For translating and adapting the instruments from the original language to Portuguese, we followed the recommended methodological procedures (Vallerand, 1989). Participants responded to several questionnaires related to all the theoretical concepts under analysis, see Table 1.

Table 1. *Variable definition and measurement*

Variable / items	Scale	Mean	SD*
<b>Running involvement (RI)</b>	Six items: Adapted from Alexandris et al. (2007) and Ridinger et al. (2012)	3.69	1.56
<b>Centrality (CEN)</b>	Seven-point Likert scale anchored by Strongly Disagree (1) to Strongly Agree (7)	4.89	1.67
A lot of my life is organized around running. Running has a central role in my life.			
A lot of my time is organized around running.			
<b>Attraction (ATT)</b>	Running is one of the most enjoyable activities for me. I have a lot of interest in running. Running is important to me.		
<b>Loyalty to running (LOY)</b>	Four questions: Adapted from Bodet and Bernache-Assolant (2011)	19.34	24.51
In the LAST year, how many races have you completed: Races less than 10 km; 10 km races; Half marathons; Marathon (or higher)	Drop list 0 to 20 or more		
<b>Subjective well-being (SWB)</b>	One item: Adapted from Diener et al. (1985) and Simões et al. (2003)	7.66	1.58
Satisfaction with Life Scale: Overall, I am satisfied with my life. (0 = Not at all satisfied to 10 = Extremely satisfied)			
<b>Affiliated to a sports federation (FED)</b>	Two questions		
Are you a federated sportsman in any sports federation? No; Yes; if so, what is the name of the federation?	Affiliated federation		
<b>Running distance (RD)</b>	One question		
At the Scalabis Night Race sporting event, what was the race you attended? 5 km; 10 km	Running distance		
<b>Sex, Age, Marriage status, Region, Education level</b>	Dummy, metric, and reference category		

(\*) Standard Deviation

*Statistical analysis*

To characterise the subjects and identify different profiles, we used an unsupervised machine learning method for the clustering. The adopted approach was random forest clustering, an ensemble approach (Breiman, 2001), with the following advantages (Cutler et al., 2012): they naturally handle both regression and (multiclass) classification; are relatively fast to train and to predict; depend only on one or two tuning parameters; have a built-in estimate of generalisation error; can be used directly for high-dimensional problems; can easily be implemented in parallel. Handling also mixed variable types well, is invariant to monotonic transformations of the input variables, and is robust to outlying observations (Shi & Horvath, 2006). The number of clusters was determined using Bayesian Information Criterion (BIC), giving the minimum BIC score which can be selected as the best model (Schwarz, 1978), simplifying the problem related to choosing the number of components and identifying the structure of the covariance matrix, based on modelling with multivariate normal distributions for each component that forms the data set (Akogul & Erisoglu, 2016). The calculation of the number of clusters used the package mclust (Scrucca et al., 2016) developed in R (R Core Team, 2020). The number of clusters identified was four considering the lower BIC applying the VVI (diagonal, varying volume and shape) model with the value -10,404.19. The multivariate normality test using Shapiro-Wilk showed non-normal distribution ( $W=0.776$ ,  $p=0.01$ ). Thereafter, Kruskal-Wallis (Kruskal & Wallis, 1952) and Dunn's Post Hoc (Dunn, 1964) were used to examine whether differences existed among the clusters in subjective well-being, loyalty to running and running involvement (centrality and attraction). The analysis was developed using JASP (Love et al., 2019), and the cluster visualisation with t-SNE (Maaten & Hinton, 2008), which allows significantly better visualisation, reducing the tendency to crowd points together in the centre of the map. t-SNE is better than existing techniques at creating a single map that reveals structure at many different scales (Maaten & Hinton, 2008).

**RESULTS**

The minimum BIC score was used to identify the number of clusters, and as a result of this we identified four clusters.

Cluster 1 ( $n = 380$ ; 67.00% of the sample) presents the group of runners with the second highest level of subjective well-being (SWB), the third lowest level of running loyalty (LOY) and running involvement (RI: CEN, ATT). Most runners are men (53.95%) and ran the race at a distance of 10 km (75.36%).

The lower values of running involvement (CEN, ATT), loyalty to running and subjective well-being are in cluster 2 ( $n = 69$ ; 12.1% of the sample), where the majority are 5 km runners and females. Cluster 2 also presents the largest number of graduates and the lowest value for non-federated runners.

Cluster 3 ( $n = 93$ ; 16.4% of the sample) contains runners with moderate levels of subjective well-being, moderate levels of race involvement, and higher levels of race loyalty ( $M = 56.84 \pm 31.40$ ) per year. Most runners are men (69.90%) who ran the 10 km race (98.93%) and are older: 66.67% are between 38 and 57 years old.

Cluster 4 ( $n = 25$ ; 4.4% of the sample) consists of runners with the highest levels of subjective well-being, race involvement and moderate levels of race loyalty ( $M = 23.88$  races per year). See Figure 3. The overall average values are presented in Table 2.

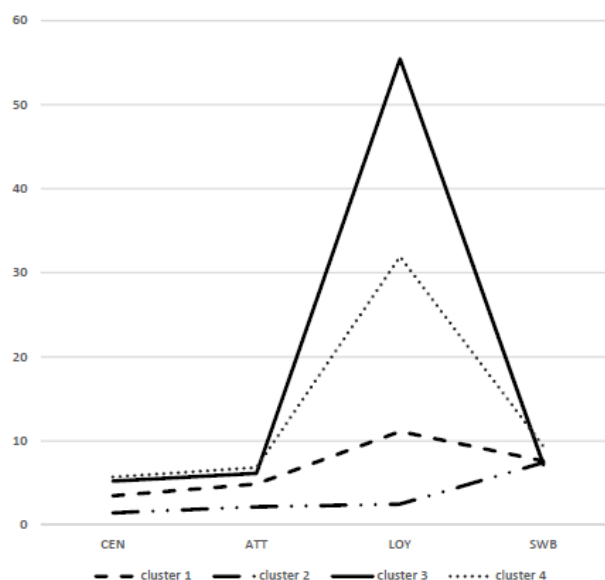


Figure 3. Average values by clusters

Note: Running Involvement (Centrality (CEN) and Attraction (ATT)), Loyalty to running (LOY), Subjective well-being (SWB).

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		1	2	3	4
N		380	69	93	25
CEN		3.51±1.16	1.44±0.45	5.4±0.80	6±0.73
ATT		4.89±1.32	2.13±0.78	6.3±0.58	6.98±0.06
LOY		13.02±14.62	1.9±1.45	56.84±31.40	23.88±5.78
SWB		7.6±1.61	7.19±1.7	7.52±1.23	9.2±0.65
Sex	F	46.05%	76.81%	30.11%	44.00%
	M	53.95%	23.19%	69.90%	56.00%
Rd	5 km	23.19%	75.36%	1.07%	16.00%
	10 km	76.84%	24.64%	98.93%	84.00%
Fed	No	87.65%	94.20%	83.87%	84.00%
	Yes	12.37%	5.80%	16.13%	16.00%
Marital status	Single	27.90%	31.89%	22.58%	44.00%
	Married	46.58%	46.38%	51.61%	24.00%
	Divorced	8.16%	4.35%	11.83%	8.00%
	Non-marital	16.58%	14.50%	13.98%	24.00%
	Widowed	0.79%	2.89%	0%	0.00%
Education	Less than 9th grade	0%	0%	0%	0.00%
	9th grade	7.11%	2.90%	7.53%	16.00%
	High school	34.74%	30.44%	38.71%	52.00%
	Graduates	42.11%	55.07%	37.63%	12.00%
	Master's/Ph.D.	16.05%	11.59%	16.13%	20.00%
Age	18-27	7.63%	5.80%	6.45%	8.00%
	28-37	27.89%	30.43%	17.20%	44.00%
	38-47	42.63%	43.48%	38.71%	36.00%
	48-57	17.63%	15.94%	27.96%	12.00%
	58-68	4.21%	4.35%	9.68%	0.00%

Note: Running Involvement (Centrality (CEN) and Attraction (ATT)), Loyalty to running (LOY), Subjective well-being (SWB), Running distance (Rd), Affiliated federation (Fed).

The representation of the t-SNE of the overall cluster representation considering the variables used to create the clusters is represented in Figure 4, where each point represents a runner. Cluster 1 has the highest number of runners.

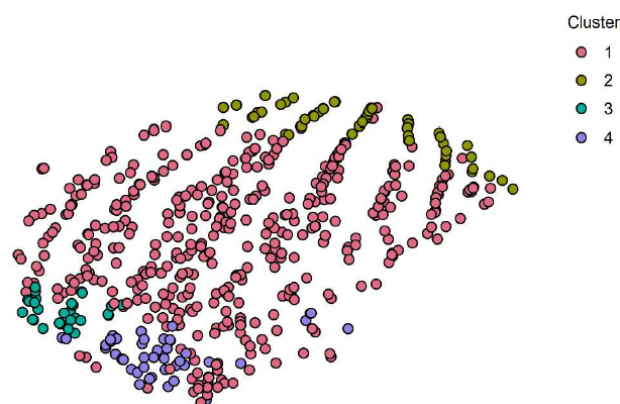


Figure 4. Cluster visualisation using t-SNE

The Kruskal-Wallis test showed that each cluster had a significant effect on centrality (CEN),  $\chi^2(3, N = 567) = 311.91, p < .001$ . A post-hoc test using Dunn's test with Bonferroni correction showed the significant differences between clusters 1-2,1-3,1-4, 2-3,2-4  $p < .001$ . Attraction (ATT) revealed a significant difference in each cluster  $\chi^2(3, N = 567) = 277.016, p < .001$ . A post-hoc test using Dunn's test with Bonferroni correction showed the significant differences between clusters 1-2,1-3,1-4, 2-3,2-4  $p < .001$ . The Loyalty to running (LOY) was also affected by each cluster,  $\chi^2(3, N = 567) = 286.156, p < .001$ . A post-hoc test using Dunn's test with Bonferroni correction showed the significant differences between clusters 1-2,1-3,1-4, 2-3,2-4  $p < .001$ . Finally, the subjective well-being (SWB) also showed differences,  $\chi^2(3, N = 567) = 38.128, p < .001$ . A post-hoc test using Dunn's test with Bonferroni correction showed the significant differences between clusters 1-4,2-4,3-4,  $p < .001$ . See Table 3 for post-hoc tests.

Table 3. *Dunn's Post Hoc Comparisons – clusters*

Clusters	CEN z	p bonf	ATT z	p bonf	LOY z	p bonf	SWB z	p bonf
1-2	9.873	<.001***	10.425	<.001***	8.347	<.001***	2.25	.07
1-3	-10.808	<.001***	-8.742	<.001***	-12.480	<.001***	1.35	.53
1-4	-7.435	<.001***	-7.244	<.001***	-4.536	<.001***	-5.30	<.001***
2-3	-16.001	<.001***	-14.951	<.001***	-15.961	<.001***	-0.87	1
2-4	-12.111	<.001***	-12.251	<.001***	-8.691	<.001***	-5.95	<.001***
3-4	-1.264	0.618	-2.150	0.095	2.251	0.073	-5.55	<.001***

Note: Running Involvement (Centrality (CEN) and Attraction (ATT)), Loyalty to running (LOY), Subjective well-being (SWB).

\*  $p < .05$ , \*\*  $p < .001$ , \*\*\*  $p < .001$

## DISCUSSION

The aim of this study was to identify and characterise runner segments based on running involvement, loyalty to running and subjective well-being using cluster analysis. This study is of interest not only to race organizers, but also to any sporting organization that relies on runners for their financial performance.

The study confirms that by using this statistical approach, it is possible to use a traditional large-scale participant survey to identify viable segments in athletics race participants based on running

involvement, loyalty to running and subjective well-being. This type of analysis enables several major factors of strategic importance to be identified. First, it allows sports programme managers to identify runner segments that may be vulnerable to dropout in running, that is, those who have manifested the lowest levels of running involvement and loyalty to running (cluster 2).

Secondly, this type of analysis allows sports programme managers to identify gaps in the running offer that is currently not meeting needs (competence, autonomy, and relatedness) in terms of athletic race attributes. For example, the findings may indicate that runners might feel dissatisfied with the current race types and reveal what additional innovations, attributes and offers they would like.

Finally, and more importantly, this analysis allows sports programme managers to discover ways in which runners with lower levels of running involvement approach races in terms of centrality and attraction. Specifically, a general understanding of the definition of runners is critical to the success of physical activity programmes using running. In many cases, the findings will reinforce what managers already know. However, in some cases, it can provide fresh insights into runner groups that have the greatest similarities in terms of running involvement, loyalty to running and subjective well-being.

The results of the cluster analysis revealed that the total sample could be clustered into four distinct groups. Two clusters were significantly different in terms of running involvement, loyalty to running and subjective well-being (cluster 2 and cluster 4). Furthermore, these results show that the cluster analysis technique is a viable means of identifying smaller subsets of consumers within the larger runner base.

Using segmentation principles, it was our expectation to create clusters as follows: 1) a cluster characterised by runners with high levels of running involvement, high loyalty to running and high subjective well-being, and 2) other clusters where levels of running involvement are moderate and low, with moderate or reduced loyalty to running and the lowest level of subjective well-being. In the light of the theoretical foundations of Self-determination theory and the Psychological Continuum Model mentioned, and the

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empirical evidence, we hypothesised that runners with high levels of involvement with running are those who show greater loyalty to running and higher levels of subjective well-being.

### Running involvement

Our first research question has been confirmed. It is possible to state affirmatively that runners with a higher level of running involvement belong to the group of runners with a higher level of subjective well-being.

The involvement with an activity as an expression of motivation and high interest in a specific sports activity was evidenced by cluster 4 ( $n = 25$ ; 4.4% of the sample); this was labelled the High Group as runners in this cluster showed high levels of subjective well-being, running involvement and high/moderate levels of loyalty to running.

This set of runners were those who consider that running has a central role in their lives, are highly interested in running with much of their time organized around running, which manifests a high level of running involvement. In turn, this group manifested the highest levels of subjective well-being.

In empirical terms, this result agrees with behavioural differences found by Beaton et al. (2011), suggesting that runners with stronger psychological connections are increasingly involved in the frequency, depth, and breadth of race-related behaviour. In turn, it was confirmed that involvement in sports was significantly related to improvements in the self-efficacy of physical activity and physical self-concept (Clevinger et al., 2020), elements that may suggest a link to subjective well-being.

This result seems to be explained by the theoretical contributions of the Psychological Continuum Model (Funk & James, 2001) and Self-determination theory (Ryan & Deci, 2000; 2017). Considering the Psychological Continuum Model (Funk & James, 2001), the runners that are at the upper levels of the model correspond to levels 3 (Attachment) and 4 (Allegiance), which culminate in persistence, loyalty and regular running behaviour.

Self-determination theory (Ryan & Deci, 2000; 2017) states that a connection with the social context of an

athletics race can satisfy psychological needs, which in turn, sustains persistence in running practice. This was the group of runners with the high/moderate level of loyalty to running, who completed on average 23.88 races per year. It was also the group that showed the highest levels of subjective well-being, which under the terms of Self-determination theory seem to have satisfied the basic needs of competence, autonomy and relatedness, thereby providing it with a high satisfaction with life.

Cluster 2, called the Low Group, consists of runners with the lower levels of running involvement and also with the lower levels of subjective well-being. This result is relevant from a theoretical and practical point of view. They seem to confirm the differences in runners' behaviour, suggesting that runners with weaker psychological connections are less involved in the frequency, depth and breadth of running-related types of behaviour (Beaton et al., 2011; López et al., 2017). This group of runners (76.81% are women) should be targeted with appropriate strategies in order to raise their levels of running involvement. In the social context of the race, activities that lead to greater satisfaction of basic needs - competence, autonomy and relatedness - as supported by Self-determination theory (Ryan & Deci, 2000; 2017), should be developed. The implementation of these strategies will help to achieve the goals of satisfying, retaining and ensuring persistent runner behaviour.

### Loyalty to running

The number of races completed per year is the best indicator of race loyalty. The research question we asked has been confirmed: Cluster 3 emerged ( $n = 93$ ; 16.4% of the sample) and was labelled the Moderate/Low Group, as runners in this cluster showed moderate levels of subjective well-being, moderate levels of running involvement and the highest levels of loyalty to running, with  $56.84 \pm 31.40$  races per year.

The highest levels of loyalty to running refer to an individual's commitment to sports activity that is reflected in a persistent attitude that guides frequent and enduring behaviour.

Strangely, this group manifested a low level of subjective well-being (the third lowest of the four clusters), a situation that seems contradictory for the

following reason. According to Self-determination theory (Ryan & Deci, 2000; 2017), high levels of running involvement, according to the in the social context of the race, would have led to the satisfaction of basic needs (competence, autonomy and relatedness), a factor that would lead to persistent behaviour. But this persistent behaviour may have "crossed the line" and have become an obsessive behaviour in such a way that it may not lead to a higher feeling of subjective well-being, as one would expect. A similar situation has been reported (Salama-Younes, 2018), where a harmonious passion was a positive predictor of life satisfaction, but obsessive passion - extreme loyalty to running - was not a direct negative predictor of life satisfaction. In addition, Self-determination theory is a highly appropriate conceptual framework from which to study sports persistence and dropout (Calvo et al., 2010); it explains loyalty to running, since a full satisfaction of the needs of competence, autonomy and relatedness leads to persistent behaviour observed by the highest number of races held per year.

Considering the Psychological Continuum Model, this group shows very high results at level 4 (allegiance), which can mean loyalty or devotion to a cause or similar (Funk & James, 2001). These runners seem to receive a high intrinsic value which creates a persistent attitude translated into consistent evaluative responses elicited by the sports object over an extended period of time, which may even assume an obsessive characteristic.

Cluster 2, designated the Low Group, consists of runners with the lowest levels of loyalty to running ( $M = 1.9$  races per year) and also with the lowest levels of running involvement. From a theoretical point of view, it can be explained by an insufficiently assigned importance to a race, perhaps by the reduced satisfaction of the needs of competence, autonomy and relatedness - supported by Self-determination Theory (Ryan & Deci, 2000; 2017) - factors that may have led to non-persistent behaviour. Appropriate strategies are required for this group of runners (76.81% are women). Segmentation requires appropriate strategies with the aim of raising the levels of running involvement with the higher objective of retaining and ensuring a persistent and frequent behaviour in this group of runners.

### Subjective well-being

As expected, a cluster was formed with the highest levels of subjective well-being: Cluster 4 ( $n = 25$ ; 4.4% of the sample) was labelled the High Group as runners in this cluster showed high levels of subjective well-being, running involvement and high/moderate levels of loyalty to running. Also, with relevant levels of subjective well-being we created the cluster with the largest number of runners. Cluster 1 ( $n = 380$ ; 67.00% of the sample) was labelled the Moderate Group as runners in this cluster showed the second highest level of subjective well-being, but low levels of running and loyalty to running.

Cluster 4 was labelled the High Group because it was the group of runners that showed the greatest feeling of subjective well-being, which probably suffered influence from the high levels of running involvement (centrality and attraction). These runners attach high importance to running; much of their life is organized according to running and running is one of the most fun activities for them. However, this group was not the one that manifested the highest levels of loyalty to running ( $M = 23.88 \pm 5.78$  vs  $56.84 \pm 31.40$  of the High Group). It was not a high level of loyalty to running that characterised the group with the highest levels of subjective well-being. On the contrary, it was a moderate level of loyalty to running that showed high levels of subjective well-being. This result reinforces two central ideas in the concept of subjective well-being. The first idea (Testoni et al., 2018) is that the way we live our lives and what we value in it are subjective, and what makes life good or bad is precisely the subjective character of our experiences (running and number of races completed). The second idea (Diener, 1984) highlights that well-being implies not only the absence of negative factors, but also the presence of positive factors (a moderate number, and perhaps not an excessive number, of races completed). These ideas can also support the results obtained in the creation of cluster 1 that consist of the large majority (two-thirds) of runners, which despite having low levels of running involvement (centrality:  $M = 3.51$ ; attraction:  $M = 4.89$ ) and loyalty to running ( $M = 1.302$  races per year) was the group that had the second highest level of subjective well-being ( $M = 7.60$  vs the highest C4:  $M = 9.20$ )

This result in particular diverges from the position of Pawlowski et al. (2011) who argue that practising

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physical activity and sports is a personal and rational decision that maximizes an individual's rational utility and must therefore be logically associated with increased subjective well-being. Perhaps it is a moderate, but vigorous, level of physical activity that shows better results, as evidenced in several investigations: walking and recreational cycling had a positive effect on individuals' happiness (Rasciute & Downward, 2010); sports participation - the weekly practising of vigorous physical activity - positively affected individuals' subjective well-being/life satisfaction (Moradi et al., 2014; Silva et al., 2020). On the other hand, Downward and Rasciute (2011) verified different effects on subjective well-being when sports practice involved a higher level of social interactions (team sports performed with partners) – and running as an individual sport may not provide a sufficient level of social interaction.

As Panza et al. (2019) highlighted, the effect of physical activity intensity on subjective well-being has not been well established, such that (1) Wicker and Frick (2017), in a study that assessed the effect of different intensities of physical activity and the recommendations of the World Health Organization (WHO) on subjective well-being, found that for 18- to 64-year-olds, walking (minutes and days/week) and vigorous activity (minutes/week) significantly added to SWB, while moderate activity (minutes/week) had a negative effect; (2) Salama-Younes (2018) proved that harmonious passion was a positive predictor of life satisfaction, whereas obsessive passion - extreme loyalty to running - was not a direct negative predictor of life satisfaction, and (3) Kekäläinen et al. (2020) showed that rambling in the countryside was also positively related to subjective health but only among men.

In theoretical terms, Self-determination theory is a highly appropriate conceptual framework from which to study sports persistence and dropout (Calvo et al., 2010), when the social context - running alone or in a group - facilitates the satisfaction of the three basic needs of autonomy, competence and relationship; then the runner will be more likely to engage in intrinsically motivated behaviour, but it will not have provided the highest levels of subjective well-being, as was expected. It seems that these needs are not enough to find satisfaction in the race, and there may be other

factors that exert influence on the subjective well-being that need further study.

The lowest levels of subjective well-being were found in cluster 2 ( $n = 69$ ; 12.1% of the sample;  $M = 7.19 \pm 1.7$  vs  $9.2 \pm 0.65$  of the High Group). This set of runners was also the one that manifested 1) the lowest levels of running involvement (centrality and attraction), and 2) the lowest levels of loyalty to running ( $M = 2.13 \pm 0.78$  races per year). Considering the Psychological Continuum Model, this group of runners seems to present a residual connection with running. Maybe they are at the base of level 2 of the model - attraction: entertainment, escape, excitement (Funk & James, 2001). In turn, the interpretation of this result in the light of Self-determination theory (Ryan & Deci, 2000; 2017) shows that it is possible to deduce that the social context of running, for these individuals, may not be sufficient for a full satisfaction of the needs of autonomy, competence and relationship, and as such, persistent and lasting behaviour is not observed. Finally, it is possible to assume that the second level: attraction (Funk & James, 2001) does not present a level of psychological connection sufficient to raise the level of subjective well-being.

## CONCLUSIONS

The creation of four homogeneous subsets of runners through marketing segmentation principles by using cluster analysis was very appropriate to gain a better understanding of runners and thereby, support the formulation of strategies aimed at increasing levels of physical activity through running.

Policymakers, those responsible for organizing athletics races and those responsible for public programmes and policies promoting physical activity, now have the quality knowledge required to increase the effectiveness of their programmes and thereby fully achieve their objectives.

The results of this study confirm that the objective of reducing a population's sedentary levels can be approached through the variables used in this study, both observing the principles of Self-determination Theory (Ryan & Deci, 2000; 2017) and the Psychological Continuum Model (Funk & James, 2001).

The high levels of running involvement and increased loyalty to running were the variables with greatest relevance in the clusters that presented runners with the highest levels of subjective well-being; this is the highest objective that can nurture the persistence of healthy behaviour from the point of view of both individuals and society.

#### *Limitations and future research*

As in any research, there are a number of limitations to the results, which should be mentioned and grouped into conceptual and methodological limitations. First, the assessment of the connection of runners with an activity was structured around the running involvement construct. This theoretical position was obviously very pertinent in evaluating the responses of runners. However, other perspectives could be admitted, such as runner identity (Runner Identity Scale) (Lough et al., 2014). As regards methodology, the use of a convenience sample may have been a limitation.

The results obtained and the methodology that led to the study, in addition to the limitations identified, provide opportunities for further research that are ready to be developed.

Regarding the constructs used, it is clear that the idea of the existence of other constructs, such as motivational or sought benefits, is not excluded. Whereas Self-determination Theory (Ryan & Deci, 2000; 2017) maintains, to a large extent, that the persistence of behaviour is driven by the satisfaction of the needs of competence, autonomy and relatedness, it would be interesting to evaluate the level of satisfaction of these needs in different runners, in relation to levels of loyalty to running, in order to understand better the attitudes and behaviour of runners. The results obtained showed that the component of behavioural loyalty did not manifest in a cluster where the levels of subjective well-being were the highest, so it is necessary to deepen the studies of the relationship between these two constructs.

In terms of context, it would seem appropriate to investigate at various race distances: 5 km, 10 km, half marathon and marathon, or even trail races.

## PRACTICAL APPLICATIONS

All runners are not the same. Quite to the contrary, runners often differ in socio-demographic characteristics, values, lifestyles, and levels of performance. One additional characteristic in which runners differ is their involvement with a race. Specifically, runners have clearly shown that they have different levels of running involvement, different levels of loyalty to running and different levels of subjective well-being.

The obtained results introduce a set of particular theoretical implications that allow us to highlight the elements studied. First of all, the idea that running involvement constitutes the cognitive and affective basis that supports the loyal responses of runners is emphasized and confirmed. Also, the running involvement construct was appropriate for the purpose of this research.

These results made it possible to reinforce the adequacy of the principles of Self-determination theory (Ryan & Deci, 2000; 2017), but with regard to the connection with subjective well-being, it will be necessary to add other factors that can lead to a better understanding of the reality of the feelings and behaviour of runners.

Third, as stated by Panza et al. (2019), the effects of physical activity on subjective well-being are not confirmed. Further research is needed, both in terms of measuring scales of concepts and social contexts.

Fourth, the Psychological Continuum Model (Funk & James, 2001) proved to be a simple and appropriate framework to lead us to a better understanding of runners' behaviour.

In terms of management, these results have implications for two main recipients. The first group is the managers of programmes to promote physical activity through a race. The second is the managers of athletics race companies. To maximise the value of physical activity, these professionals need to have an adequate understanding of the different segments that make up their marketing targets.

For managers of physical activity promotion programmes, the recommendations are: First, try to follow the principles of Self-determination theory



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(Ryan & Deci, 2000; 2017), in creating social running contexts that can meet the basic needs of runners - autonomy, competence and relationship - with the aim of nurturing persistent, lasting and regular physical activity behaviour. The result underlying this recommendation is cluster 3 (n = 93; 16.4% of the sample); this was labelled the Moderate/Low Group, because the runners in this cluster showed moderate levels of subjective well-being and moderate levels of running involvement. They are mostly men (69.9%) who have run the 10 km race and are older, with 66.67% aged between 38 and 57 years.

Second, to innovate through the introduction of attributes into races in order to broaden the connections to a race, observing the levels of the Psychological Continuum Model (Funk & James, 2001) and the principles of Self-determination theory (Ryan & Deci, 2000; 2017), including the targeting of women who are in the majority in cluster 2 (n = 69; 12.1% of the sample); these manifest a lower level of running involvement subjective and well-being.

Third, considering that the runners who ran the 5 km race (75.36%) belong to cluster 2 (n = 69; 12.1% of the sample), and are the ones who demonstrated the lowest levels of running involvement, the recommendation is to stimulate this subset of runners to positive experiences of races of 10 km, with the aim of raising the level of connection to the race, making them ascend to the higher levels of the Psychological Continuum Model (Funk & James, 2001), by satisfying the basic needs of autonomy, competence and relationship established by Self-determination theory (Ryan & Deci, 2000; 2017). In this case, the detailed recommendation should encourage opportunities for social interaction between runners, both during and after the race, promote a sense of community among runners, develop public relation actions associated with races (e.g., autograph sessions with top runners or influencers) and ensure the presence on the internet and social networks that facilitate interactions between runners. In addition, through partners, promote the creation of exclusive advantages for runners, such as newsletters and discounts on running products.

For the managers of athletics race companies, which in most cases are profit-driven, the recommendation is to invest in cluster 3, because it is the one that can contribute the most permanent revenue, since it is

composed of the most loyal runners. The key points are as follow: cluster 3 (n = 93; 16.4% of the sample) consists of highly loyal runners, completing on average 56.84 races per year, with 98.00% participating in the 10 km race. Most are men (69.90%), have a high level of education (Bachelor or Master's/Ph.D. = 66.66%) and 66.67% are aged between 38 and 57 years.

For future research we propose the following: Analyze the motivations and objectives sought which can provide relevant information to know better and segment the runners in greater detail; deepen and stabilize the subjective well-being construct, both in measuring instruments and in the contexts in which it is evaluated; use a Structural Equation Modeling (SEM) statistical analysis to design a model that provides a better understanding of runners' behaviour; and finally, add other variables that support a better understanding, such as the level of physical activity, using for example the International Physical Activity Questionnaire (Craig et al., 2013).

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