



Universidade de Lisboa
Faculdade de Motricidade Humana

Keep on Running – Understanding and influencing sustained
participation in recreational running

Hugo Carlos Fernandes Vieira Pereira

Orientador: Professor Doutor Pedro Jorge do Amaral de Melo Teixeira

Tese especialmente elaborada para obtenção do grau de Doutor em Motricidade Humana na
Especialidade de Atividade Física e Saúde

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Para o meu Pai e a minha Mãe, fonte de eterno amor, apoio e inspiração
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ABSTRACT

This dissertation sought to provide a comprehensive understanding of recreational running in adults. Specifically, it comprises a set of three studies that were designed to i) characterize recreational running in Portuguese adults; ii) study correlates of recreational runners (e.g. motivation, goals, consequences); and iii) explore how recreational running might be effectively promoted in the long term.

Study 1 aimed to estimate the prevalence of recreational running, and explore demographic, behavioral and psychological characteristics of the “Portuguese Recreational Runner”. It characterizes runners and describes the relative importance of running for total physical activity (PA). Study 2 reflects the state of the art regarding psychological and behavioral correlates of recreational running. It suggested that intrinsic motives are key antecedents of recreational running and that mood and wellbeing are the most frequently associated outcomes. Finally, study 3 described the development of a brief, theory-based intervention, delivered in a digital format, aimed at increasing the maintenance of running behaviors over time. Additionally, results from the pilot study informs about adjustments to future interventions to improve its acceptability.

The findings in this thesis highlight the importance of recreational running as a PA promotion strategy, and the need for long-term individualized approaches for its implementation.

Lessons learned can inform future research initiatives, focused on testing the KoR intervention, and also recreational running promotion policies.

Keywords: Recreational running; Behavior maintenance; Motivation; Self-regulation; Technology implementations

RESUMO

Esta dissertação teve como objetivo ampliar a compreensão da corrida recreativa em adultos.

Especificamente, integra um conjunto de três estudos que foram concebidos para i) caracterizar a corrida recreativa em adultos Portugueses; ii) estudar correlatos da corrida recreativa (p.ex., motivação, objetivos, consequências); e iii) explorar como a corrida recreativa pode ser eficazmente promovida a longo prazo.

O estudo 1 teve como objetivo estimar a prevalência da corrida recreativa e explorar as características demográficas, comportamentais e psicológicas do “Corredor Recreativo Português”. Além da caracterização, revelou a importância relativa da corrida para a atividade física (AF) total. O estudo 2 reflete o estado da arte relativamente aos correlatos psicológicos e comportamentais da corrida recreativa. Sugeriu que os motivos intrínsecos são antecedentes fundamentais da corrida recreativa, e que o humor e bem-estar são os efeitos mais frequentemente associados. Finalmente, o estudo 3 descreveu o desenvolvimento de uma intervenção breve, baseada em teoria, implementada em formato digital, com o objetivo de aumentar a manutenção dos comportamentos de corrida no longo prazo. Além disso, os resultados do estudo piloto indicam alguns ajustes na intervenção, a fim de melhorar sua aceitabilidade.

Os resultados desta tese destacam a importância da corrida recreativa como estratégia de promoção da AF e a necessidade de abordagens individualizadas de longo prazo para a sua implementação. As lições aprendidas podem informar futuras iniciativas de investigação, focadas em testar a intervenção KoR e, também, políticas de promoção de corrida recreativa.

Palavras-chave: Corrida recreativa; Manutenção de comportamento; Motivação;

Autorregulação; Implementações tecnológicas

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CHAPTER 1

Introduction

Sedentary behavior and lack of physical activity: a public health burden

Concurrently, the harms of physical inactivity, described as a level of physical activity (PA) insufficient to meet the guidelines [1] and benefits of meeting these guidelines, are well established [2, 3]. PA, as well as exercise, a planned, structured, repetitive version of physical activity, that favors physical fitness maintenance or development [1], arise as key components of a lifestyle medicine, which improves mental health and quality of life, and contributes for the prevention or treatment of several chronic diseases [4, 5], such as overweight and obesity, cardiovascular disease, diabetes, and several types of cancer [6].

Whilst the benefits of PA are well established, worldwide people seem to resist in engaging in physical activity [7]. Almost 60% of Europeans (and 74% of Portuguese) aged 15 and above, report to never or rarely exercise or play sports, and 56% (and 79% in Portugal) never or seldomly engage in PA [8]. In Portugal, a survey found that only 27% of the Portuguese are active, and 43% sedentary [9]. Objectively measured PA data indicate that 74% of Portuguese adults do not meet the World Health Organization (WHO) PA recommendations [10].

The independent relationship between sedentary behavior, defined as activity in the sitting or reclining position performed by the individual, while awake and which involves a low energy expenditure (1-1.5 METs) [11], and the degradation of the health conditions of adults (incidence of disease, hospitalization and death) [12, 13] is widely documented in the literature. Sedentary behavior has been proposed as an independent risk factor for chronic disease risk, and its interruption has emerged as a protective potential of cardio-metabolic [14] and overall health [15].

Lack of PA and excess sedentary behavior represent a health-care systems burden estimated in international \$ 53.8 billion worldwide in 2013. Furthermore, physical inactivity related deaths contribute to \$13.7 billion in productivity losses, and physical inactivity was responsible for 13.4 million DALYs worldwide [16].

Nations have been developing programs towards PA promotion, including reduction of sedentary behaviors, such as surveillance and National plans [17, 18]. In 2013, the European Union member countries agreed on health-enhancing physical activity policy measures, which were associated with more positive time trends in sports participation from 2009 to 2017 [19]. In Portugal, the National Program for the Promotion of PA was created in 2016. It works in harmony with the National Health Plan and with the main international guidelines in the area, including the WHO [20].

In 2018, the WHO established the Global action plan on physical activity 2018–2030 [21]. After the PA Guidelines for the Americans have been updated and upgraded to an interval that double the amount of time (150 to 300 minutes of moderate PA, 75 to 150 minutes of vigorous PA, or a combination of both) [22]. In 2020, the WHO issued its own revised recommendations, and met this upgraded interval [23].

Physical activity adherence and maintenance

Sustained adherence is a well-known challenge in exercise contexts, as many people struggle to keep up their behavior for longer than 6 months [24, 25]. The most common criteria to consider a participant in PA maintenance is based on the ACSM position stand of 150 minutes of moderate PA or 60 minutes of vigorous PA per week, as a cut off value for active [26] and the Dishman's 6 months, for maintenance [27]. In sum, PA maintenance reflects the situation in which previously sedentary individuals who increased their PA level are still

regularly physically active for at least 6 months [24] and maybe associated to various psychological constructs such as motivation, goals, and self-regulation skills [28].

Research on the characterization of people who are physically active [29] and manage to sustain their PA behavior [30] is extensive. Yet, few studies have empirically examined the mechanisms that support long-term maintenance and engagement among those already active [31], such as the quality of their motivation, the emotions and gains they experience while exercising, or the regulatory resources they possess to overcome exercise-related challenges and barriers.

Research into psychological correlates (factors associated with activity) or determinants (those with a causal relationship) has shown that self-efficacy, attitudes and beliefs, and autonomous motivation are associated with PA [29, 32]. On a broader perspective, ecological models included as contributors to PA, urban planning, transportation systems, and parks and trails. Research has also identified genetic factors contributing to PA, and evolutionary factors and obesity that might predispose to inactivity, and have explored the longitudinal tracking of physical activity throughout life [29].

A systematic review of theoretical explanations for behavior change maintenance identified sustained maintenance motives (e.g. satisfaction with behavioral outcome, enjoyment, or congruence with identity, beliefs and values), among five interconnected themes reflecting theoretical explanations about how individuals maintain initial behavior changes over time. Other themes were self- regulation (e.g. successfully use of skills to regulate behavior), resources (e.g. psychological and physical), habits (supported by automatic response to relevant cues), supportive environmental and social influences [33].

Over the past two decades, group interventions have successfully been used to promote PA among adults [34]. Positive associations have been found between group cohesion features

such as individual attraction to the group task, shared commitment to the task, social bonding within the group, and opportunities to interact with others, and PA outcomes, including intervention adherence [35, 36]. In addition, informed by sound theoretical propositions and empirical evidence, a task-involving peer motivational climate has been shown to positively predict feelings of competence, autonomy, and relatedness [37], which have been implicated in the successful maintenance of PA behaviors [38].

Main predictors of long-term adherence are autonomous motivation [39] and intrinsic motivation [40]. A systematic review found support for the role of internal forms of motivation in PA and behavior sustainability [38], suggesting that Self-Determination Theory [SDT; 41] can provide a valid framework to study PA maintenance. This hypothesis has been explored in more depth in conceptual proposals around the maintenance of weight loss and health related behaviors [42-45]. Recently, a meta-analysis of the impact of SDT-informed interventions on SDT constructs and health indices, reported that positive changes most SDT constructs, in health behaviors, and in physical and psychological health outcomes [46].

Self-Determination Theory progressed as a theoretical framework to comprehend the foundations of human motivation [47], to examine the differential effects of different types of motivation [41]. It distinguishes between intrinsic and extrinsic types of motivation. Intrinsic motivation is defined as doing an activity because of its inherent satisfaction. When intrinsically motivated the person experiences feelings of enjoyment, personal accomplishment, and excitement [47]. Contrasting, extrinsic motivation refers to doing an activity for instrumental reasons, or to obtain some outcome other than the activity itself.

The underlying premise of SDT is that sustained motivation is elicited from within the person (not imposed by someone else) and that supporting participants' basic needs for i) autonomy (need to feel a sense of choice, volition and self-endorsement), ii) competence (need to feel a

sense of mastery and capacity to accomplish the behavior), and iii) relatedness (need to feel meaningfully connected to others, valued and understood) will best promote the initiation and maintenance of behavior change, by fostering autonomous motivation and well-being [41, 47]. On the contrary, when these three needs are thwarted, people will tend to develop controlled motivations, regulating their behavior based on external contingencies and internalized self-judgments [48].

In addition, not all types of goals have the same consequences [49]. The outcomes that individuals are pursuing through the new behavior can have intrinsic or extrinsic qualities, which can also influence behavior maintenance. Relative to “extrinsic goals” (e.g., wealth, social recognition, physical attractiveness), “intrinsic” goals (e.g., health, personal growth, social connectedness) tend to be regulated by more self-determined forms of behavioral regulation, and are thought to result in improved self-regulation and longer-term outcomes [50]. Controlled motivation is consistently unrelated with physical activity outcomes, independent of the type of analyses performed [38].

Self-regulation, describing efforts of humans to alter their thoughts, feelings, desires and actions in the perspective of attaining higher goals, also provides good insights into the understanding of physical activity maintenance [51, 52]. Interventions pointing at changes in physical activity, through strategies like setting adequate goals, changing their beliefs and expectations, and providing guidance in the use of a variety of self-regulation skills (such as self-monitoring), are thought to influence behavior change and maintenance [52, 53].

Generally, skills such as self-monitoring, individualized goal setting or action planning have been identified as important mediators of long-term physical activity [31] and as core features of effective behavior change/maintenance interventions [54].

Additionally, some psychological benefits of physical activity (gains), such as flow [55] can also be associated with exercise adherence rates. While further work is required to determine whether gains are a causal determinant of exercise adherence, this influence could be particularly relevant for exercisers, as gains can offer a potential foundation for building long-term exercise engagement [56, 57].

Sustained adherence to running

Recreational running is increasingly widespread, worldwide, and could therefore be seen as an obvious public health promotion target [58, 59]. The health benefits of running are vast, including prevention of obesity, hypertension, dyslipidemia, type 2 diabetes, osteoarthritis and hip replacement, benign prostatic hypertrophy, respiratory disease, cancer, disability, reduction of cardiovascular, and all-cause mortality [58-60].

Like other countries, Portugal has seen a steep increase in running events over the past 20 years suggesting that running prevalence is on the rise. A survey concerning levels of self-reported PA and preferences of leisure-time activities of Portuguese adults indicated that running was the preferred leisure-time PA by 18% of men and 8% of women in 2015-16 [61]. Although determined with different criteria, running prevalence in European countries vary between 31% in Denmark (considering running regularly in the last 12 months), 19% in Belgium (considering running as a leisure-time sports activity) and France, 18% in the Netherlands (considering participating at least once a year in a running activity), 15% in Finland, 13% in Germany, 6% in Spain, and 5% in the UK (considering running for at least four occasions in the previous 28 days, for at least 30 minutes, at moderate or vigorous intensity)[62].

Data from USA [63] and Australia [64] suggest a 15% of participation in running and jogging activities. According to the 2020 US Running Trends [65], 17.6 million runners registered for U.S. road races in 2019, 60% female and 49% between 25 and 44 years of age. A large cohort study [66] reported that Australian runners usually ran 20-40 km per week, distributed by 2-5 running sessions. Significantly more males than females reported running over 40 km per week and running at least six sessions per week, a gender gap in running participation which was also observed in the Portuguese data [61].

According to a recent online report about recreational running [67], event participation has declined by 13% since 2016, from 9.1 to 7.9 million recreational runners worldwide. Runners have apparently never been older (35.2 in 1986 to 39.3 in 2018) and, for the first time in history, there appears to be more female than male runners (50.2% were female).

The motives for participating in running [68] are potentially changing from being achievement-focused to being psychological, health and socially focused. Runners can be relatively uninterested in proper running technique, ambivalent about the presence of others when running, reticent about being pulled into a more committed collective practice [69], and perceiving environmental characteristics as important determinants in the attractiveness and restorative capacity of the running environment [70].

Running-related technology has great potential to support runners in their training activities, guide them in running, and motivate them. Wearable technology (e.g., activity trackers, smart watches, heart rate monitors, and GPS tracking devices) has been a top worldwide fitness trend for the last few years [71], so the use of wearable technology and/or running-related apps for training optimization, distance recording or social media on a consistent basis, is reasonable. Apps are more likely to be used by younger, less experienced and involved

runners. In contrast, sports watches are more likely to be used by a different group of older and more experienced runners with higher involvement [72].

Running is widely accepted, because it is an enjoyable and rewarding activity in itself, running is closely related to health, piece of mind and love of the outdoors, while restraining from the competitiveness. In addition, running can be practiced without having to join a club, considered a 'light' organized sports activity [62].

Regardless of running participation rates, acceptance, and convenience, running-related research is still primarily focused on the understanding of injuries, its risk factors [73, 74], and treatment [75], as well as health benefits [60], and addiction to running [76]. Running presents an exceptional opportunity to study exercise behavior, especially because of the challenging everyday-life management necessary to free up time to practice and compete [77, 78], which suggests that motivational aspects related with training for and completing a recreational race may be unique [79].

In sum, to better promote running sustainability and its long-term health benefits, it is crucial to understand individuals' running experiences and outcomes, as well as the factors that predispose them to engage in this activity. Studying the correlates of running, as well as the efficacy of different types of interventions to promote running sustainability, will enhance the understanding of the phenomenon, possibly creating new insights into the effective promotion of PA maintenance.

Aims of the thesis

The present thesis sought to provide a comprehensive understanding of recreational running in adults, by answering three central questions: 1) **What is the expression** of recreational running in Portugal (i.e. **how many** runners, **who** they are, and **how** they behave)?; 2) **What**

is known about the psychological correlates of recreational running?; and 3) **How** can an online intervention to impact running motivation be built and delivered? As a result, this dissertation was primarily designed to:

- i. To characterize recreational running in Portuguese adults;
- ii. To study correlates of recreational running (e.g., motivation, goals, consequences);
- iii. To explore how recreational running could be effectively promoted in the long term.

Outline of the thesis

This thesis comprises a collection of three research articles published or accepted for publication in peer-review journals in the field of exercise and health, with an established ISI Impact Factor. This series of articles contains several novel attributes, collectively aiming to contribute to the body of literature at a national and international level. The present document is organized in five chapters plus an Appendices section, as follows:

- This first chapter (**Chapter 1**) provides a general introduction aiming at presenting an overview of the topic that informs the main research questions and goals of the three studies included. Additionally, this chapter outlines the relevance and the flow of the studies and highlights the diversity of samples and types of studies conducted.
- **Chapter 2** comprises the first study, an epidemiological survey to estimate the prevalence of recreational running, and explore demographic, behavioral and psychological characteristics of Portuguese runners. This study was developed to describe running in Portugal, because there was no representative data available on how many people were running, how, and why. Behavioral patterns are context-sensitive and, therefore, a better understanding of the current Portuguese's runners is

useful for the promotion of more effective running-promotion interventions for the Portuguese population.

- **Chapter 3** presents the second study, a systematic review of psychological and behavioral correlates of recreational running. This was the first systematic review providing a comprehensive outlook on psychological and behavioral correlates of recreational running across populations, and can contribute to inform and guide interventions focused on helping people sustain regular running.
- Sequentially, the third study (**Chapter 4**) was designed to develop a brief, theory-based intervention, delivered in a digital format, aimed at increasing the maintenance of running behaviors over time, and test its acceptability and feasibility with a pilot study. The first phase of the development of such a pioneer intervention is critical to its fine-tuning and adaptation, allowing the economy of resources, greater participant engagement, and better results in the main trial.
- The last chapter (**Chapter 5**) integrates and discusses the main empirical findings from the three studies, providing a comprehensive understanding of recreational running and factors associated to its maintenance. Practical implications and directions for future research are presented.
- Finally, the Appendices section includes:
 - i. the self-report instruments used;
 - ii. the abstracts of oral/poster communications related to the studies presented in the thesis.

Due to the nature of this thesis, which is based on independent peer-review articles, there may be some duplication of information, particularly in the introduction and discussion sections of the articles. Chapter 2 to 4 are presented as individual empirical manuscripts, with

their own abstract, introduction, methods, results, discussion and references sections. Each of these articles followed the format requested by the journal of publication. The first and the last chapters intend to interrelate the content of this series of articles, providing an overall coherence to this document.

List of articles and communications as part of the doctoral research

The investigation carried out as part of the present doctoral research program resulted in the following publications and communications (oral/poster) as first author:

Peer-reviewed articles

Pereira HV, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2021) Running prevalence in Portugal: Socio-demographic, behavioral and psychosocial characteristics. PLoS ONE 16(1): e0245242. <https://doi.org/10.1371/journal.pone.0245242>.

Pereira HV, Palmeira, A. L., Encantado, J., Marques, M. M., Santos, I., Carraça, E. V., & Teixeira, P. J. (2021). Systematic Review of Psychological and Behavioral Correlates of Recreational Running [Systematic Review]. *Frontiers in Psychology*, 12(1162). <https://doi.org/10.3389/fpsyg.2021.624783>

Pereira HV, Palmeira AL, Encantado J, Marques MM, Carraça EV, Silva MN, Santos I, Teixeira PJ (2021). Keep on running – a randomized controlled trial to test a digital evidence-based intervention for sustained adoption of recreational running: rationale, design and pilot feasibility study, *Health Psychology and Behavioral Medicine*, 9:1, 149-164, DOI: 10.1080/21642850.2021.1885410.

Non-published abstracts (poster communications)

Pereira HV, Palmeira AL, Silva MN, Santos I, Rovisco R, Morgado J, Teixeira PJ (2016).

Associations between needs satisfaction and behavioral regulations in a sample of recreational runners. The 6th International Conference on Self-Determination Theory 2016.

Pereira HV, Palmeira AL, Carraça EV, Marques MM, Santos I, Teixeira PJ (2017).

Caracterização da corrida em Portugal em 2017. VIII Congresso Internacional da Corrida.

Pereira HV, Palmeira AL, Carraça EV, Marques MM, Silva MN, Teixeira PJ (2018) Keep

on Running: Evidence-based digital intervention for the sustained adoption of recreational running: study protocol. Center for Behavior Change Conference 2018.

Pereira HV, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2018).

Motivation of Portuguese recreational runners: The Keep on Running national survey.

International Society of Behavioral Nutrition and Physical Activity Annual Meeting 2018.

Pereira HV, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2018).

Prevalence of recreational running and behavioral characteristics of Portuguese runners: The Keep on Running national survey. VII International Society for Physical Activity and Health Congress, 2018.

Pereira HV, Palmeira AL, Encantado E, Marques MM, Santos I, Carraça EV, Teixeira PJ

(2019). Validation of the motives of recreational runners scale – MORS. 7th International Conference on Self-Determination Theory 2019.

Pereira HV, Encantado E, Palmeira AL, Teixeira PJ (2019). Systematic review of psychological and behavioural correlates of recreational running. International Society of Behavioral Nutrition and Physical Activity Annual Meeting 2019.

List of articles and communications as part of complementary work

The complementary work during the present doctoral research program also resulted in the following publications and communications (oral/poster):

Peer-reviewed articles

van Nassau F, van der Ploeg HP, Abrahamsen F, Andersen E, Anderson AS, Bosmans JE, Bunn C, Chalmers M, Clissmann C, Gill JM, Gray CM, Hunt K, Jelsma JG, La Guardia J.G., Lemyre PN, Loudon DW, Macaulay L, Maxwell DJ, McConnachie A, Martin A, Mourselas N, Mutrie N, Nijhuis-van der Sanden R, O'Brien K, **Pereira HV**, Philpott M, Roberts GC, Rooksby J, Rost M, Røynesdal Ø, Sattar N, Silva MN, Sorensen M, Teixeira PJ, Treweek S, van Achterberg T, van de Glind I, van Mechelen W, Wyke S (2016) Study protocol of European Fans in Training (EuroFIT): a four-country randomised controlled trial of a lifestyle program for men delivered in elite football clubs. *BMC Public Health*, 16:598.

van de Glind I, Bunn CJ, Andersen E, Jelsma J, Morgan H, **Pereira HV**, Roberts G, Rooksby J, Røynesdal Ø, Silva MN, Sørensen M, Treweek S, van Achterberg T, van der Ploeg HP, van Nassau F, Nijhuis-van der Sanden R, Wyke S (2017). The intervention process in the European Fans in Training (EuroFIT) trial: a mixed method protocol for evaluation. *Trials*, 18:356.

Wyke S, Bunn C, Andersen E, Silva MN, van Nassau F, McSkimming P, Kolovos S, Gill JMR, Gray CM, Hunt K, Anderson AS, Bosmans J, Jelsma JGM, Kean S, Lemyre N, Loudon DW, Macaulay L, Maxwell DJ, McConnachie A, Mutrie N, Nijhuis-van der Sanden M, **Pereira HV**, Philpott M, Roberts GC, Rooksby J, Røynesdal ØB, Sattar N, Sørensen M, Teixeira PJ, Treweek S, van Achterberg T, van de Glind I, van Mechelen W, van der Ploeg HP (2019) The effect of a programme to improve men's sedentary time and physical activity: The European Fans in Training (EuroFIT) randomised controlled trial. *PLoS Med*, 16(2):e1002736.

Non-published abstracts (oral and poster communications)

Pereira HV (2016). Modificação Comportamental - O Exemplo da Atividade Física. XII MedSCOOP - Medical Students' Cooperation Meeting

Silva MN, **Pereira HV** (2016). O clube de futebol como promotor de saúde na população: Ir “à bola” com estilos de vida ativos no programa EuroFIT. 18º Simpósio Anual da Fundação Portuguesa de Cardiologia.

Silva MN, **Pereira HV** (2016). O projeto EuroFIT: O futebol ao serviço da alteração comportamental em saúde. 11º Congresso Nacional de Psicologia da Saúde.

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CHAPTER 2

Running prevalence in Portugal: Socio-demographic, behavioral and psychosocial characteristics (Study I)¹

¹ **Pereira HV**, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2021)

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Abstract

The purpose of this study was to cross-sectionally estimate the prevalence of recreational running in Portugal and describe characteristics of adult recreational runners. A random representative sample of 1068 Portuguese adults was selected. Socio-demographic information, physical activity habits and running behavior were assessed. Recreational runners' training habits, motivations, barriers, vitality and flow were also assessed. The prevalence of recreational running in Portugal was 10.6%. It was higher in men (14.6% vs. 6.6%, $p = .024$) and in younger runners (13.6% vs. 7.7%, $p = .026$). Participants ran on average 3 times, 20 kilometers and 3 hours per week. General health orientation (88%), self-esteem (63%), and life meaning (57%) were the most predominant motives for running, while time was the most prevalent barrier (43%). This first Portuguese running prevalence representative study, indicates that almost 11% of adults ran regularly, and describes correlates of running, which can inform future running promotion interventions.

1. Introduction

Regular physical activity (PA) is important for staying healthy and prevent chronic diseases, such as overweight and obesity, cardiovascular disease, diabetes, and several types of cancer.[1-3] Despite the evidence about the positive relationship between PA and health, 60% of Europeans (and 74% of Portuguese) aged 15 and above, report to never or rarely exercise or play sports, and 56% (and 79% in Portugal) never or seldomly engage in PA. [4] In Portugal, objectively measured PA data indicate that 74% of Portuguese adults do not meet the World Health Organization (WHO) PA recommendations. [5]

To date, considerable research has addressed the mechanisms of PA initiation among sedentary individuals, but fewer research has addressed how to support long-term maintenance and engagement among those already active. [6] PA maintenance refers to previously sedentary individuals who increased their PA level and maintained regular PA for at least 6 months. [7] Several contextual and individual factors influence PA maintenance. Individual factors such as motivation, goal setting, self-regulation skills (e.g. self-monitoring of behavior), and self-efficacy have been associated with sustained PA behavioral changes. [8, 9] Additionally, exercise induced flow and vitality can also contribute to exercise intrinsic reward, and may be associated with exercise adherence rates. [10-12] Finally, a favorable built environment positively influences physical activity. [13] For instance, the role of active communities, including increases in PA accessibility, routes for walking and bicycling, providing protected and suitable access to parks, sidewalks, greenways, have been shown to play a role in PA promotion. [14]

Running is a unique leisure activity that requires specific behavioral self-regulation processes, which are the object of interest from the PA maintenance research community, in part because of the long hours of training and numerous running events with a large number of participants. [15] Running is one of the most popular leisure exercises, [16] probably

because it is inexpensive and can be performed anywhere, almost at any time. In addition, it requires little technical skills and it is easy to learn. The health benefits of running are vast, including prevention of obesity, hypertension, dyslipidemia, type 2 diabetes, osteoarthritis and hip replacement, benign prostatic hypertrophy, respiratory disease, cancer, disability, reduction of cardiovascular, and all-cause mortality. [17-19]

Like other countries, Portugal has seen a steep increase in running as a PA preference, and the number of running events appears to have increased exponentially over the past 20 years. Previous data suggest a prevalence between 5.5 and 8.5% of running among the Portuguese population. [20, 21] A recent survey, concerning levels of self-reported PA and preferences of leisure-time activities of Portuguese adults, indicated that running was the preferred leisure-time PA by 18% of men and 8% of women. [16] Prevalence data from other European countries vary between approximately 30% in Denmark, 23% in Spain and England, 19% in Belgium and France, 18% in the Netherlands, 15% in Finland, 13% in Germany and 12% in Slovenia. [20] Data from USA[22] and Australia[23] suggest a 15% of participation in running and jogging activities.

Longitudinal data from a sample of runners suggest that behavioral skills, self-efficacy, social support and enjoyment may be of particular importance for the adoption of regular activity, and are likely to have a key role in encouraging running maintenance. [24, 25]

In order to promote PA and running in a sustainable manner, it is crucial to understand individuals' experiences and outcomes, as well as the factors that predispose them to engage and maintain this activity. This study contributes to filling this gap in the literature by estimating the prevalence of recreational running in Portugal and describing the characteristics of adult recreational runners, including socio-demographic, behavioral (e.g., running history and patterns), and psychological (e.g. motives, barriers, vitality and flow).

2. Materials and methods

2.1. Study design

This was a cross-sectional study based, through a PA and running habits survey applied during October 2017, to a Portuguese representative sample of adults.

2.2. Participants

Participants were selected based on a computer generated probabilistic (digit randomization) sample of telephone numbers, which were stratified by country region. The sampling unit was private residential households with a landline and/or mobile telephone. To assume representativeness of the Portuguese population (mainland Portugal and islands) by gender and age group (18-40 yrs.; 41-65 yrs.), a sample size of 1068 individuals (267 for each gender-age group) was estimated, considering a response rate of 50%, with a 95% confidence interval and a country sampling error of 3%. Considering a previous estimate of running prevalence in the Portuguese population of about 10%, [21] the expected sample of recreational runners was 106 (with a 90% confidence interval, and 5% country sampling error).

Of the 2246 initial contacts, 1150 accepted participating in the study (participation rate of 51.2%), 40 were excluded due to chronic diseases, 10 due to pregnancy, and 16 due to incomplete answers (unable to complete de questionnaire). Therefore, the final sample was constituted by 1084 eligible individuals, i.e., with Portuguese nationality and aged between 18 to 65 years. Sixty participants failed to provide valid data on weekly PA, and were not included in some PA analyses. All participants gave their informed consent before entering the study.

Survey

This study was approved by the Ethics Committee of the Faculty of Human Kinetics, University of Lisbon (CE-FMH 13/2017).

First, a panel of running and PA experts from academic and non-academic public and private institutions, agreed on a definition of recreational running. In this process, a literature-based definition [26-28] was sent to 10 experts. After a content analysis of 8 definitions, the research team arrived at the following definition: a recreational runner is someone who runs at least 2 days per week or at least 60 minutes per week, over the past 3 months, excluding any preparation for competitive sports. Then, a telephone-based survey was developed, in close collaboration with this panel. The survey assessed socio-demographic characteristics (e.g., gender, age, marital status), weekly physical activity habits (IPAQ-SF[29]) preference for non-sedentary activities (ACI[30]) attitudes toward PA (e.g., PA prevalence and health benefits), and running behavior (weekly sessions and time). For those classified as recreational runners in accordance to the definition aforementioned, running behavior (including self-reported running frequency, time, distance, location, and monitoring devices used), behavioral regulations (e.g., introjected, integrated, etc. – BREQ-3[31]) motives for running (e.g., health or challenge – MOMS[32]), vitality levels (e.g., feelings of energy – SVS[33]), experience of flow (e.g., task focus – DFS[34]) and barriers to running (e.g., time or injuries) were also assessed. Short versions of previously validated scales, representing these different constructs were adapted for usage in epidemiological surveys through telephone interview. After eligibility checking, two questions about running frequency and volume (minutes) determined if the participant could be classified as a recreational runner. If so, running behavior, motives and regulations, as well as vitality and flow, were assessed (Full version of the questionnaire can be found in <https://osf.io/qmvws/>).

Data was collected by fieldwork researchers from the Institute of Environmental Health / Institute of Preventive Medicine & Public Health, Faculty of Medicine, University of Lisbon, through a 20-minute telephone interview. All researchers received equal training regarding the explanation of the goals of the study and conduction of the interviews. A quality control

procedure was conducted by reapplying (by a different interviewer) the same questionnaire to 10% of the initial sample. The dataset used for the analysis is publicly and freely available at <https://osf.io/qmvws/>.

2.3. Data analysis

Statistical analyses were conducted using IBM SPSS® version 23. The significance level was set at $p < 0.05$ for all tests. Descriptive statistics were expressed in relative frequencies or mean \pm standard deviation. Differences between runners and non-runners regarding socio-demographic factors, PA habits, attitudes toward PA, and differences between gender and age groups regarding running motives, behavioral regulations, vitality, flow, and barriers for running, were analyzed using independent-sample t tests and effect size (Cohen's d) calculations, for continuous variables and Chi-square (χ^2) tests, for categorical variables. Pearson correlations were used to examine associations between the motivational running behavior variables and the psychological outcomes.

3. Results

3.1. Prevalence of recreational running

The prevalence of recreational running in Portugal was 10.6%. The prevalence was higher in men when compared with women (14.6% vs. 6.6%; χ^2 , (1, N = 115) = 5.089, $p = 0.024$) and in younger than in older participants (13.6% vs. 7.7%; χ^2 , (1, N = 115) = 4.975, $p = 0.026$).

3.2. Characteristics of recreational runners

Regarding running behavior, runners reported running 3.4 ± 1.3 sessions/week, 20.0 ± 10.7 km/week, and 3.0 ± 2.3 h/week. 73% of the participants prefer to run alone (vs. 13% preferring a “running group”), 69% also do other physical activities (of which 58% reported doing warm-up and stretching exercises), 69% use technology during running sessions (of

which 45% use a watch and music features), 68% report running in a natural setting (of which 58% run “on roads”). Of all runners, 21% have participated in at least one race/event (13% engaged in 2 to 5 events per year) and 15% had an injury in the previous year (with an average of a 7 weeks recovering period).

3.3. Age and gender comparisons

General health orientation, self-esteem, and life meaning were the most prevalent motives for running (57-88%), while (lack of) time was the most prevalent barrier (43%). When comparing motives and behavioral regulations across gender and age groups (Table 1), the only significant differences detected were that younger people tend to run more for the feeling of competition ($p = 0.01$) and personal goal achievement ($p = 0.03$) motives.

3.3.1. Running motivation, behavior and psychological outcomes

Table 2 presents associations of motives and behavioral regulations with running behavior, namely weekly running frequency, distance and time. Personal goal achievement was associated with weekly distance ($r(113) = .253; p < .014$) but no other significant association was noted.

Associations of motives and behavioral regulations with vitality and experience of flow are shown in Table 3. More autonomous forms of motivation for running (identified, integrated, and intrinsic), and “Life Meaning” and “General Health Orientation” motives were associated with higher vitality and experience of flow.

		Female (36)		Male (79)		18-40 Yrs. (73)		41-65 Yrs. (42)			
		M(SD)	M(SD)	T	<i>P</i>	<i>d</i>	M(SD)	M(SD)	T	<i>P</i>	<i>d</i>
MOMS	Psychological coping	2.6 (0.9)	2.6 (0.8)	-0.40	.69	.08	2.7 (0.8)	2.4 (0.9)	1.92	.06	.36
	Self-esteem	3.4 (1.1)	3.4 (1.0)	0.36	.72	.07	3.5 (1.0)	3.2 (1.1)	1.28	.20	.24
	Life meaning	3.4 (0.9)	3.4 (0.9)	-0.07	.95	.03	3.4 (0.8)	3.3 (0.9)	0.77	.44	.15
	General health orientation	4.3 (0.8)	4.1 (0.7)	1.32	.19	.25	4.2 (0.7)	4.2 (0.8)	-0.07	.94	.01
	Weight concern	2.2 (1.1)	2.3 (1.0)	-0.32	.75	.06	2.2 (1.1)	2.2 (0.9)	0.01	.99	.00
	Recognition	2.2 (0.8)	2.0 (0.8)	1.65	.10	.31	2.0 (0.9)	2.0 (0.7)	-0.09	.93	.02
	Competition	2.2 (0.9)	2.4 (1.0)	-0.89	.38	.17	2.5 (1.0)	2.0 (0.8)	2.83	.01	.53
	Affiliation	2.2 (1.1)	2.3 (1.0)	-0.32	.75	.06	2.2 (1.1)	2.2 (0.9)	0.01	.99	.00
	Personal goal achievement	2.1 (0.9)	2.3 (1.0)	-1.29	.20	.24	2.4 (1.1)	2.0 (0.8)	2.23	.03	.42
	BREQ-3	External regulation	1.6 (0.8)	1.8 (0.7)	-1.09	.28	.21	1.7 (0.8)	1.8 (0.6)	-0.61	.54
Introjected regulation		2.7 (0.9)	2.6 (0.9)	0.61	.55	.11	2.7 (1.0)	2.5 (0.7)	1.60	.11	.30
Identified regulation		4.3 (0.8)	4.2 (0.5)	0.71	.48	.13	4.2 (0.6)	4.1 (0.6)	1.01	.31	.19
Integrated regulation		3.6 (1.0)	3.5 (1.0)	0.53	.60	.10	3.4 (1.0)	3.7 (1.0)	-1.39	.17	.26
Intrinsic motivation		4.1 (0.8)	3.8 (0.8)	1.72	.09	.32	3.9 (0.8)	4.0 (0.7)	-0.23	.82	.04

Table 1. Motives and behavioral regulations across age and gender groups of runners

		Weekly frequency	Weekly distance (km)	Weekly time (min)
MOMS	Psychological coping	-0.13	-0.08	0.03
	Self-esteem	-0.09	-0.14	-0.02
	Life meaning	-0.01	0.14	-0.08
	General health orientation	-0.03	0.03	-0.06
	Weight concern	0.00	0.16	-0.15
	Recognition	0.09	0.07	-0.10
	Competition	0.07	0.15	0.04
	Affiliation	0.00	0.16	-0.15
	Personal goal achievement	0.13	0.25*	0.02
BREQ-3	External regulation	0.01	-0.12	-0.07
	Introjected regulation	0.06	-0.05	-0.09
	Identified regulation	0.00	0.09	0.05
	Integrated regulation	0.16	0.13	-0.08
	Intrinsic motivation	0.03	0.03	-0.06

Table 2. Correlation between motives and behavioral regulations with quantitative measures of running behavior. N=115; * $p < .05$.

3.4. Runners vs. non-runners

The percentage of runners in a civil partnership/marriage was lower than in the non-runner sample (49.0% vs. 66.0%; χ^2 , (1, N = 917) = 11.38, $p = .001$). There was a higher percentage of runners with a third level education degree (64.63% vs. 41.38%; χ^2 , (1, N = 790) = 16.14, $p < .001$) and earning more than 1456€ per month (46.9% vs. 33.3%; χ^2 , (1, N = 1025) = 8.06, $p = .005$) in comparison to non-runners.

Table 4 shows weekly PA levels of recreational runners vs. non-runners. Sixty participants failed to provide valid data on weekly PA. Although vigorous PA, measured in minutes, was higher in runners ($p < 0.001$), there were no differences between runners and non-runners regarding moderate PA or walking. Regarding the preference for non-sedentary activities, runners presented a higher overall ACI score than non-runners ($p < 0.05$). About 75% of runners reported selecting the stairs instead of the elevator, stand instead of seating, and to walk instead of driving in their daily routine.

		Vitality	Flow
MOMS	Psychological coping	0.03	0.05
	Self-esteem	0.08	0.18
	Life meaning	0.24*	0.28**
	General health orientation	0.28**	0.42**
	Weight concern	0.13	0.12
	Recognition	0.18	0.13
	Competition	0.01	0.03
	Affiliation	0.13	0.12
	Personal goal achievement	-0.04	0.06
BREQ-3	External regulation	0.05	0.04
	Introjected regulation	0.11	0.16
	Identified regulation	0.36**	0.47**
	Integrated regulation	0.53**	0.53**
	Intrinsic motivation	0.43**	0.45**

Table 3. Correlations between motives and regulations with vitality and flow. $N = 115$; ** $P < .001$; * $p < .05$.

	Non-runners (910)	Runners (114)	T	<i>P</i>	<i>d</i>
Vigorous PA (min/wk)	32.3 (52.5)	72.3 (46.6)	-7.77	<.001	.49
Moderate PA (min/wk)	79.3 (68.7)	73.0 (67.1)	0.93	.35	.06
Walking (min/wk)	47.7 (51.7)	51.9 (58.9)	-1.00	.32	.06
Activity Choice Index	2.6 (0.7)	2.9 (0.7)	-3.00	<.003	.19

Table 4. Weekly PA levels in recreational runners vs. non-runners in minutes/week.

Table 5 presents attitudes toward PA of recreational runners and non-runners. Almost all Portuguese individuals believe that PA increases quality of life but, surprisingly, only 3% knew the current WHO PA recommendations for adults. The great majority of runners enjoy doing sports and PA and believe that more people are nowadays engaging in PA, and between 80-90% believe that active commuting is important and state having a group friends to do PA with. Compared with non-runners, runners reported enjoying PA more frequently, recognizing that now, there are more people engaging in PA, having friends who can do PA with, and more free PA opportunities (all $p < 0.05$).

Regarding health perception, 82% percent of runners state having a good or excellent health, comparing to 58% of non-runners ($\chi^2, (1, N = 1021) = 23.40, p < .001$).

	non-Runners (910)	Runners (114)	Comparison
PA increases quality of life	99%	99%	$\chi^2, (2, N = 1035) = 1.05, P = .59$
Enjoy doing sport and PA	87%	98%	$\chi^2, (2, N = 1035) = 22.66, P < .001$
More people are now engaging in PA	92%	95%	$\chi^2, (2, N = 1035) = 8.51, P < .05$
Active commuting is important	93%	89%	$\chi^2, (2, N = 1035) = 5.96, P = .051$
Having a group of PA friends	69%	84%	$\chi^2, (2, N = 1035) = 15.82, P < .001$
There are free PA opportunities	58%	74%	$\chi^2, (2, N = 1035) = 11.06, P < .05$
Inability to do PA at the moment	18%	4%	$\chi^2, (2, N = 1035) = 21.94, P < .001$

Table 5. PA attitudes of recreational runners vs. non-runners

4. Discussion

The present study revealed that in Portugal 10.6% (14.6% - men; 6.6% - women) of adult individuals were recreational runners by 2017. The prevalence was higher in men compared to women and in younger participants compared to the older population group. Runners reported running on average approximately 3 times, 20 kilometers and 3 hours per week. The prevalence of running behavior among Portuguese adults found in this study, is slightly lower than the preferences for running in the leisure-time activities survey previously published. [16] Moreover, it is lower than those found in other countries, which range from approximately 30% in Denmark and 12% in Slovenia. [20] Data from USA [22] and Australia [23] suggest a 15% of participation in running/ jogging activities. Due to differences

in definitions and survey methodology, levels of participation in running cannot be rigorously comparable.

This prevalence result is higher than the one reported by Scheerder and coworkers[20] who previously estimated running prevalence in Portugal, by multiplying the running percentages in Spain with their sport-participation rate, based on Eurobarometer data, and then multiplying it by Portugal's sport-participation rate. According to this estimation, the running participation rate for Portugal in 2015 was then 5.5%. Results are also higher than those emerging from another data set, in which the prevalence was 8.5%.[21] However, evaluation approaches are not entirely comparable. Gender differences in running participation are similar to those found previously [21] and reflect gender inequalities in overall PA involvement. [4]

Relative to the running motives, results suggest that intrinsic motives (general health orientation, self-esteem and life meaning) are more prevalent than controlled ones (weight concern, recognition and personal goal achievement) in recreational runners. Our data also suggests that this set of runners presents higher score in autonomous forms of behavior regulation (intrinsic, integrated and identified). Previous research about running motives suggests physical and mental health as the main motives for engaging in running. [35-38] Additionally, these findings are similar with those found with female ultra-runners, proposing general health orientation, self-esteem and psychological coping as the strongest motivational factors, [36] with half, full and ultra-marathoners, identifying health orientation, personal goal achievement and self-esteem. [37] Besides health and wellbeing, one other study suggests challenge[39] as the main motive for engaging in running but these results were not confirmed by our data.

The difference between younger and older runners' motives (younger being more motivated by competition and personal goal achievement) was previously analyzed by Masters and

colleagues, [39] who indicated that first time (“rookie”) runners were more concerned with health, weight and personal goal achievement. More recently, it was found that younger runners were more motivated by personal goal achievement, such as running to beat personal best times. [15]

Our data suggests that the most prevalent barrier is lack of time. Although we did not find any study about barriers towards running exercise in already active individuals, lack of time was reported as the main obstacle to physical activity among inactive adults. [40, 41]

Besides an association between personal goal achievement motive and weekly distance ran by the participants, no other relation between motivations and running behavior measures (weekly running distance and time, and years of running experience) was found. Although there was low association between motivational variables and quantitative measures of running behavior, intrinsic motives, together with autonomous forms of behavior regulation were related to positive health outcomes (vitality and flow). Similar results were found longitudinally in a sample of runners, [42] in systematic reviews, [43, 44] and agree with self-determination theory (SDT) basic tenets, [45] by which qualitative aspects of motivation should have a closer association with qualitative aspects of the behavior, rather than with its amount (quantitative aspect).

This data suggests recreational runners report higher VPA compared to non-runners, but not MPA and walking. Walking and MPA comparison might be hindered by IPAQ-SF overestimation, and small accuracy of this instrument at moderate PA levels. [29] There are some differences in reported running and IPAQ-SF measures for VPA, probably due to overestimation of running or methodologic issues related to IPAQ-SF calculations. [29] Regarding attitudes towards PA, it seems that both runners and non-runners believe in PA health-enhancing potential, but runners tend to enjoy PA, have people with whom to practice and recognize PA opportunities more frequently than non-runners.

Although our results confirm previous studies on physical activity motivation, the use of self-reported instruments to estimate running and weekly PA might lead to some bias, and the cross-sectional nature of this investigation prevents determining the causal direction of the associations. Longer prospective and intervention studies are thus required to clarify how motivational dynamics influence psychological wellbeing and also running maintenance.

5. Conclusions

This is the first Portuguese running prevalence study with a representative sample and the first to address psychological determinants of recreational running. The prevalence can be considered high (about one in every 10 adults runs regularly for exercise) and may have increased since 2017. Moreover, results suggest that intrinsic motives (general health orientation, self-esteem, and life meaning) and autonomous forms of behavior regulation (intrinsic, integrated, and identified) are significant for these runners. With this in mind, public policies and marketing efforts could target these constructs, aiming to promote recreational running initiation and/or maintenance, by helping runners to find their own motivation, through the satisfaction of the three psychological needs (competence, autonomy, and relatedness) identified by SDT, and training self-regulation strategies.

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CHAPTER 3

Systematic review of psychological and behavioral correlates of recreational running (Study II)²

²**Pereira HV**, Palmeira AL, Encantado J, Marques MM, Santos I, Carraça EV, Silva CS, Teixeira, PJ (2021). Systematic review of psychological and behavioral correlates of recreational running. *Frontiers in Psychology* (in press).

Abstract

Introduction: The aim of this review was to systematically synthesize the published literature describing the psychological and behavioral correlates of recreational running in adults,

defined as running for leisure, with or without a competitive component. *Methods:*

Quantitative research published in peer-reviewed journals until January 2021 were included.

Studies were identified through MEDLINE, PsycINFO, SPORTDiscus, and Web of Science,

and were included in this review if they 1) were aimed at recreational running, 2) included a general adult samples (18 years or older, without a diagnosed medical condition or metabolic disorder), and 3) assessed psychological or behavioral correlates of recreational running.

Results: Fifty-six articles reporting 58 studies met the eligibility criteria and were included.

There were 27 cross-sectional studies, 12 longitudinal studies, and 19 trials (8 non-controlled trials, 5 controlled trials and 6 randomized controlled trials) (n = 37501, 18 to 77 years old,

43% women). Twenty-eight studies assessed antecedents of running behavior, and 25 studies used running behavior as treatment or predictor of a given effect or outcome. Four studies

examined both predictors and outcomes of running. Thirty-one studies showed poor quality,

while 20 had fair and 7 good quality. Motives were the most frequently studied antecedent of running behavior (k = 19), and results suggest that the highest ranked or more prevalent motives were physical health, psychological motives, and personal achievement.

Additionally, perceived control, attitude towards running, intention and subjective norms, self-efficacy and social support may also played a role in the adoption of recreational running.

Moreover, improvements in mood (k = 10) and wellbeing (k = 10) were the most frequently reported positive outcomes of running. Reductions in depression, anxiety, and stress were also

reported in included studies. *Discussion:* To our knowledge, this is the first systematic review

on this topic. The identification of behavioral and psychological correlates of recreational running across populations can contribute to inform and guide a public policy agenda,

focused on helping people sustain regular physical activity, through a modality they have chosen and appear to enjoy.

Introduction

Recreational running, defined as running for leisure, with or without a competitive component, has increased exponentially (Scheerder et al., 2015). Although determined with different criteria, running prevalence in European countries vary between 31% in Denmark (considering running regularly in the last 12 months), 19% in Belgium (considering running as a leisure-time sports activity) and France, 18% in the Netherlands (considering participating at least once a year in a running activity), 15% in Finland, 13% in Germany, 6% in Spain, and 5% in the UK (considering running for at least four occasions in the previous 28 days, for at least 30 minutes, at moderate or vigorous intensity) (Scheerder et al., 2015).

Portuguese adults indicated that running was the preferred leisure-time PA for 18% of men and for 8% of women (Teixeira et al., 2019), and the overall prevalence of recreational runners (considering at least two sessions and 60 minutes per week) was 10.6% (Pereira et al., 2021). Regarding non-European countries, there was a rate of participation in running and jogging activities of 16% in Australia (ASC, 2016) and 15% in the USA (Running-USA, 2017). Many factors contribute to the growth of recreational running, including the physical and psychological health benefits (Lavie et al., 2015; Nezelek et al., 2018), the low cost, and the fact that it can be performed in various contexts and requires little technical skills. The health benefits of running are vast, including prevention of obesity, hypertension, dyslipidemia, type 2 diabetes (Lavie et al., 2015), reduction of cardiovascular and all-cause mortality (Lee et al., 2014), but also cancer mortality (Pedisic et al., 2019).

Recreational runners tend to run often, for more than 5 kilometers, and all year long (Bell & Stephenson, 2014), in many cases reporting many hours of training (Zach et al., 2017). This

suggests the existence of potentially unique motivational and behavioral factors related with running, training for and completing a recreational race (Zach et al., 2012).

Most of the running-related literature focused on injuries (van der Worp et al., 2015), addictions (Hausenblas et al., 2017), or health-related outcomes (Pedisic et al., 2019), but understanding the interrelated psychological and behavioral attributes that explain *why* some individuals are regular (often avid) runners is also of importance to physical activity and public health research. Identifying running correlates, both antecedents or outcomes can contribute to more effective and tailored intervention approaches to promote the adoption and sustainability of recreational running.

One review has previously examined determinants for running, but with the purpose of developing a self-report questionnaire and this was conducted using a systematic and comprehensive approach (Masters et al., 1993). Further, that work was published in 1993, and many primary studies (cross-sectional, longitudinal and experimental) have been conducted since then (e.g. Malchrowicz-Moko et al., 2018; Tjelta et al., 2017).

The aim of this systematic review was therefore to identify and summarize the published literature describing psychological and behavioral correlates of recreational running in adults.

Methods

This systematic review was conducted in agreement with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009), and the protocol pre-registered (PROSPERO: CRD42017068954).

Eligibility criteria

Studies examining psychological and behavioral correlates of recreational running in healthy adults (18 years or older), excluding preparation for any competitive sports, and without a diagnosed medical condition or metabolic disorder, were included. Studies conducted in

samples of recreational runners only, and studies including both runners and non-runners' groups, were included. Observational and experimental design studies were included with no restrictions on the setting (e.g. community). Studies had to report a quantitative estimate for the correlate(s). Study protocols, reviews, and commentaries were excluded. This review was limited to articles written in English and published in peer-reviewed journals.

Search Strategy and Study selection

Electronic databases (MEDLINE, PsycINFO, SPORTDiscus, and Web of Science) were searched for relevant articles published between the review from Masters and colleagues (1993), finished in December of 1991, and January of 2021, by combining keywords related with behavioral and psychological correlates of running behavior. Searches included a combination of four sets of terms: i) terms concerning the population of interest (e.g., recreational runners), ii) terms concerning the running behavior (e.g., jogging, marathon); iii) terms related to antecedents of the behavior (e.g., self-efficacy, motives); iv) and terms representing outcomes of running (e.g., mood, flow) (See Table 1. for the full search strategy). In addition, reference lists from previous reviews and retrieved papers were hand-searched to find additional studies.

Two researchers independently identified potentially eligible studies based on title, abstract and references, according to the pre-specified inclusion/exclusion criteria. The same two researchers independently reviewed the full text of the potentially relevant studies. All discrepancies were resolved by consensus. A third researcher resolved any remaining disagreements.

Table 1. Full search strategy

Population	Behavior	Correlates
NOT (injuries OR disease)	(“recreational running” OR “recreational runners” OR “jogging” OR “jog” OR “marathon”)	(motivation OR reasons OR intention OR regulations OR motives OR goals OR gains OR vitality OR happiness OR wellbeing OR mindfulness OR engagement OR sleep OR “cognitive clarity” OR “cognitive function” OR “body appreciation” OR “body functionality” OR “body attunement” OR affect OR emotion OR emotions OR enjoyment OR depression OR anxiety OR “quality of life” OR self- esteem OR self-worth OR “body image” OR self- efficacy OR attitudes OR “social norms” OR control OR “action plans” OR coping OR stress OR “decisional balance” OR self-schemata OR personality OR knowledge OR health OR barriers OR benefits OR beliefs OR “stages of change” OR “processes of change” OR skills OR diet OR smoking OR alcohol OR music OR meditation OR relaxation OR social OR flow OR “runners high” OR “dietary habits” OR mood OR “psychological health”)

Data extraction

A data extraction form was developed, informed by the PRISMA statement for reporting systematic reviews (Liberati et al., 2009). Data extraction included information about i) study details (authors, year, country of publication), ii) participants (age, gender, attrition and blinding), iii) study design and setting, iv) correlates of interest (motivation, reasons, intention, regulations, motives, goals, and gains, as well as vitality, happiness, quality of life, wellbeing, mood, enjoyment, relaxation, flow, mindfulness, meditation, runners high, engagement, sleep, cognitive clarity or function, body appreciation or functionality or attunement, affect, emotion, depression, anxiety, stress, self-esteem, self-worth, body image, self-efficacy, attitudes, social norms, control, action plans, coping, beliefs, stages or processes of change, skills, decisional balance, self-schemata, personality, knowledge, health, barriers, benefits, diet, smoking, alcohol, music, social, dietary habits, psychological health v) intervention length and characteristics, vi) psychosocial instruments, and vii) results.

Two researchers independently retrieved the data, and all discrepancies were resolved by consensus. A third researcher resolved any remaining disagreements.

Assessment of the risk of bias in individual studies

Two researchers independently assessed the methodological quality and risk of bias of included studies using the National Heart Lung and Blood Institute, National Institute for Health (NHLBI – NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (Thomas et al., 2004). Additional items from the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies (Armijo-Olivo et al., 2012) were added, in order to analyze study aspects exclusively related to interventions. The final tool comprised 20 items, addressing seven key domains: study design; blinding; representativeness (selection bias and withdrawals/dropouts); confounders; data collection; data analysis; and reporting. Each item was classified as present or absent. A global rating of Good (low risk of bias), Fair, or Poor (high risk of bias) methodological quality, was determined based on the present or absence of each item in (see Supplementary table S1 for methodological quality and risk of bias assessment of included studies). Two researchers independently rated each item and overall quality. Discrepancies were resolved by consensus. A third researcher resolved any remaining disagreements.

Data synthesis

Participants' sociodemographic characteristics, as well as the psychological and behavioral correlates of running behavior/participation were qualitatively synthesized and presented in tabular form (Supplementary table S1). Correlates were divided in antecedents and outcomes, depending on the purpose of the studies and its theoretical frame.

Results

Study Selection

The literature search yielded 4225 potentially relevant studies (after duplicates removal). After titles and abstract screening, 4140 studies were excluded. Common reasons for exclusion were the study design (qualitative study, commentary or review), not meeting subjects inclusion criteria, and the presence of outcomes related to the preparation for competitive sports (performance-oriented). The full text of the remaining 93 eligible studies was retrieved and reviewed, resulting in the inclusion of 56 articles (see Figure 1).

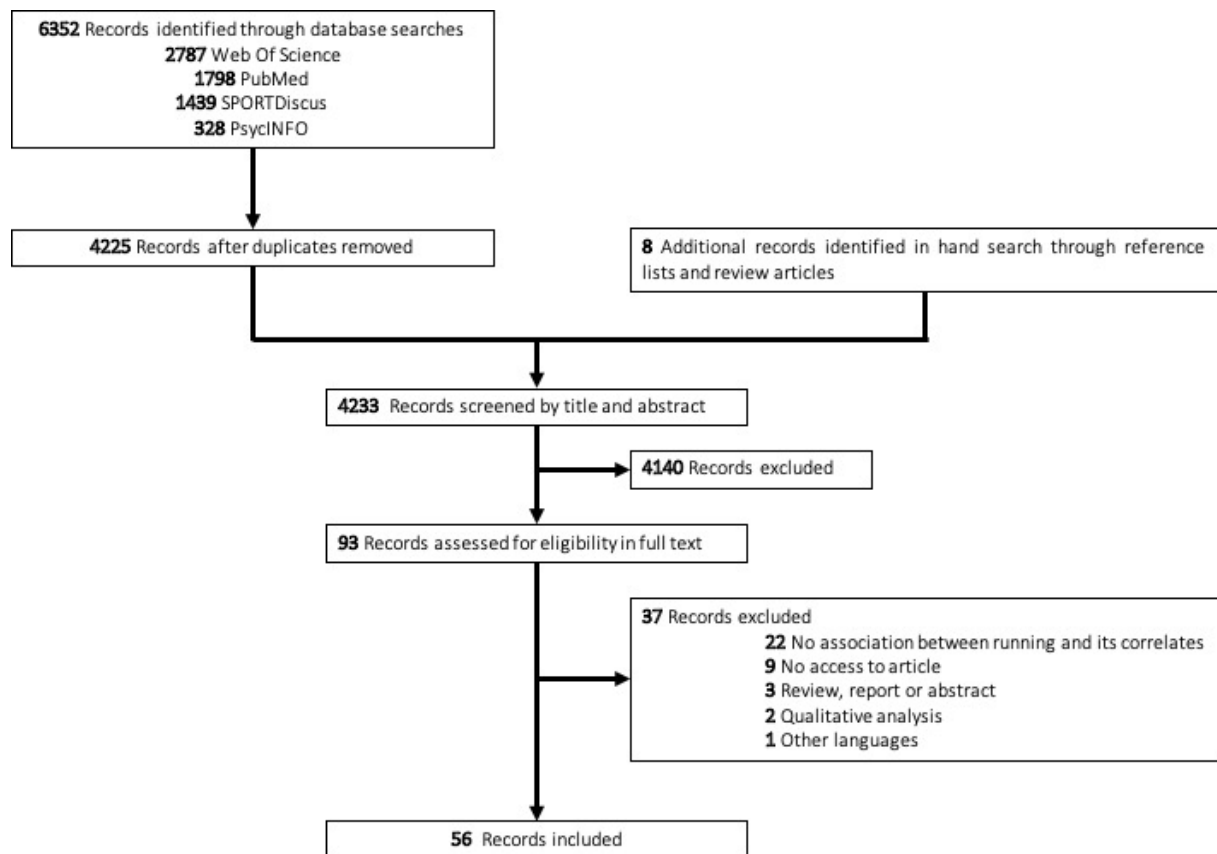


Figure 1. Flowchart of studies

Description of included studies

There were 27 cross-sectional studies, 12 longitudinal studies, and 19 trials (8 non-controlled trials, 5 controlled trials and 6 randomized controlled trials). Table 2 shows the characteristics of the included studies. In total 37501 healthy participants took part in all the studies reviewed, with a range of ages of 19 to 77 years old, and 43% were women. Most studies used samples of regular runners from running groups, communities or organized events.

Quality of the studies and risk of bias

Thirty-one studies showed poor quality, while 20 had fair and 7 good quality. Generally, the research objective was clear (k = 56, 96.6%), subjects were recruited from the same or similar populations (k = 52, 89.7%), exposure and outcome measures were clearly defined, valid, reliable, and implemented consistently across all study participants (k = 52, 89.7%), and the study population clearly specified and defined (k = 37, 78.7%). On the other hand, only two studies presented sample size and power calculations (3.4%), only five had a participation rate of eligible persons of at least 50% at baseline (8.6%) and three had the outcome assessors blinded to the exposure status of participants (5.2%) (Armijo-Olivo et al., 2012) (Supplementary table S2. Methodological quality and risk of bias assessment of included studies).

Table 2. Characteristics of the included studies

Study design (k = 58)	Number of studies	Antecedents (k = 32)	Number of studies	Outcomes (k = 29)	Number of studies
CS	27	Motives	19	Mood	10
LG	12	Intention	4	Wellbeing	10
NCT	8	Attitude towards run	3	Depression	6
NRCT	5	Perceived control	3	Anxiety	5
RCT	6	Self-efficacy	3	Cognitive function	4
Sample size		Social support	3	Affect	4
<100	22	Behavior regulation	3	Self-efficacy	3
100-199	12	Mood	2	Vitality	3
200-299	6	Anxiety	2	Flow	3
>299	18	Depression	2	Stress	2
Participants (k = 57)		Subjective norms	2	Perceived health	2
Gender		Self-motivation	1	Life satisfaction	2
Women only	4	Flow	1	Positive orientation	1
Men only	6	Experience	1	Self-esteem	1
Both genders	47	Involvement	1	Enjoyment	1
Age		Shame	1	Fatigue	1
19-44	36	Pride	1	Emotion regulation	1
45-66	8	Action planning	1		
Broad range	11	Health	1		
QA (k = 58)		Process of change	1		
Poor	31				
Fair	20				
Good	7				

RCT - Randomized controlled study; CCT - Controlled clinical trial; NCCT – Non-controlled clinical trial; LG - Longitudinal study; CS - Cross sectional study; QA – quality assessment

Synthesis of results

This systematic review analyzed the published literature describing the psychological and behavioral correlates of recreational running in adults. Overall characteristics of the included studies are presented in Table 2 and in Table 3 can be found the trend of the association with each correlate. A full description and results of individual studies can be found in Supplementary Table S2. In cross-sectional studies, we established *a priori* which correlates were interpreted as ‘antecedents’ and which were ‘outcomes’ largely based on information from the study design and methods, but also from popular theories of motivation and behavior change, such as the Theory of Planned Behavior (Ajzen & Driver, 1991) or Self-Determination Theory (Ryan & Deci, 2000). Generally, measures of mood and psychological health (depression and anxiety) were treated of consequences as running although they can also play a role in adoption (and that was the case in some longitudinal studies). Twenty-eight studies reported antecedents of running behavior, and 25 studies reported effects or outcomes. Four studies examined simultaneously predictors and outcomes of running.

Table 3. Association between the identified correlates and recreational running

Antecedents (k = 32)	Number of studies	No Association	Significant association		Outcomes (k = 29)	Number of studies	No Association	Significant association	
			positive	negative				positive	negative
Motives	19	13	6		Mood	10	2	8	
Intention	4	2	2		Wellbeing	10	1	9	
Perceived control	3	1	2		Depression	6	1		5
Attitude toward run	3	1	2		Anxiety	5	2		3
Self-efficacy	3		3		Cognitive function	4	1	3	
Social support	3	2	1		Affect	4	2	2	
Behav regulation	3	1	2		Self-efficacy	3	2	1	
Mood	2	1	1		Vitality	3	1	2	
Anxiety	2	1		1	Flow	3	2	1	
Depression	2	1		1	Stress	2			2
Subjective norms	2		2		Perceived health	2		2	
Self-motivation	1		1		Life satisfaction	2		2	
Flow	1		1		Positive orientation	1		1	
Experience	1	1			Self-esteem	1	1		
Involvement	1		1		Enjoyment	1		1	
Shame	1	1			Fatigue	1			1
Pride	1		1		Emotion regulation	1	1		
Action planning	1		1						
Health	1		1						
Process of change	1	1							

Antecedents of recreational running

Motives were frequently reported as antecedents of running behavior ($k = 19$). Studies described motives prevalence among different samples of runners, while others studied motives according to running experience, training, gender, and age. Studies of other predictors, such intention ($k = 4$), perceived control ($k = 3$), attitude towards running ($k = 3$), self-efficacy ($k = 3$) and social support ($k = 3$), behavior regulation ($k = 3$), subjective norms ($k = 2$), and mood ($k = 2$). Measures of trait anxiety and depression, or state anxiety at the beginning of the program ($k = 2$) were also included. Regarding self-motivation, experience, involvement, action planning, process of change, perceived health, flow during the race, shame and pride, only one study was found for each variable.

Nineteen cross-sectional studies described or compared motives between groups of runners. Among the highest ranked motives reported was physical health (Krouse et al., 2011), psychological motives (Tjelta et al., 2017), health orientation (Malchrowicz-Moško, Gravelle, Dąbrowska, & León-Guereño, 2020) and personal achievement (Doppelmayer & Molkenhain, 2004). Less frequent or lower ranked motives were competition (Leedy et al., 2000), social motives, such as affiliation or social comparison (Malchrowicz-Moko et al., 2018), and also having fun (Tjelta et al., 2017).

Motives such as competition and health (Ogles & Masters, 2000) or personal goal achievement (Pereira et al., 2021) were associated with weekly training distance, while enjoyment anticipated the adoption of regular running (Titze et al., 2005). Although one study found an interaction between high enjoyment and high family support in the prediction of running behavior (Titze et al., 2005), another found no significant main or interaction effects of social condition (Carnes et al., 2016). One study found that effort was greater for participants who usually reported experiencing more pride than others (Gilchrist et al., 2017). Studies comparing motives between different groups found that age (Ogles & Masters, 2000),

gender (Tjelta et al., 2017), experience in running (Masters & Ogles, 1995), training profile (Ogles et al., 1995), and type of event (Doppelmayr & Molkenhain, 2004) were associated with different motives. Younger runners were more motivated by personal goal achievement and competition (Pereira et al., 2021). In opposition, older runners were more motivated by health orientation, weight concern, life meaning, and affiliation with other runners (Ogles & Masters, 2000). Age was positively associated with health orientation and affiliation, and negatively correlated with weight concern, personal goal achievement, competition, recognition, psychological coping, life meaning, and self-esteem (Waśkiewicz, Nikolaidis, Gerasimuk, et al., 2019a). Other authors found that older runners were also more frequently motivated by the exercise itself and experiencing nature, and less by challenge (Tjelta et al., 2017). Nonetheless, older runners who reported competition as an important motive were more likely to have participated in more marathons, and trained greater distances per week (Ogles & Masters, 2000).

Regarding gender differences, studies observed that males runners scored higher on competition and challenge (Tjelta et al., 2017) or achievement motives (Whitehead et al., 2020). In agreement, Popov and co-workers (2019) observed that women scored higher on both mental health improvement and physical health and condition, while men scored significantly higher on the competitive factor. On the opposite, data from another study suggests that women were more likely to endorse psychological coping, self-esteem and personal goal achievement motives for running (Nikolaidis, Chalabaev, Rosemann, & Knechtle, 2019). Data from other samples showed that compared to men, women scored higher on weight concern, affiliation, psychological coping, life meaning, and self-esteem (Ogles et al., 1995; Waśkiewicz, Nikolaidis, Gerasimuk, et al., 2019a).

A study comparing motives across different levels of running experience suggests most experienced veterans and runners with mid-level experience scored higher on both

competitive and health motives, whereas first time runners were not characterized by either function (Masters & Ogles, 1995). Others recorded differences in intrinsic motives accordingly with runners' ability. Runners with high and medium ability were most induced by altruism, while runners with low ability were motivated by health (Bell & Stephenson, 2014). A recent study with polish runners found that running experience was negatively associated with personal goal achievement and self-esteem (Waśkiewicz, Nikolaidis, Gerasimuk, et al., 2019a), while other found no differences in motives according to running experience (Malchrowicz-Mośko et al., 2020).

Concerning the amount of training and commitment to running, data suggest that weekly distance was associated with personal goal achievement (Pereira et al., 2021). Similarly, runners registered for a marathon event, running more than 45 miles and intending to continue after the race were more likely to endorse competition, personal goal achievement, and recognition, as motives for continued training; in turn, less serious runners (registered for a 5k race, not having participated in a marathon, training less than 15 miles per week and intending to continue after the race) endorsed more of a general health orientation (Masters & Ogles, 1995).

Two studies compared motives for participation of a sample of adventure ultramarathon, ultramarathon and marathon runners. Results revealed significant differences between the three groups of runners indicating less importance of the reason competition, but higher importance of the motives nature and life meaning for adventure ultramarathon participants compared to marathon runners (Doppelmayr & Molkenhain, 2004). Ultra-marathoners showed higher scores in affiliation, life meaning and lower in the areas of weight concern, personal goal achievement and self-esteem than runners covering shorter distances (Waśkiewicz, Nikolaidis, Chalabaev, Rosemann, & Knechtle, 2019b). On the other hand, 5K

runners showed highest scores on self-esteem, physical fitness and achievement motives (Whitehead et al., 2020).

Ogles and Masters (2003) have found a motivational-based (MOMS) 5-cluster solution in 1519 runners participating in one of the midwestern marathons: Running Enthusiast (RE), Lifestyle Managers (LM), Personal Goal Achievers (PGA), Personal Accomplishers (PAc), and Competitive Achievers (CA). Differences between clusters were significant: CA ran more days per week than LM and PGA; LM trained fewer miles than all the others groups; and RE had completed more marathons than LM, PGA and PAc.

Other antecedents

Concerning intention as an individual's plan to participate in a single behavior, engage in a behavioral category, or achieve a goal, studies suggest that it was positively associated (Bell & Stephenson, 2014) or predicted future running participation (A. Luszczynska et al., 2007). Others reported that both cognitive (important, relevant, valuable, means a lot and needed) and affective (interesting, appealing, fascinating, exciting and involving) elements of the personal involvement inventory were predictors of participation among ultramarathon athletes (Mueller, 2012).

According to one study, behavior at baseline and recovery self-efficacy predicted future participation (A. Luszczynska et al., 2007). Another study showed correlation between baseline self-efficacy with running and between fluctuation in self-efficacy and fluctuation in running (Scholz et al., 2008). Regarding gains (outcomes runners have already experienced), flow felt in the race was positively correlated with the future running motivation (Schüler & Brunner, 2009), and vigor (mood scale) showed correlation with future running behavior (Suter & Marti, 1992).

Two earlier studies with the same sample showed that beliefs, attitudes, norms and behavior control contributed to behavior prediction (Ajzen & Driver, 1991, 1992). Other studies found

some associations between autonomous forms of motivation and both event participation and training compliance. Individuals high in autonomous behavior regulations reported significantly higher levels of participation in both marathons and half marathons (Aicher et al., 2017) and runners with higher self-motivation scores complied better with the exercise regimen (Welsh et al., 1991). Two other studies showed that ability, defined as 5K race personal record in the past two years standardized by age and gender, was positively associated with participation (Bell & Stephenson, 2014), and there were also correlations between the linear trend action planning, and action control, which are self-regulation skills, with the linear trend in running (Scholz et al., 2008). In the Scholz and co-workers' study (2008), a positive correlation emerged between baseline coping planning and linear trend in running over time.

Finally, three studies describing runners behaviors found that 85.2% of runners sets goals for their chosen events, 80.1% trained alone and with others (Krouse et al., 2011), and more than 90% of runners systematically prepared themselves for the competition (Pišot, 2015), 73% of the participants prefer to run alone, 69% do other physical activities besides running, 69% use technology during running sessions, and 68% report running in a natural setting (Pereira et al., 2021).

Outcomes of recreational running

Studies examining outcomes of recreational running assessed psychological outcomes such as mood (k = 10), wellbeing (k = 10), affect (k = 4), cognitive function (k = 4), self-efficacy (k = 3), vitality (k = 3), flow (k = 3), perceived health (k = 2), and life satisfaction (k = 2).

Likewise, some studies reported reductions in depression (k = 6), anxiety (k = 5), and stress (k = 2). Concerning positive orientation (self-esteem, satisfaction with life and optimism), self-esteem, enjoyment, physical fatigue and emotion regulation (deficits), only one study was found for each variable.

Studies aiming to understand the effect of running on mood suggest a main effect for running time, immediately after a short run trial (Berger et al., 1998 a, b, c; Berger et al., 2016). A previous study compared pre-post changes in mood and found that the running group exhibited significant changes in total mood disturbance, tension, and confusion immediately after the running session (75 minutes and more than two miles running) (McGowan & Pierce, 1991). Mood benefits after a marathon race included decreases in depression, anger, confusion, tension and fatigue, and increases in vigor (Hassmén & Blomstrand, 1991). No significant acute (immediately after, 20 and 40 minutes post-training) or medium (6 and 9 weeks) term effects of running were observed in one study (Walter et al., 2013). Other RCT found no differences between the acute effect of a 30-minute run and equivalent time doing stretching (Bernstein & McNally, 2017). One study found long-term (17 years) improvements in mood states of a small group of runners (Morgan & Costill, 1996).

Wellbeing was suggested as a positive psychological outcome/correlate of running in a cross-sectional study (Galper et al., 2006). Studies reported acute positive effects of running on revitalization, tranquility, positive engagement, physical exhaustion (Szabo & Abraham, 2013), and positive orientation (Gorczyca et al., 2016). Wellbeing was cross sectionally related with motives for running (Popov et al., 2019), and also longitudinally associated with the amount of running (distance and frequency) (Nezlek et al., 2018). However, data suggest that the effect of running on wellbeing diminishes over time (Bonham et al., 2018).

Other outcomes

Contradictory results regarding the flow/worry ratio were found in two randomized controlled trials by the same author (Elbe et al., 2010). While female runners experienced significantly more flow than football players, no differences were observed in males. Worry was higher in male runners than in male football players, but no differences were observed in female.

Regarding depression, an inverse association with running has been cross-sectionally

observed for both men and women (Roeh et al., 2020; Galper et al., 2006), but also longitudinally: marathon runners showed lower Beck Depression Inventory scores when compared to controls (Winker et al., 2010). The effect of running on anxiety has been addressed in some studies (Larumbe-Zabala et al., 2019). A RCT, showed negative association between state anxiety at program end and running frequency (Welsh et al., 1991). A long-term longitudinal study observed that anxiety decreased significantly across the 23-year period in one sample, while it increased in other. In addition, the neuroticism score for the combined sample decreased significantly (Morgan & Costill, 1996). Others found that both comedy videos and running exercise resulted in reductions of state anxiety (Szabo, 2003). One longitudinal study found that the probability of mental stress (tense, nervous, impatient, anxious, sleepless) was lowest for joggers, when compared with low, moderate and high physical activity levels (Schnohr et al., 2005).

Discussion

This review sought to systematically synthesize the published literature describing the psychological and behavioral correlates of recreational running in adults. Because of the limited number of studies reporting each correlate, it was not possible to meta analyse the data. However, the identification of antecedents most strongly associated with recreational running, such as intrinsic motives, highlights potential candidates to target in future real-world interventions in this domain. Likewise, the identification of most common psychological benefits of running, for instance mood, can strengthen its perceived value and the likelihood of its adoption.

Antecedents of recreational running

The findings from this review show that a typical runner set goals for specific running events, systematically prepares for competing, and runs for 30 to 50 km/week in average. Studies

reporting motives of runners, suggest that the highest ranked or more prevalent motives were physical health, psychological motives, and personal achievement. It can be argued that, due to item's narrative, intrinsic and extrinsic motives can coexist in the same dimension, nevertheless, health orientation, personal goal achievement, self-esteem, life coping and life meaning are predominantly intrinsic motives (Gunnell et al., 2014), and were often present among those who sustain their running behavior. Additionally, participants in some of the studies were long distance runners, using running as a cathartic behavior, often used as a coping mechanism (Nemec, 2016). They are moved by more intrinsic reasons, such as personal achievement and general physical and psychological health. The study which compared motives across adventure ultramarathon, ultramarathon and marathon runners hints for a lesser importance of competition, but higher importance of the contact with nature and life meaning for adventure ultramarathon participants compared to marathon runners (Doppelmayer & Molkenthin, 2004). It could be explained by the unique characteristics of this high demanding ultra-marathons, in which finishing is the main goal. Similar findings emerged from the study comparing obligatory runners, moved by competition, goal achievement and recognition, with recreational runners, motivated mainly by health purposes (Ogles et al., 1995). Extrinsic motives, like competition or social motives, such as social comparison was indeed less frequent or lower ranked. Since results come from samples of regular runners, which are in behavior maintenance, these findings are in line with the Self-determination Theory assumptions (Ryan & Deci, 2019), and quite similar to those of previous studies of physical activity behavior correlates (Sheeran et al., 2020; Teixeira et al., 2012).

Although both intrinsic motives and autonomous behavior regulations were predictors of higher levels of running participation (Aicher, Rice, & Hambrick, 2017) and perseverance (Qiu, Tian, Zhou, Lin, & Gao, 2020), one study (Gilchrist et al., 2017) found that pride, which

is a manifestation of introjected behavior regulation (Ryan & Deci, 2000), can motivate people to put forth immediate (5 weeks) and greater effort and persistence toward long-term goals despite short-term costs.

Results suggest age influences the main reasons why people run (Ogles & Masters, 2000; Tjelta et al., 2017). Generally, older participants are more autonomously motivated than their younger colleagues. Similar results were registered in the comparison of different levels of running experience. Veterans and mid-level experience runners were mostly driven by health, personal goal achievement and self-esteem. Results match those found in CrossFit participants (Box et al., 2019), in which older participants scored higher on health-related motives, while younger participants scored higher on social motives relative to their counterparts. Others (Molanorouzi et al., 2015) suggest young adults are also motivated by affiliation, mastery, and enjoyment whereas middle-aged adults considered psychological condition and others' expectations more important motives for participating in PA, than young adults.

Data from two studies indicates gender differences in the motives for running (Ogles et al., 1995; Tjelta et al., 2017). Men tend to run more for competition and challenge, and women for weight concern, affiliation, psychological coping, life meaning, and self-esteem. Similar results were found in a cross-sectional survey about motives for PA, indicated that females reported higher motivation for appearance and physical condition than males, whereas males were more motivated by competition/ego and mastery than females (Molanorouzi et al., 2015).

It was suggested that gains may play a role in running maintenance, regardless of the nature of the expected benefits. Flow experienced in the race and vigor, showed correlation with future running behavior. This supports the assumption that gains can function as a reward of

the running activity, acting as moderators of the effects of motives, which leads to the desire to perform the activity again (Ingledeu et al., 2014).

Ability, beliefs, attitudes, norms, perceived behavior control and intention, positively predicted running participation (Ajzen & Driver, 1991, 1992). This result agrees with the central idea of the Theory of Planned Behavior (Ajzen & Driver, 1991), that once an individual forms the intention to perform a behavior, he or she is extremely likely to actually behave in that manner and that it predicts how hard people are willing to try, and how much of an effort they are planning to exert in order to perform the behavior. However, many fail to translate their physical activity intentions into behavior. This intention-behavior gap can be explained by (a) explicit trait self-control, (b) implicit executive functions, and (c) their interactions (Pfeffer & Strobach, 2017).

Previous behavior, and self-efficacy predicted future participation (A. Luszczynska et al., 2007; Scholz et al., 2008). These conclusions agree with the principles of the Socio-cognitive Theory (Bandura, 1982). Conversely, difference in the strength of effects of intention and self-efficacy on behavior may depend on the particular type of self-efficacy. Among individuals who experienced lapses or who decline in their performance, recovery self-efficacy may be a stronger predictor of physical activity than just beliefs about the ability to maintain behavior, because these beliefs themselves are measured in a way more proximal to actual behavior.

The role of action planning, and action control for predicting running behavior was also identified (Scholz et al., 2008), suggesting self-regulation skills may play an important role in running maintenance (Carraro & Gaudreau, 2013; Reyes Fernandez et al., 2015; Sniehotta et al., 2006). Both cognitive (need or importance) and affective (sign value or pleasure) elements of involvement showed to be predictors of participation among ultramarathon athletes.

Runners are attracted to the sport through emotion (affective), then build self- perceived skill through facts and problem-solving (cognitive) (Mueller, 2012).

Outcomes of recreational running

There is considerable research on the relationship between exercise and its positive psychological outcomes. Running psychological benefits are interrelated, so differentiating one from another may not be possible. Among several possible causes, self-efficacy, thermogenic effect of exercise, hormonal response and unclear neurobiological mechanisms are the strongest essential means (Szabo, 2013; Szabo & Abraham, 2013).

Results suggest a positive effect of running on mood after a single exposure. Methods (instruments, samples and time-frame) from the included studies on mood were quite different, but mood benefits included decreases in depression, anger, confusion, tension and fatigue, as well as increase in vigor (Berger et al., 2016; Rendi et al., 2008). These results agree with previous reviews about the mood-enhancement effect of exercise (Basso & Suzuki, 2017; Chan et al., 2019) and may be partially explained by some neurosteroids blood level changes (Sonnenblick et al., 2018).

Wellbeing is a general positive psychological outcome associated to running. There is some evidence of a dose-response relationship. It is clearer regarding frequency than duration, maybe because of the influence fatigue and physical pain related to long running bouts. It was studied as perceived health, psychological health, revitalization, tranquility, positive engagement, subjective feeling, arousal and positive orientation, and less physical exhaustion and positive orientation (Bonham et al., 2018; Gorczyca et al., 2016). Such findings are coherent with previous evidence that exercise may benefit for people of any age, improving psychological wellbeing and quality of life (Mandolesi et al., 2018), and can be partially justified by the effect of exercising in a natural environment (Lahart et al., 2019).

In agreement with the flow-exercise relationship found in the literature (Jackman et al., 2019), results from one intervention regarding experiences of flow were unsatisfying (Elbe et al., 2010). Results indicate that all groups experience rather high levels of flow regardless of the kind of sport (running or any other).

The registered reduction in depression, anxiety, stress and life dissatisfaction were, to some extent in harmony with the improvement of positive psychological outcomes, and with a previous systematic reviews of the effect of exercise on anxiety, depression, and quality of life (Ensari et al., 2015; Morris et al., 2018).

Though results suggest running is associated with improved cognitive function, evidence is still scarce (Batmyagmar et al., 2019). Immediately upon completing the marathon, runners showed impairment in the explicit memory task, but enhancement in the implicit memory task (Eich & Metcalfe, 2009). Likewise, it seems that nonverbal fluency, attention and neuro-motor performance may be increased in runners or as a result of a running intervention, mediated by increase neurotrophic factors release (Harada et al., 2004). These results match those from two recent meta-analysis (Falck et al., 2019; Northey et al., 2018), suggesting exercise improves cognitive function in both adults and older adults, reiterating the notion that exercise is a panacea for aging well.

These results generally agree with previous reviews of physical activity and exercise correlates. According to our findings, intrinsic motives, goal-setting and other self-regulation skills seem to be the key antecedents of regular running. Hence, interventions that nurture intrinsic motives and behavior self-regulation skills may increase the likelihood of sustainable adoption of running. On the other hand, improvements in mood and wellbeing, and reductions in depression and anxiety appear to be the main outcomes. For many other variables, studies remain very scarce preventing us from withdrawing firm conclusions regarding their role in recreational running.

This systematic review provides the first comprehensive approach to identify psychological and behavioral correlates of recreational running across populations. Like in other systematic reviews, the variety of studies available (variables, study designs, measurement methods, populations represented, and so forth) is a substantial limitation. In this review, the heterogeneity of research designs, assessment instruments, correlates, populations, and interventions (running) characteristics, hindered the process, but simultaneously enriched its results.

Strengths and limitations

Despite the findings of the review, a number of limitations must be considered. The search strategy was limited to English language publications and thus there is a possibility of a language bias in the systematic review. Unpublished studies and evidence from grey literature were not included, increasing the chance of an incomplete picture of all the studies in this field. Also, due to the heterogeneity of research designs, instruments, correlates, populations, and intervention, it was not possible to conduct meta-analysis to determine the strength of the correlation between all the correlates, and the running behavior itself. Few studies were found for some of the correlates, hindering solid conclusions or interpretations. Finally, many of the included studies had a cross-sectional design, hampering the possibility of causality inference between variables. Future avenues of research could explore further which psychological mechanisms better explain recreational running sustainability and manipulate them, but also clarify by which mechanisms does running produces its positive outcomes. The popularity of running self-monitoring tools and the possibility to access application programming interface data, represents an opportunity to study the association between behavior (measured in multiple data points) and its psychological correlates. To allow the establishment of causality association, longitudinal research designs are recommended. This information can contribute

to inform and guide interventions focused on helping people sustain regular physical activity, through an activity they have chosen and appear to enjoy.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Author contributions

HP contributed in the design, search, data extraction, quality assessment, and manuscript. JE and MM contributed for the search, data extraction, quality assessment, and manuscript. AP, IS, EC, and PT contributed in the design, manuscript, and supervision of the overall process. All authors contributed to the article and approved the submitted version.

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Supplementary material

The Supplementary Material for this article can be found online at:

<https://www.frontiersin.org/articles/10.3389/fpsyg.2021.624783/full#supplementary-material>

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Supplementary table S1. Description of reviewed studies

1. Antecedents of running behavior/ participation							
Study details	Design	Participants		Psychosocial instruments	Correlates	Results	QA
		Size (%F)	Features				
Aicher et al., 2017, USA	CS	439 (74.0%)	African American runners (mean 29.4 yrs.)	Revised sport motivation scale (SMS-II)	Behavior regulations	Individuals high in autonomous motivation reported significantly higher levels of participation in both marathons and half marathons. Runners with high ability are most influenced by altruism and competition; Runners with medium ability are most influenced by altruism and social; Runners with low ability are most influenced by health and social. Intention and ability positively predicted participation.	Fair
Bell & Stephenson, 2014, USA	CS	521 (59.0%)	Completed a 5K race, belonged to running club, or subscribed to a running website (mean 43.0 yrs.)	Runner-ability score, Motives of marathoners scale (MOMS), and Modified Attitude Scale	Motives, Attitude, and Intention	Differences between the three groups of runners indicating less importance of the reason competition but higher importance of the motives nature and life meaning for adventure ultramarathon participants compared to marathon runners.	Fair
Doppelmayr & Molkenhuth, 2004, Austria	CS	149 (0%)	Adventure ultramarathon, ultramarathon and marathon runners	Motivations of Marathoners Scales (MOMS)	Motives		Poor

Krouse et al. 2011, USA	CS	344 (100%)	Women ultrarunners 18 years and older (mean 40 yrs.)	Motivation on marathon running scale (MOMS), Perception of success questionnaire (PSQ) and 12 questions designed to distinguish between a task or ego orientation	Motives, Goals	General health orientation and psychological coping were the two strongest motivational factors. Participants were higher in task-orientation (e.g., finishing the race or accomplishing various goals) than ego- orientation (e.g., placing in the top 3 overall or beating an opponent). Trained an average of 12.49 hours a week and spent 64% of their time training alone. Information came from their own experience, blogs, websites. 80% of the participants did not use a coach because of cost and a perceived lack of necessity. Women were task-oriented, internally motivated, health and financially conscious individuals.	Fair
Larumbe-Zabala et al., 2019, USA	CS	140 (12.9%)	Participants in marathon race (mean 39.7 yrs.)	PODIUM questionnaire	Self-confidence, Perceived physical fitness, Social support, Anxiety	Males showed higher values of self-confidence and perceived physical fitness. Women reported higher values of social support.	Poor
Leedy et al. 2000, USA	CS	276 (62.2%)	Participants in a Midwest running event pre-race dinner (mean 38.3 yrs.)	19 statements about runners' motivation, 10 statements from the Running Addiction Scale (RAS) and questionnaire on	Motives, Depression, and Anxiety traits	Stress relief was positively correlated with weekly distance; There was a negative association between depression and adherence to training. Strongest motives	Poor

				overall disposition for anxiety and depression..		were health/fitness and challenge.	
Malchrowicz-Mósko et al., 2018, Poland	CS	178 (41.0%)	University students running half-marathon (19 – 50 yrs.)	Self-constructed motives questionnaire	Motives	Most prevalent motives - maintain good physical/ health condition, check myself, develop passion, achieve the goal set, to experience strong emotions, feel the extraordinary mood of the whole party, feel unity and integration with other people, have fun.	Poor
Malchrowicz-Mósko et al., 2020, Poland	CS	493 (29.2%)	Runners participating in the PKO Poznan Marathon (18-70)	Motivation on marathon running scale (MOMS)	Motives	No differences in motives according to running experience.	Poor
Masters & Ogles, 1995, USA	CS	472 (19.9%)	Runners who participated in one of three Midwestern marathons (54.4 yrs.)	Motivation on marathon running scale (MOMS)	Experience, Motives	Veterans scored significantly higher on Marathon Identity than did the mid-level or rookies. Mid-level group Scored highest on Internal Focus followed by the veterans and rookies.	Poor
Mueller et al., 2012, USA	CS	424 (17.4%)	Subscribers to Ultrarunning magazine, and athletes who entered the Umstead 100-mile endurance run (mean 46.7 yrs.)	Zaichkowsky's Personal Involvement Inventory (PII), Laurent and Kapferer's Consumer Involvement Profile (CIP)	Involvement, and Intention	Cognitive and affective elements of the PII scale were not predictive of intention, but were predictors of participation among ultramarathon athletes. The five CIP factors were predictors of intent to participate.	Poor

Nikolaidis et al. 2019, Poland	CS	166 (19.3%)	Runners participating in the PKO Poznan Marathon (mean 43.4 yrs.)	Motivation on marathon running scale (MOMS)	Motives	Women participants scored higher than male on coping, self-esteem, and personal goal achievement these motives. Younger men (<30 yrs.) scored higher than older ones (35-45 yrs.) on competition motive. The slowest women scored higher on competition and personal goal achievement than the faster ones. Obligatory runners were more likely to endorse competition, personal goal achievement, and recognition, as motives for continued training, whereas the recreational runners endorsed more of a general health orientation. Women scored higher on weight concern, affiliation, psychological coping, life meaning, and self-esteem. Older runners were more motivated by health orientation, weight concern, life meaning, and affiliation with other runners. Younger runners were more motivated by personal goal achievement. Older runners who reported competition as an important motive were more likely to have participated in more marathons, and those	Fair
Ogles et al. 1995, USA	CS	610 (21.0%)	Runners registering to participate in a midwestern marathon, half- marathon or one of three 5k/10k races. (mean 37.5 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives		Poor
Ogles & Masters, 2000, USA	CS	214 (0%)	Runners pre- registered for one midwestern marathon (between 20 and 28 or > 50 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives		Poor

Ogles & Masters, 2003, USA	CS	1519 (18.2%)	Runners participating in one of six Midwestern marathons (15-79 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives	<p>endorsing competitive motives trained greater distances per week. Competition and Health orientation predicted training miles per week.</p> <p>MOMS based cluster analysis yielded five cluster solution: Running Enthusiast, Lifestyle Managers, Personal Goal Achievers, Personal Accomplishers, and Competitive Achievers. Motivational differences between clusters were significant. CA ran more days per week than LM and PGA. LM trained fewer miles than all the others groups, and RE had completed more marathons than LM, PGA and PA.</p>	Poor
Pereira et al., 2021, Portugal	CS	1068 (50%)	Telephone survey to a random national representative sample (18-65 yrs.)	Motivations of Marathoners Scales (MOMS); Behavioral Regulation in Exercise Questionnaire (BREQ-3)	Motives and Behavior regulations	<p>General health orientation, self-esteem , and life meaning were the most predominant motives for running. Younger runners tend to run more for personal goal achievement, which was associated with greater weekly distance.</p> <p>Women scored higher on Mental Health Improvement and Physical Health and Condition, while men scored higher on the Competitive Spirit. The younger age group</p>	Fair
Popov et al., 2019, Serbia	CS	289 (46.0%)	Participants in at least one marathon recruited online (36.65 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives	<p>endorsing competitive motives trained greater distances per week. Competition and Health orientation predicted training miles per week.</p> <p>MOMS based cluster analysis yielded five cluster solution: Running Enthusiast, Lifestyle Managers, Personal Goal Achievers, Personal Accomplishers, and Competitive Achievers. Motivational differences between clusters were significant. CA ran more days per week than LM and PGA. LM trained fewer miles than all the others groups, and RE had completed more marathons than LM, PGA and PA.</p>	Poor

Pišot et al., 2015, Slovenia	CS	260 (38.1%)	Participants in the 1st Istrian marathon (mean 41.4 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives	scored higher on Mental Health Improvement, Physical Health and Condition, and Physical Appearance. Most common motives “to compete with myself”; “to improve health and physical fitness” and “to diminish stress”.	Poor
Qiu et al., 2020, China	CS	300 (30.0%)	Participants in the Hangzhou marathon event (>18 yrs.)	Sport Motivation Scale (SMS-6)	Behavior regulations	Amotivation was negatively associated with perseverance, career, ethos, and identity. Identified regulation was positively associated with perseverance, career, ethos, and benefits. Integrated regulation was positively associated with identity, and intrinsic motivation was positively associated with perseverance, personal effort, career, ethos, and benefits.	Fair
Tjelta et al., 2017, Norway	CS	862 (38.4%)	Web based survey distributed to the “Tresjøersløpet” (“The Three Lace Race”) half-marathon (mean 41.8 yrs.)	Questionnaire on reasons to run	Motives	The major reasons for the participants to regularly practice running was importance to their physical and psychological health, it is fun, and for other health issues. Males ran more for competition and challenge. Older runners were more frequently motivated by the exercise itself and experiencing nature, and less by challenge.	Poor

Waśkiewicz et al., 2019a, Poland	CS	1537 (24.7%)	Polish runners through running websites (>18 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives	Age was positively associated with health orientation and affiliation, and negatively correlated with weight concern, personal goal achievement, competition, recognition, psychological coping, life meaning, and self-esteem. Running experience was negatively associated with personal goal achievement and self-esteem. Female marathon finishers exceeded men on the motivational scales for weight concern, affiliation, psychological coping, life meaning, and self-esteem and they scored lower on competitive motivation.	Poor
Waśkiewicz et al., 2019b, Poland	CS	1537 (24.7%)	Polish runners through running websites (>18 yrs.)	Motivations of Marathoners Scales (MOMS)	Motives	Ultra-marathoners had higher scores in affiliation, life meaning and lower in the areas of weight concern, personal goal achievement and self-esteem than runners covering shorter distances.	Poor
Whitehead et al., 2020, UK	CS	1022 (32.2%)	Sent via email to all participants engaging in a national marathon event (13-77 yrs.)	Reduced version of Motivations of Marathoners Scales (MOMS)	Motives	5K runners showed highest scores on self-esteem, physical fitness and achievement motives. Males scored higher on achievement motives.	Fair
Ajzen & Driver, 1991, USA	LG	146 (70.6%)	Undergraduate university students (mean 20.1 yrs.)	Attitudes toward behaviors, Subjective norms and perceived	Attitude towards running, Subjective norms, Perceived behavior control	Attitudes, norms and behavior control contribute to behavior prediction.	Poor

Ajzen & Driver, 1992, USA	LG	146 (70.6%)	Undergraduate university students (mean 20.1 yrs.)	behavioral control scales Attitudes toward behaviors, Subjective norms and perceived behavioral control scales	Attitude towards running, Subjective norms, and Perceived behavior control	Beliefs, attitudes, norms and behavior control contribute to behavior prediction.	Poor
Gilchrist et al., 2017, USA	LG	158 (76.0%)	Men and women residing in the Greater Toronto Area and training for a marathon/ half- marathon (mean 32.5 yrs.)	Single-item measures of pride and shame	Shame, and Pride	Effort was greater for participants who usually reported experiencing more pride than others.	Poor
Luszczynska et al., 2007, UK, Poland, Germany	LG	139 (20.1%)	Advertised on a noncommercial website for leisure- time running (mean 29.5 yrs.)	Three questions for intention, four for maintenance self- efficacy, and for recovery self- efficacy	Self-efficacy, and Intention	Intention at T1 predicted behavior measured 2 years later; Behavior at T1 predicted behavior at 2 years; Recovery self-efficacy at T1 predicted behavior 2 years later. Baseline self-efficacy was positively associated with baseline running and fluctuation in self-efficacy correlated positively with fluctuation in running. There were correlations between the linear trend action planning, and action control and the linear trend in running. A positive correlation emerged between baseline coping planning and linear trend in running over time.	Poor
Scholz et al., 2008, Switzerland	LG	30 (86.7%)	Formerly untrained participants in a training program for running a marathon (mean 41.2 yrs.)	Action and coping planning items, Action control items, Frequency and running volume question, Objective performance data from Gutenberg Marathon	Planning, and Self- efficacy		Fair

Titze et al., 2005, Austria	LG	539 (100%)	Registered for the women's fun run held in Graz, Austria	Questions about individual and social factors, running motives, and environmental factors, 16 reasons to run, process of change, and running regularity.	Motives, Perceived health, Social support, and Process of change	Predictors of adoption of regular running were process of change frequent use, high enjoyment, and interaction between high enjoyment and high family support. Predictors of regression from of regular running were having few motives, bad perceived health, and interaction between low perceived health and low attractiveness.	Fair
Carnes et al., 2016, USA	NCCT	24 (50.0%)	Participants from 2 running clubs (mean 37.0)	"Liking" visual analog scale, Borg RPE scale, and GPS	Peers influence	There were no significant main or interaction effects of social condition.	Poor
Schüler & Brunner, 2009, Switzerland	NCCT	109 (17.4%)	Participants recruited at a marathon exhibition prior to a race (mean 36.3 yrs.)	Flow Short Scale, and three question about future running motivation	Flow	Mean flow experience during the race was positively correlated with the future running motivation.	Fair
Suter & Marti, 1992, Switzerland	RCT	61 (0%)	Volunteers wishing to enter an exercise program	Running diaries, and Mood questionnaire	Mood	Vigor (mood scale) at 4 months showed correlation with running at 8 months, but lack of energy and depressiveness did not.	Good
Welsh et al., 1991, USA	RCT	22 (100%)	Women were recruited from a community to begin a jogging program (mean 35.7 yrs.)	Multidimensional-health locus of control, Jenkins activity survey; Self-motivation inventory	Anxiety, Depression, Locus of control, and Self-motivation	Subjects with higher self-motivation scores complied better with the exercise regimen.	Good

2. Outcomes of running behavior/ participation

Study details	Design	Participants		Psychosocial instruments	Correlates	Results	QA
		Size (%F)	Features				
Eich & Metcalfe, 2009, USA	CS	261 (34.9%)	Have completed either the NYC or Boston Marathon	Modified Graf & Williams's Normed Word Pool	Memory	There was an interaction between group (marathon vs. control) and memory task (implicit vs. explicit). Explicit memory task was worse and implicit memory test was better for the marathon group.	Poor
Galper et al., 2006, USA	CS	6555 (19.4%)	Aerobics Center Longitudinal Study population (mean 49.2 yrs.)	Center for epidemiologic studies depression scale (CES-D), and General well-being schedule (GWB)	Emotional wellbeing and depression	Negative association between running and estimated mean CES-D scores for both men and women, and positive association with estimated mean GWB scores in men and women.	Fair
Larumbe-Zabala et al., 2019, USA	CS	140 (12.9%)	Participants in marathon race (mean 39.7 yrs.)	PODIUM questionnaire	Anxiety	Women reported higher values of anxiety.	
Pereira et al., 2021, Portugal	CS	1068 (50%)	Telephone survey to a random national representative sample (18-65 yrs.)	Dispositional Flow Scale-2 (DFS-2); Subjective Vitality Scale (SVS)	Vitality and Flow	Vitality and flow showed positive association with life meaning, general health orientation, identified and integrated behavior regulation, and intrinsic motivation.	Fair
Popov et al., 2019, Serbia	CS	289 (46.0%)	Participants in at least one marathon recruited online (36.65 yrs.)	Serbian Inventory of Affect (SIAB-PANAS); Short Subjective Well-Being Scale	Wellbeing and Affect	Mental health improvement motives were negatively associated with positive affect and well-being, and positively related to negative affect. Stress Coping, Affiliation and Physical Health and	Poor

Ransford & Palisi, 1996, USA	CS	2980 (62.0%)	Data from The National Survey of Personal Health Practices and Consequences (20-64 yrs.)	Subjective health single item, Psychological well-being 7- item scale	Subjective health and wellbeing	Conditioning were positively associated with Positive Affect. Physical Health and Condition was also a significant predictor of Well-Being. 92% of the males and 88% of females who run often, 71% of males and 90% of women who run sometimes perceived their health and wellbeing as good or excellent.	Poor
Roeh et al., 2020, Germany	CS	106 (25.5%)	Population was part of the ReCaP trial, a longitudinal observational study of marathon runners registered for the Munich Marathon (18-60 yrs.)	Minnesota Multiphasic Personality Inventory 2 (MMPI-2-RF); The self-rating scale Beck Depression Inventory (BDI); and Hamilton Depression Scale (HAMD)	Depression	Marathon runners had lower scores in scales measuring somatic and cognitive complaints, stress, demoralization, hopelessness and distrust.	Poor
Winker et al., 2010, Austria	CS	114 (10.5%)	Recruited if (a) participated in at least one marathon in the preceding two years, (b) were in continuous training during the recruitment phase and (c) over the age of 60 (mean 66 yrs.)	Mini Mental State Examination (MMSE), Clock Drawing Test, self-rating scales and forms to assess premorbid intelligence levels, subjective memory functions, psychological and	Cognitive function, wellbeing, psychological health, and depression	Nonverbal Fluency, attention (Symbol Counting Task) was higher in athletes. Marathon runners showed higher wellbeing, and psychological health, and lower Beck Depression Inventory scores when compared to controls.	Poor

Batmyagmar et al., 2019, Austria	LG	99 (9.1%)	Elderly marathon runners (mean 66 yrs.)	physiological well-being, depression. German Plus-version of neuropsychological test battery, Short form health survey (SF-36)	Cognitive function and subjective health	Cognitive performance was not better in athletes than in non-athletes. Self-reported health is higher in endurance athletes compared to non-athletes.	Fair
Bonham et al., 2018, UK	LG	38 (47.4%)	Parkrun recreational runners (18 - 50 yrs.)	Feeling Scale, and Felt Arousal Scale	Affect	Mean valence was significantly higher on run days than next days; higher on next days than baseline days; higher after run than before run; and arousal - Arousal was significantly higher on run days than baseline.	Good
Gorczyca et al. 2016, Poland	LG	80 (29.0%)	Runners who completed the first marathon (mean 35.1 yrs.)	General self-efficacy scale, and Positivity scale	Self-efficacy, positive orientation	PO and GSE were higher after completion of a marathon.	Fair
Morgan & Costill, 1996, USA	LG	15 (0%)	(mean 50.5 yrs.)	Depression Adjective Check List (DACL), Eight-Parallel-Anxiety-Battery, Eysenck Personality Inventory (EPI), Parallel-form anxiety battery (IPAT 8), State-trait anxiety inventory (STAI), Body awareness scale (BAS), and Profile	Depression, anxiety, and mood	Anxiety decreased significantly across the 23-year period, Trait anxiety was observed to increase significantly. neuroticism score for the combined sample decreased significantly. The overall mood score did not differ across time.	Poor

Nezlek et al., 2018, Poland	LG	212 (48.1%)	Residents of Poland recruited via the internet and running magazines (mean 32.5 yrs.)	of mood states (POMS) Rosenberg self-esteem scale, Satisfaction with life scale, affect was based on a circumplex model (e.g., Feldman Barrett & Russell, 1998), questions about life stress	Wellbeing, self-esteem, life satisfaction, self-efficacy, and affect	Well-being was positively related to days people ran and how far they ran each week. Satisfaction with one's progress mediated relationships between well-being and the amount of running.	Good
Schnohr et al., 2005, Denmark	LG	12028 (54.5%)	Random sample drawn from the Copenhagen Population (mean 55.9 yrs.)	Questionnaire about physical activity, smoking, alcohol consumption, two questions about stress and one about life dissatisfaction	Wellbeing, life dissatisfaction and stress	There was a clear trend of higher level of stress and life dissatisfaction in the sedentary group compared with the more active groups. There was a dose-response effect between physical activity and psychosocial well-being.	Fair
Berger & Owen, 1998a, USA	NCCT	71 (54.9%)	College students enrolled in 3 body conditioning courses (mean 21.4 yrs.)	Profile of mood states (POMS)	Mood	Joggers reported mood benefits (tension, depression, anger and confusion).	Poor
Berger & Owen, 1998b, USA	NCCT	68 (58.8%)	College students enrolled in 3 body conditioning courses (mean 22.2 yrs.)	Profile of mood states (POMS)	Mood	Joggers reported mood benefits (tension, depression, vigor and confusion).	Poor
Berger et al. 2016, USA	NCCT	55 (49.1%)	College students from three jogging classes (mean 20.6 yrs.)	Profile of Mood States (POMS), and Physical Activity Enjoyment Scale (PACES)	Mood, and enjoyment	Mood benefits included decreases in Depression, Anger and Confusion, and increases in Vigor.	Poor

Hassmén & Blomstrand, 1991, Sweden	NCCT	106 (0%)	Runners with the intention of finishing the Stockholm marathon race in a 3h to 3h45min (mean 40 yrs.)	Profile of mood states (POMS)	Mood	All groups showed decreases in tension and vigor, as well as an increase in fatigue when their pre- and post-marathon scores were compared.	Fair
Rendi et al., 2008, Hungary	NCCT	80 (5.0%)	Regular users of a large urban fitness center (mean 35 yrs.)	Exercise-Induced Feeling Inventory (EFI)	Vitality, and wellbeing	Both groups had high self-reported level of enjoyment of the exercise sessions and in the psychological improvements from pre- to post-exercise (revitalization, tranquility, positive engagement, physical exhaustion).	Fair
Szabo & Ábrahám, 2013, Hungary	NCCT	50 (26.0%)	Every third runner preparing to start her or his run on a specially designated 5-km long public running path (mean 29.0 yrs.)	Exercise-Induced Feeling Inventory (EFI)	Vitality, and wellbeing	Pre- to post- exercise improvements in revitalization, positive engagement and tranquility, and increases in exhaustion.	Good
Anderson & Rice, 2011, UK	CCT	40 (50.0%)	Opportunity sampling from sports clubs (18-25 yrs.)	Short Profile of Mood States (POMS)	Mood	10-min bouts of exercise beneficially impacted mood	Poor
Berger & Owen, 1998c, USA	CCT	91 (55.0%)	College students enrolled in 3 body conditioning courses and health science class as control.	Profile of mood states (POMS)	Mood	Joggers (regardless of exercise intensity) reported significant reductions in tension, depression, anger, fatigue and confusion, and increases in vigor.	Fair
Harada et al. 2004, Japan	CCT	14 (43.0%)	Volunteers were solicited from the community of the	Branching task (BR)	Cognitive function	Neuro-motor performance increased from weeks 0 to 6 in the jogging group, but not in	Poor

McGowan et al., 1991, USA	CCT	25	City of Handa (mean 27 yrs.) Student volunteers	Profile of mood states (POMS)	Mood	control. From weeks 6 to 12, the rates did not increase in either group. The running group exhibited significant reductions in total mood disturbance, tension, and confusion.	Poor
Szabo et al., 2003, UK	CCT	39 (43.6%)	Second year sport science students (20- 23 yrs.)	Spielberger State Anxiety Inventory (SSAI); Subjective Exercise Experience Scale (SEES)	State anxiety, positive wellbeing, psychological distress, and physical fatigue	Both exercise session and the humor session showed positive results on state anxiety.	Good
Bernstein & McNally, 2017, USA	RCT	80 (50.0%)	Harvard University Study Pool (mean 22.3 yrs.)	Exercise Addiction Inventory: Short Form (EAI); Affect Intensity Measure (AIM), Emotion Regulation Questionnaires (ERQ), and Ruminative Responses Subscale of the Response Style Questionnaire (RRS); The Depression Anxiety Stress Scales (DASS- 21); Affective circumflex measure to report their affect, Difficulties in Emotion Regulation Scale (DERS); Coping	Emotional regulation, affect, mood, and self- efficacy, depression and anxiety	Before and after 30 minutes of stretching or jogging, the two groups did not differ in their reports of sadness, happiness, overall positive affect (feeling excited, happy, or content), or overall negative affect (feeling anxious, angry, or sad).	Good

				Self-Efficacy Scale (CSE).			
Elbe et al. 2010a Denmark	RCT	41 (100%)	Recruited from advertisements in the local newspapers (mean 37.1 yrs.)	Flow Short-scale (FSS)	Flow	Runners experiencing significantly more flow than football players. No differences were found regarding their experience of worry.	Fair
Elbe et al. 2010b, Denmark	RCT	36 (0%)	Recruited from advertisements in the local newspapers (mean 31.8 yrs.)	Flow Short-scale (FSS)	Flow	Worry is higher in runners than in football players. No significant differences were found regarding the flow total score.	Fair
Walter et al., 2013, Germany	RCT	23 (52.2%)	Apprentices from the Karlsruhe Institute of Technology (mean 19.4 yrs.)	Short-scale for mood states	Mood	All mood dimensions increased immediately after acute endurance exercise but results were not significant	Good
Welsh et al., 1991, USA	RCT	22 (100%)	Women were recruited from a community to begin a jogging program (mean 35.7 yrs.)	State-trait anxiety inventories (STAI Form X), Beck depression inventory, Jenkins activity survey	Anxiety and Depression	There was a correlation between state anxiety scores and exercise frequency at baseline and program end.	Good

RCT - Randomized controlled study; CCT - Controlled clinical trial; NCCT – Non-controlled clinical trial; LG - Longitudinal study; CS - Cross sectional study

Supplementary table S2. Methodological quality and risk of bias assessment of included studies.

	Research question	Study population	Participation rate	Subject recruitment	Inclusion and exclusion criteria	Sample size justification	Exposure measured prior to the outcome	Sufficient timeframe	Different levels of the exposure	Clearly defined, valid, reliable exposure	Exposure assessed more than once over	Clearly defined, valid, reliable outcome	Outcome assessors blinded	Attrition 20% or less	Confounding variables measured and	Study design	Randomized	Method of randomization described	Appropriate method	Representative of the target population	Overall Quality
Aicher, 2017	Y	Y	N	Y	Y	N	N	N	N	Y	N	Y	Y	NA	Y	CS	N	NA	NA	Y	FAIR
Ajzen, 1991	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	N	Y	N	LG	N	NA	NA	N	POOR
Ajzen, 1992	Y	Y	CD	Y	Y	N	N	Y	Y	Y	N	Y	N	Y	N	LG	N	NA	NA	N	POOR
Anderson, 2011	Y	N	CD	Y	Y	N	N	N	N	Y	N	Y	CD	CD	N	BAS	Y	Y	Y	N	POOR
Batmyagmar, 2019	Y	N	CD	CD	CD	N	Y	Y	N	Y	N	Y	CD	Y	N	LG	N	NA	NA	N	FAIR
Bell, 2014	Y	Y	N	Y	Y	N	N	N	NA	Y	N	Y	Y	NA	N	CS	N	NA	NA	Y	FAIR
Berger, 1998a	Y	Y	CD	Y	Y	N	N	Y	Y	Y	Y	Y	N	CD	N	BAS	N	NA	NA	N	POOR
Berger, 1998b	Y	Y	CD	Y	Y	N	N	Y	Y	Y	Y	Y	N	CD	N	BAS	N	NA	NA	N	POOR
Berger, 1998c	Y	Y	CD	Y	Y	N	N	Y	Y	Y	Y	Y	N	CD	Y	CCT	N	NA	NA	N	FAIR
Berger, 2016	Y	Y	CD	Y	Y	N	N	N	Y	Y	N	Y	N	CD	Y	BAS	N	NA	NA	N	POOR
Bernstein, 2017	Y	Y	CD	Y	Y	N	N	N	Y	Y	N	Y	N	CD	Y	RCT	Y	Y	Y	N	GOOD
Bonham, 2018	Y	Y	CD	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	LG	N	NA	NA	N	GOOD
Carnes, 2016	CD	CD	N	Y	N	N	N	N	N	Y	CD	Y	CD	Y	Y	BAS	Y	N	CD	N	POOR
Doppelmayr, 2004	Y	N	CD	Y	CD	N	N	N	N	Y	N	Y	Y	NA	N	CS	NA	NA	NA	N	POOR
Eich, 2009	Y	N	CD	Y	CD	N	N	N	N	Y	N	Y	CD	NA	Y	CS	N	NA	NA	Y	POOR
Elbe, 2010a	Y	Y	CD	Y	Y	N	N	Y	Y	Y	Y	Y	CD	CD	Y	RCT	Y	N	NA	N	FAIR
Elbe, 2010b	Y	Y	CD	Y	Y	N	N	Y	Y	Y	Y	Y	CD	CD	Y	RCT	Y	N	NA	N	FAIR
Galper, 2006	Y	Y	CD	Y	Y	N	Y	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	Y	FAIR
Gilchrist, 2017	Y	Y	CD	Y	Y	N	N	N	Y	N	N	N	N	CD	Y	LG	N	NA	NA	N	POOR
Gorzycya, 2016	Y	N	CD	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	LG	N	NA	NA	N	FAIR
Harada, 2004	N	Y	CD	N	Y	N	Y	Y	CD	Y	Y	Y	CD	Y	CD	CCT	N	NA	NA	N	POOR
Hassmen, 1991	Y	Y	CD	Y	Y	N	Y	Y	Y	Y	Y	Y	N	CD	Y	BAS	N	NA	NA	N	FAIR
Krouse, 2011	Y	Y	N	Y	Y	N	N	N	N	Y	N	Y	N	NA	N	CS	N	NA	NA	Y	FAIR

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Larumbe-Zabala, 2019	Y	Y	CD	Y	CD	N	N	N	N	Y	N	N	CD	NA	N	CS	N	NA	NA	N	POOR
Leedy, 2000	Y	Y	CD	Y	Y	N	N	N	Y	Y	N	Y	N	CD	Y	CS	N	NA	NA	Y	POOR
Luszczynska, 2007	Y	Y	CD	Y	N	N	Y	Y	Y	Y	Y	Y	CD	N	N	LG	N	NA	NA	N	POOR
Malchrowicz-Móska, 2018	Y	Y	CD	Y	Y	Y	N	N	NA	N	N	N	N	NA	N	CS	N	NA	NA	Y	POOR
Malchrowicz-Mośko, 2020	Y	Y	CD	Y	CD	N	N	N	Y	Y	N	Y	CD	NA	N	CS	N	NA	NA	Y	POOR
Masters, 1995	Y	Y	N	Y	Y	N	N	N	NA	NA	N	Y	CD	NA	N	CS	N	N	N	Y	POOR
McGowan, 1991	Y	N	CD	Y	Y	N	N	N	N	Y	N	Y	N	CD	Y	CCT	N	NA	NA	N	POOR
Morgan, 1996	Y	Y	CD	CD	CD	N	N	Y	Y	Y	Y	Y	CD	Y	N	CHS	N	NA	NA	N	POOR
Mueller, 2012	Y	Y	N	Y	Y	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	N	POOR
Nezlek, 2018	Y	Y	CD	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	LG	N	NA	NA	Y	GOOD
Nikolaidis, 2019	Y	Y	CD	Y	CD	N	N	N	Y	Y	N	Y	CD	NA	Y	CS	N	NA	NA	N	FAIR
Ogles, 1995	Y	N	N	Y	N	N	N	N	Y	Y	N	Y	N	NA	N	CS	N	N	N	Y	POOR
Ogles, 2000	Y	N	N	Y	N	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	N	N	Y	POOR
Ogles, 2003	Y	Y	CD	Y	N	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	N	N	Y	POOR
Pereira, 2021	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	Y	FAIR
Pišot, 2015	Y	N	CD	Y	Y	N	N	N	N	Y	N	Y	N	NA	N	CS	N	NA	NA	Y	POOR
Popov, 2019	Y	Y	CD	Y	CD	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	N	POOR
Qiu, 2020	Y	Y	CD	Y	Y	N	N	N	Y	Y	N	Y	CD	NA	Y	CS	N	NA	NA	Y	FAIR
Ransford, 1996	Y	Y	CD	Y	Y	N	N	N	N	N	N	N	N	NA	Y	CS	N	NA	NA	Y	POOR
Rendi, 2008	Y	N	CD	CD	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	BAS	Y	Y	N	N	FAIR
Roeh, 2020	Y	Y	CD	N	Y	N	N	N	Y	Y	N	Y	N	NA	N	CS	N	NA	NA	N	POOR
Schnohr, 2005	Y	Y	Y	CD	CD	N	Y	Y	Y	Y	Y	CD	CD	CD	N	LG	N	NA	NA	Y	FAIR
Scholz, 2008	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	N	Y	N	LG	N	N	N	N	FAIR
Schüler, 2009	Y	Y	CD	Y	CD	N	Y	Y	Y	Y	Y	Y	N	Y	N	BAS	N	N	N	N	FAIR
Suter, 1992	Y	Y	CD	Y	Y	N	Y	N	Y	N	Y	Y	N	Y	Y	RCT	Y	N	NA	N	GOOD
Szabo, 2003	Y	Y	CD	Y	Y	N	N	N	Y	Y	N	Y	N	CD	Y	CCT	Y	Y	Y	N	GOOD
Szabo, 2013	Y	Y	CD	Y	Y	N	Y	Y	Y	Y	Y	Y	N	CD	N	BAS	Y	Y	Y	N	GOOD
Titze, 2005	Y	Y	Y	Y	CD	N	Y	Y	Y	Y	Y	Y	CD	Y	N	LG	N	N	N	Y	FAIR

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Tjelta, 2017	Y	Y	N	Y	Y	N	N	N	N	N	N	N	N	NA	N	CS	N	NA	NA	Y	POOR
Walter, 2013	Y	Y	CD	Y	CD	N	Y	Y	Y	Y	Y	Y	N	Y	N	RCT	Y	Y	Y	N	GOOD
Waskiewicz, 2019a	Y	N	CD	Y	Y	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	Y	POOR
Waskiewicz, 2019b	Y	N	CD	Y	Y	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	Y	POOR
Welsh, 1991	Y	Y	CD	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	RCT	Y	N	NA	N	GOOD
Whitehead, 2020	Y	Y	CD	Y	Y	N	N	N	Y	Y	N	Y	N	NA	Y	CS	N	NA	NA	Y	FAIR
Winker, 2010	Y	Y	CD	Y	CD	N	N	N	Y	Y	N	Y	CD	Y	N	LG	N	N	N	N	POOR

Y – yes; N – No; CD – Cannot determine; NA – Non applicable

CHAPTER 4

Keep on running – a randomized controlled trial to test a digital evidence-based intervention for sustained adoption of recreational running: rationale, design and pilot feasibility study (Study III)³

³**Pereira HV**, Teixeira PJ, Marques MM, Carraça EV, Silva MN, Encantado J, Santos I, Palmeira AL (2020). Keep on running – a randomized controlled trial to test a digital evidence-based intervention for sustained adoption of recreational running: rationale, design and pilot feasibility study, *Health Psychology and Behavioral Medicine*, 9:1, 149-164, DOI: 10.1080/21642850.2021.1885410

Abstract

Background: This paper describes the rationale, intervention development, study design and results from the pilot feasibility study of the Keep On Running (KOR) trial. KOR aims to test a web-based brief theory-based intervention, targeting maintenance of recreational running behavior over time (i.e. relapse preventing). *Methods:* Intervention development was based both on Self-Determination Theory and on Self-Regulation Theory. As part of it, a pilot study was implemented (n=18) to measure intervention adherence and participant satisfaction in order to establish the feasibility and acceptability of the intervention toolkit. Furthermore this pilot study was also used to test the feasibility and acceptability of the questionnaires selected to be part of the later RCT. *Results:* Pilot intervention acceptability was good, but overall adherence was low. Features such as feedback and social sharing should be added to the toolkit. The main trial should lessen questionnaire length and include data from usual monitoring gadgets and apps (APIs). The protocol of the RCT was adjusted to test the efficacy of the refined final version of the intervention, and the RCT that will test it, contributing to the understanding of recreational running sustainability, allowing the optimization of future interventions aimed at physical activity promotion.

Background

While benefits of regular physical activity (PA) and exercise are well established (Kraus, 2019; Oja et al., 2015), insufficient PA and the prevalence of sedentary behavior remain as challenges in health promotion (Ding et al., 2016; Guthold, Stevens, Riley, & Bull, 2018). Although research suggests that behavior change interventions can increase PA over the course of an intervention, these effects are generally not persistent after the intervention ends (McEwan, Rhodes, & Beauchamp, 2020).

Along with initial involvement, sustained adherence is a well-known challenge in exercise contexts, as many people struggle to keep up their behavior for longer than 6 months (Kahlert, 2015; Marcus et al., 2000). Research on the characterization of people who are physically active (Cortis et al., 2017; Sawyer, Ucci, Jones, Smith, & Fisher, 2017) and manage to sustain their PA behavior (Amireault, Godinb, & Vézina-Imb, 2013) is extensive. While most of the research about behavior sustainability report how many discontinue practice, only few studies addressed the psychological mechanisms of behavior maintenance (Kwasnicka, Dombrowski, White, & Sniehotta, 2016), such as the quality of their motivation, the emotions and gains they experience while exercising, or the regulatory resources they use to overcome exercise-related challenges and barriers.

Self-determination theory (SDT) (Deci & Ryan, 2000, 2008) can provide a valid framework to study PA maintenance. The underlying premise of SDT is that sustained motivation is elicited from within the person (not imposed by someone else) and that supporting clients' basic needs for autonomy (need to feel a sense of choice, volition and self-endorsement), competence (need to feel a sense of mastery and capacity to accomplish the behavior), and relatedness (need to feel meaningfully connected to others, valued and understood) will best promote the initiation and maintenance of behavior change, by fostering autonomous motivation and well-being. Conversely, when these three needs are thwarted, people will tend to develop controlled motivations, regulating their behavior based on external contingencies and internalized self-judgments (Vansteenkiste & Ryan, 2013).

In addition, not all types of goals have the same consequences (Ryan, Sheldon, Kasser, & Deci, 1996). The outcomes that individuals are pursuing through the new behavior can have intrinsic or extrinsic qualities, which can also influence behavior maintenance. Relative to "extrinsic goals" (e.g., wealth, social recognition, physical attractiveness), "intrinsic" goals (e.g., health, personal growth, social connectedness) tend to be regulated by more self-determined forms of

behavioral regulation and are thought to result in improved self-regulation and longer-term outcomes (D. Ingledeu & Markland, 2009).

In summary, SDT interventions have a significant effect on health behavior change (Sheeran, 2020). Additionally, SDT-informed interventions positively affect indices of health, partly due to increases in internalization, self-determined motivation and support from social agents, and were stronger at the end of interventions than at follow up (Ntoumanis et al., 2020). The effect sizes seen in PA interventions are mediated by our current theories (Rhodes, Boudreau, Josefsson, & Ivarsson, 2020). Taken together, recent evidence suggests that SDT (Deci & Ryan, 2000) can provide a valid framework to study PA maintenance. Furthermore, aligning motivational and post-motivational (i.e. self-regulatory) features represents a promising avenue for lasting behavior change (Hagger & Chatzisarantis, 2014). In this regard, self-regulatory skills such as self-monitoring, individualized goal setting or action planning, have been identified as important mediators of the effect of interventions on long term physical activity and as potentially core features of effective behavior change/maintenance interventions (Rhodes et al., 2020).

Thousands of health applications (apps) are available world-wide for smartphones and represent a unique opportunity to reach a broad audience of users. The most popular apps are for exercise, diet, and weight management, and 500 million users use mobile health applications. Mobile health interventions have surged in popularity but their implementation varies widely, and evidence of effectiveness is mixed (Dugas, Gao, & Agarwal, 2020). When trying to understand design features through the SDT lens, only one fourth of the sample provided users support for the three basic psychological needs of competence, autonomy and relatedness (Villalobos-Zúñiga, 2020). It was found that prompts and cues, techniques of

personalization, feedback and monitoring, goal setting and action planning were most commonly used in effective mobile health interventions (Dugas et al., 2020).

The case for recreational running

Running is one of the most popular forms of leisure-time exercise (Andersen, 2020; Running-USA, 2020; Teixeira, Marques, Lopes, Sardinha, & Mota, 2019) in part because it is inexpensive and can be performed anywhere, almost at any time. In addition, it requires little technical skills, is relatively safe, and it is easy to learn. The health benefits of running are vast, including prevention of obesity, hypertension, dyslipidemia, type 2 diabetes, osteoarthritis and hip replacement, benign prostatic hypertrophy, respiratory disease, cancer, disability, reduction of cardiovascular, and all-cause mortality (Lavie et al., 2015; Lee et al., 2014; Pedisic et al., 2019).

Running stimulates the interest of the research community, especially because of the long hours of training throughout the year and the large number of events runners participate in (Zach et al., 2017). This suggests that motivational aspects related with training for and completing a race may be unique (Zach et al., 2017). With this in mind, running clubs/groups may provide a novel testbed for understanding why people adopt recreational running and how motivational factors can support PA maintenance.

To better promote running sustainability and its long-term health benefits, it is crucial to understand individuals' running experiences and outcomes, as well as the factors that predispose them to engage in this activity. Studying the antecedents and outcomes of running motivation, as well as the efficacy of different types of interventions to promote running behavior will enhance the understanding of the phenomenon, possibly creating new insights into the effective promotion of PA maintenance.

To our knowledge, no previous study has been designed to test the efficacy of interventions to promote sustained running behavior and identify the mechanisms behind it. Future interventions will aim to test if motivation and self-regulation mediators can be successfully modified via a digital-based intervention. This will ultimately lead to sustained adherence to an activity that participants have chosen and appear to enjoy, via large-reach interventions, capitalizing on the widespread availability of running clubs/events and increased reliance of exercisers on remote technologies.

This paper describes the rationale, intervention development, study design, and pilot study of the Keep On Running (KOR) trial. KOR aims to test a brief theory-based intervention, delivered through digital technology (web app), targeting maintenance of recreational running behavior over time (i.e. relapse prevention) after being voluntarily initiated in the previous 3 months. The pilot study was focused on intervention adherence and participant satisfaction in order to establish the feasibility and acceptability of the intervention toolkit. Furthermore, it was also used to test the feasibility and acceptability of the questionnaires selected to be part of the later RCT.

Study objectives and hypotheses

The study's objective is to develop and present a new digital toolkit aiming at maintenance of recreational running behavior over time (i.e., relapse preventing), and evaluate whether it can be delivered and accepted by participants. We hypothesize that the built intervention can be delivered and will be accepted by the participants, and the tested by the RCT.

Methods

Study Design

KOR is a Randomized controlled trial (RCT). It was developed based on a logic model (figure 1), adapting the motivational and self-regulation arm of the NoHoW study (Marques et al., 2016; Scott et al., 2019). The trial involved combinations of two conditions: a) organized (i.e. Programa Nacional de Marcha e Corrida – PNMC) vs. free recreational runners (FRR), and b) self-regulation and motivation (SRM) intervention vs. no intervention. As a result, it comprises four different groups (figure 2): i) a group of runners enrolled in the running program and additionally receiving the theory-based intervention (PNMC+SRM); ii) a group of FRR merely participating in the organized running program (PNMC); iii) a group of FRR receiving the theory-based intervention (FRR+SRM); and lastly, iv) a group of FRR receiving only general information on running (i.e. control group).

This approach was taken because a) comparing runners belonging to PNMC with FRR (i.e. control group) allows examining the effect of the PNMC on behavior maintenance; b) comparing runners enrolled in the SRM intervention with FRR allows testing the effectiveness of a light-touch intervention on motivational and other psychological variables, and on behavior maintenance; and c) comparing runners belonging to PNMC and receiving the SRM intervention with FRR receiving the PNMC intervention will allow examining whether the SRM intervention has an additional effect on the study outcomes. Trial duration is one year with assessments at 6 weeks, and 6 and 12 months postbaseline (figure 3).

Eligibility criteria

Inclusion criteria: age between 18 and 65 years; running for no longer than 3 months; performing a minimum of 60 minutes of vigorous physical activity per week; being free from major orthopedic limitations (defined as those which would limit MVPA); and from clinical

diagnosis with any condition that may interfere with performing MVPA; being free from untreated or major psychological disorders (e.g., psychosis, clinical depression); and possessing or willing to acquire a smartphone or computer with internet access.

Exclusion criteria: inability to provide written informed consent; inability to follow written material or telephone conversations in Portuguese that would preclude completion of study questionnaires and use of the digital intervention (i.e., KOR toolkit, see below); intention of pregnancy in the next 12 months; planning to travel for more than 2 weeks in the next 12 months or to emigrate; suffering any injury in the course of the study.

Motivation and Self-regulation Intervention

We developed a web-based intervention adapted from the motivational and self-regulation arm of the NoHoW trial (Marques et al., 2020; Scott et al., 2019). It consists of 11 short sessions divided in 8 modules with motivational and self-regulation based exercises, quizzes, videos and animations aimed to elicit reflection about motives, goals, barriers and strategies to foster running behavior sustainability. Beyond the long-term promotion of running behavior, by implementing theory-based and evidence-based behavior change techniques, this brief intervention aims at promoting participants' intrinsic and well-internalized motivations for running and the use of self-regulation skills (e.g. goal setting) that facilitate behavior maintenance.

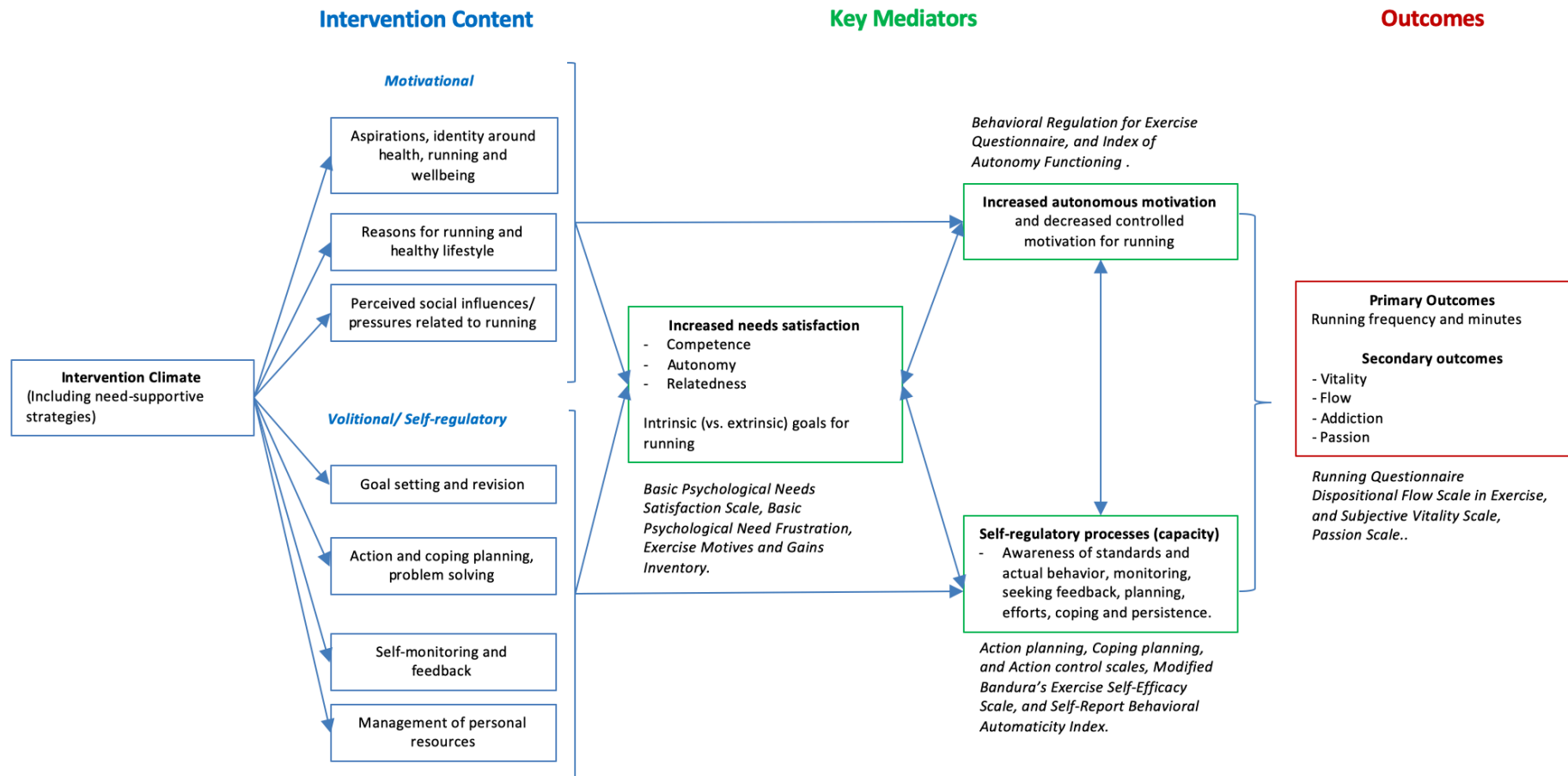


Figure 1. KoR's Logic Model

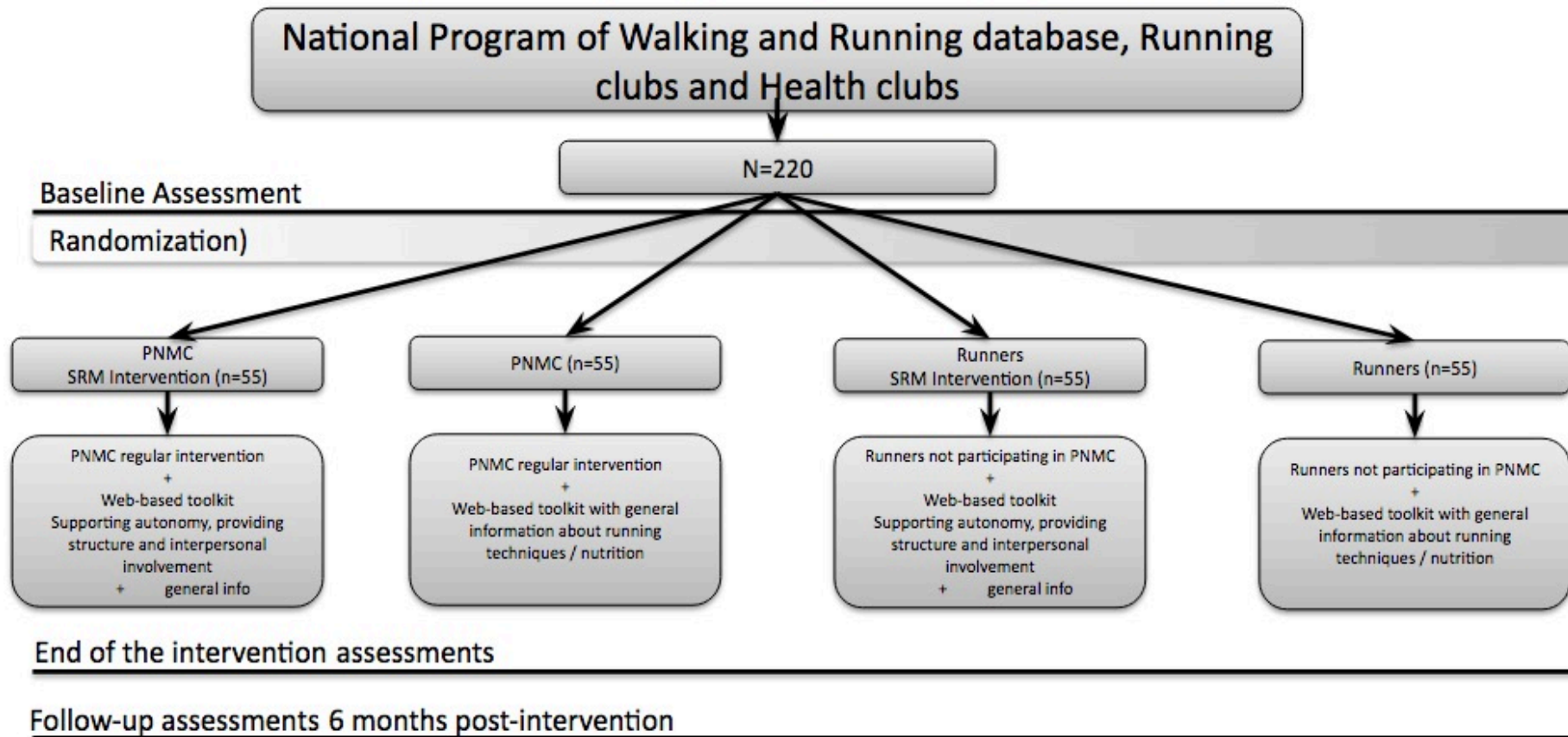


Figure 2. Organization of participant groups

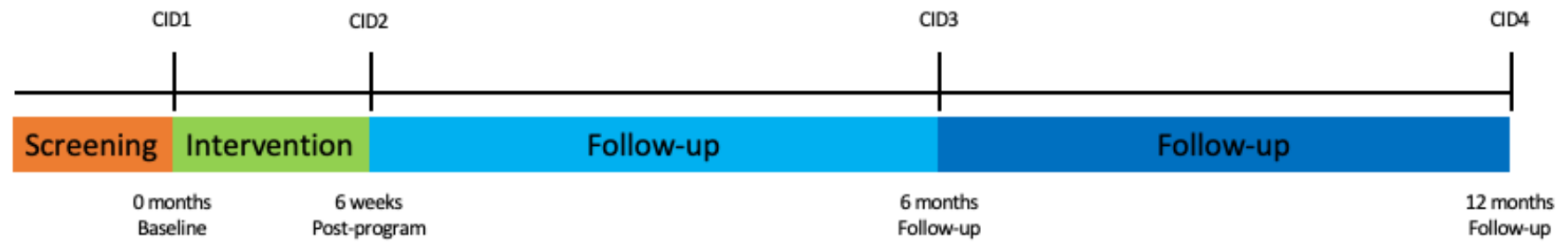


Figure 3. Participants' timeline (CID - clinical investigation day)

The intervention includes:

i) Access to a web-based intervention comprising 11 distinct sessions of 5-10 minutes each and 8 educational modules concerning motivation and self-regulation constructs, delivered through several technological implementations, including videos, animations, quizzes and exercises, as well as images, text and audio (Figure 4). Several multimedia tools, including a web-based HTML5 interactive map as a navigation tool for the SRM sessions (<http://leafletjs.com/>), the questionnaires platform to design interactive features, and whiteboard drawings to convey some of the more theoretical constructs of the intervention (<http://www.videoscribe.co/>), were used to develop these implementations, supported by the team's previous experience in similar interventions.

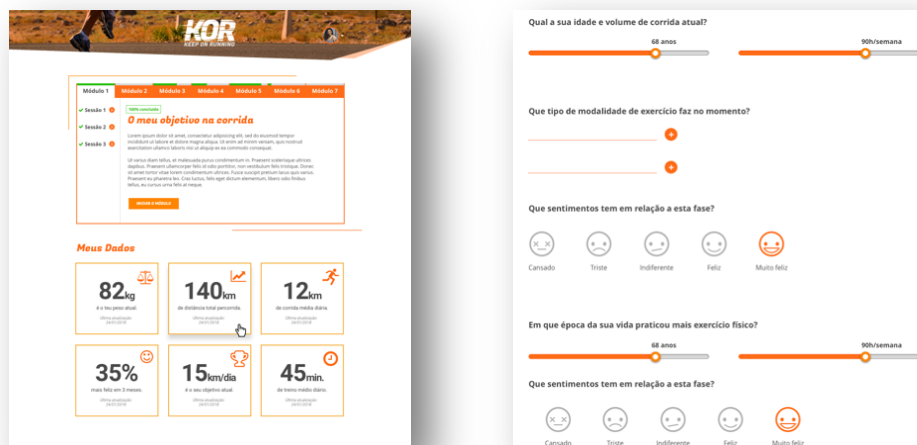


Figure 4. Screenshots of the intervention toolkit.

ii) Bi-weekly text messages (see Table 1 for an overview of weekly text messages to participants) are sent to prompt participants toward the sessions and each week specific contents. Yet, participants are able to move faster or slower through the program to fit their needs and availability.

The SRM intervention includes both motivation and self-regulation components. The

intervention's theoretical logic model is adapted from the NoHoW project (Marques et al., 2020; Scott et al., 2019) and presented in figure 1. The self-regulation skills component will seek to empower users to identify goals and make action plans for when, where, and how the goals will be implemented, allowing them to formulate explicit implementation intentions. Coping plans for relapses will also be supported. The motivational component is therefore based on SDT and configured to optimally support participants' psychological needs for autonomy, competence, and relatedness, via specific technological implementations (e.g., self-awareness exercises, videos and practice modules), and as a result improve autonomous regulation of physical activity behaviors. Participants will explore personal motives to run, skills, life goals, social connections, and other motivational elements. Messages, videos, animations, self-awareness questionnaires, among other tools, will stimulate users' sense of volition and ownership (vs. external pressure), confidence and competence (vs. unpreparedness and sense of failure), and positive social support (vs. isolation). It is anticipated that the use of these implementations will increase autonomous self-regulation and intrinsic motivation, which are associated with longer-term behavior change, and positive health outcomes.

The SRM web-based toolkit will be accessible only to the groups receiving the SRM intervention. In addition, all the study participants will receive weekly email messages with general technical information about running. An individual telephone session will introduce runners to specific elements of their unique intervention and how it will unfold.

Recruitment and randomization

Part of the runners will be recruited from the PNMC program, which consists in 2-3 supervised running group-sessions of 10-20 runners per week, lasting 90 minutes each. Certified trainers lead these sessions, apply specific methodologies for running and for walking sessions. Prior to their enrollment, trainers must complete a training course. The other set of runners (which

run freely, on their own) will be recruited from the community (recreational runners). To recruit this sample, we will use online advertisement and running events list servers, reach out for running clubs, and partnerships with both state and private organizations.

We will use a rolling recruitment strategy: participants will join the study as soon as they are considered eligible to facilitate management of available human resources. Each set of runners will be randomly assigned to the KoR intervention group or the control group general information group in a 1:1 ratio, stratified by group (PNMC and Free runners). The method of randomized permuted blocks will be used, with random block lengths (4 or 6) (Broglia, 2018). Because participants will know which arm of the study they are in, blinding is not possible.

Text reminder 1	Good afternoon, runner, you have already registered on the website http://kor.fmh.ulisboa.pt/ . By now, you will have received an email to validate your account. Good races!
Text reminder 2	Good morning Athlete, have you had the opportunity to explore the contents and activities of the KoR program? Good Sunday wishes.
Text reminder 3	Good morning Athlete, how about a visit to the KoR program during today? This is the third of 11 reminders. Good races
Text reminder 4	Good morning Athlete, how is the exploitation of KoR content RUNNING? Good races
Text reminder 5	Good afternoon Athlete, you can do the activities of the KoR program at your own pace. How's your run going? Good races
Text reminder 6	Good afternoon Athlete, fortunately tomorrow is already cooling. We have now spent half of the KoR program. We hope you're enjoying it. Good runs (in the shade)
Text reminder 7	Good afternoon, this is the 7th of 11 messages. At this point, you may have finished exploring the content or just be at the beginning. You can continue to enjoy content at your own pace. Good races
Text reminder 8	Good morning, the heat returned and we are on the final stretch of the KoR program. On vacation or at work we hope you are enjoying the program and your races. Good races
Text reminder 9	Good afternoon athlete! It is now just a little bit to finish your trip in the KoR toolkit. I hope you're enjoying it. Good races

Text reminder 10	Good morning athlete! Weekend it is here, and a nice time for a run. This is the penultimate sms of the KoR program. You have certainly had the opportunity to explore the contents of the toolkit and reflect on your run. Best wishes for a great weekend
Text reminder 11	Good afternoon athlete! This will be the last message / reminder to access the KoR program. During this week, you will also be able to access the contents and register your race. Soon I will send you the link to complete the completion questionnaire. Have a nice week and good races

Table 1. Overview of weekly text messages to participants

Assessments

Data on demographics (age, gender, date of birth, education, income, employment, marital status, weight, height, physical activity history, and personal characteristics) and potential psychological moderators (i.e., index of autonomous functioning) will be collected only at baseline.

The primary outcome of this study is running behavior, which will be measured at baseline, intervention's end and 6-month follow-up by self-report (frequency and minutes of running per week). At 12 months, participants will be asked by telephone whether they keep running (at least) at their initial level, or not.

Secondary outcomes will include putative mediators and outcomes. Basic psychologic need satisfaction will be assessed via the Psychological Need Satisfaction in Exercise Scale (Wilson, Rogers, Rodgers, & Wild, 2006); Basic psychological need frustration will be assessed through the Basic Psychological Need Frustration in Exercise Scale (Chen et al., 2015); Motives and gains via Exercise Motives and Gains Inventory (D. K. Ingledew, Markland, & Strömmer, 2014); Behavioral regulations will be assessed via the Behavioral Regulation in Exercise Questionnaire - 3 (Cid et al., 2018); Self-determination trait will be assessed via the Index of Autonomy Functioning (Weinstein, Przybylski, & Ryan, 2012); Self-regulation skills will be measured through the Action planning, Coping planning, and Action control scales (Sniehotta,

Scholz, & Schwarzer, 2005; Sniehotta, Schwarzer, Scholz, & Schuz, 2005); Self-efficacy will be assessed via the Modified Bandura's Exercise Self-Efficacy Scale (Bandura, 1997); Automaticity will be measured through the Self-Report Behavioural Automaticity Index (Gardner, Abraham, Lally, & de Bruijn, 2012; Gardner & Tang, 2014); and exercise identity via the Exercise Identity Scale (Anderson & Cychosz, 1994). Regarding psychological outcomes, flow will be measured through the Dispositional Flow Scale – 2 in Exercise (Jackson & Eklund, 2002); Vitality will be assessed through the Subjective Vitality Scale (Ryan & Frederick, 1997); and passion through the Passion Scale (Cid et al., 2019).

Data collection

Participants will go through four assessment periods at baseline, 6 weeks (post-program), 6 months, and 12 months follow-up. The training and clarification session will be completed by telephone to ensure participants are equipped with the skills to access the intervention contents. Before the first, third and fourth assessment periods, eligibility will be checked against inclusion and exclusion criteria through a telephone screening/re-screening call, 1 week prior to each visit. Participant's timeline is shown in figure 3.

Assessment 1 (baseline): clarification session about the study. If participants are still interested in enrolling in the study, eligibility will be checked, and they will be asked to fill out an informed consent form. Randomization and allocation to one of the four arms of the trial will be performed. Data on demographics and potential psychological moderators will be collected. A battery of psychological and behavioral questionnaires will be completed online using google forms (in one-week time) – running behavior (i.e., frequency and minutes per week), motivations, basic psychological needs, motives and gains, self-regulation skills, passion, flow, and vitality. This task is estimated to take approximately 1 hour, but participants will be able to do breaks and return later to complete the psychometric evaluation during that week. Debrief on how to use the KOR web-based intervention content – the toolkit (approximately 1 h).

Assessment 2 and 3 (intervention's end and 6-month follow-up). Email reminder prior to this evaluation period will be sent. The same battery of psychological and behavioral questionnaires will be completed online using google forms (in one-week time) – running behavior (i.e., frequency and minutes per week), motivations, basic psychological needs, motives and gains, self-regulation skills, passion, flow, and vitality –, and will take approximately 1 h.

Assessment 4 (12-month follow-up). Running behavior maintenance will be assessed through a telephone call, asking participants whether they keep running at their initial level or higher, or not.

Analytical Strategy

Statistical analysis will be performed using SPSS Statistics version 25.0 (SPSS Inc., an IBM Company, Chicago IL, USA). Descriptive statistics will be calculated (mean, standard deviation and range). Repeated measures with Bonferroni corrections for adjusted comparisons will be used to examine differences between each intervention (PNMC or SRM) and controls (i.e., free recreational runners), at all assessment points, in the primary and secondary outcomes measured. Statistical significance will be set at $p < 0.05$.

Mediation analysis, will test the psychological mechanisms underlying changes in running behavior from baseline to post program, 6 and 12 months. Multilevel modeling will be used to determine the SRM intervention effect on these motivational variables, with intervention group (SRM vs. General Info) as the between-subject factor and change in self-regulation and competence for running at baseline, 6-8 weeks, 6 months and 12 months, serving as dependent variables. If necessary, multiple imputation methods will be implemented to provide robust results for primary and main secondary outcomes.

Power calculations and sample size estimation

Two types of sample size calculations were made: a) using the primary outcome - running minutes; and b) using secondary outcomes, in particular, changes on key psychosocial variables. Regarding our primary outcome, we have used vigorous physical activity for our calculations. A small effect size (Cohen's $d = 0.23$) is expected, a value previously registered in studies with intrinsic motivation interventions (Ntoumanis et al., 2020; Sheeran, 2020). Considering a power of 0.8 with two-tailed analysis, we estimated that each intervention group should have 37 ($p = 0.05$) or 55 participants ($p = 0.01$). Concerning our secondary outcomes, we are expecting effects sizes ranging from 0.23 to 0.73, based on previous reports (Ntoumanis et al., 2020; Sheeran, 2020). Thus, assuming an effect size of 0.50, 18 subjects/group will be required to detect significant differences at $p = 0.05$ and 28 for $p = 0.01$. Given that the primary outcome is expected to have a smaller effect size, and expecting a dropout rate of 15% at follow-up, we estimate that approximately 55 subjects/group are needed at baseline (for $p = 0.05$). Thus, recruiting 220 participants will ensure high statistical power for our primary analyses, extending its power to the secondary analyses.

Trial results will be published in peer-reviewed scientific journals and in several international and national scientific conferences. The website will be our central media to promote the dissemination of the results to the general public. Other media will be reached through university partners and website.

Pilot Feasibility Study

This pilot study is focused on intervention adherence and participant satisfaction, in order to establish the feasibility and acceptability of the web-based intervention toolkit and questionnaires. Besides eligibility, baseline and post-program questionnaires, participants were interviewed about their overall experience with questionnaire filling and toolkit (Smailes et al.,

2016). Additionally, toolkit usage analytics were obtained. The pilot feasibility study was conducted in order to better inform the final program and procedures. This study, as well as implications for final protocol are briefly described here.

Pilot study participants

Pilot participants were recruited among the running community through online advertisement. Study procedures were equivalent to those defined for the RCT, except that participants were not randomized, following the path of the study as if they were included in the intervention group. Participants were informed about the results of this pilot by individual reports.

The pilot feasibility study was a 6-week non-controlled trial without the follow-up. Considering an expected effect size of 0.23, 55 subjects per arm should be required in the main trial to detect significant differences at $p = 0.05$ (see sample size calculations for the main trial). Bearing in mind the rule of thumb for pilot sample size (Bell, Whitehead, & Julious, 2018), for an 80% powered main trial, with an expected medium effect size, the pilot should have between 10 to 15 subjects per arm.

Results of the pilot feasibility study

Due to recruitment problems, the eligibility criteria to participants with more than three months of running experience was more flexible. All other recruitment procedures were equivalent to the RCT.

Pilot participant characteristics

The CONSORT diagram for the pilot is shown in Figure 5. In total, 18 participants were enrolled and completed the baseline assessment. Of those, 3 dropped out during the intervention, allegedly due to time constraints and injuries; 15 participants finished the 6 week-intervention, 7 the post-program questionnaire, and 14 the overall study satisfaction questionnaire.

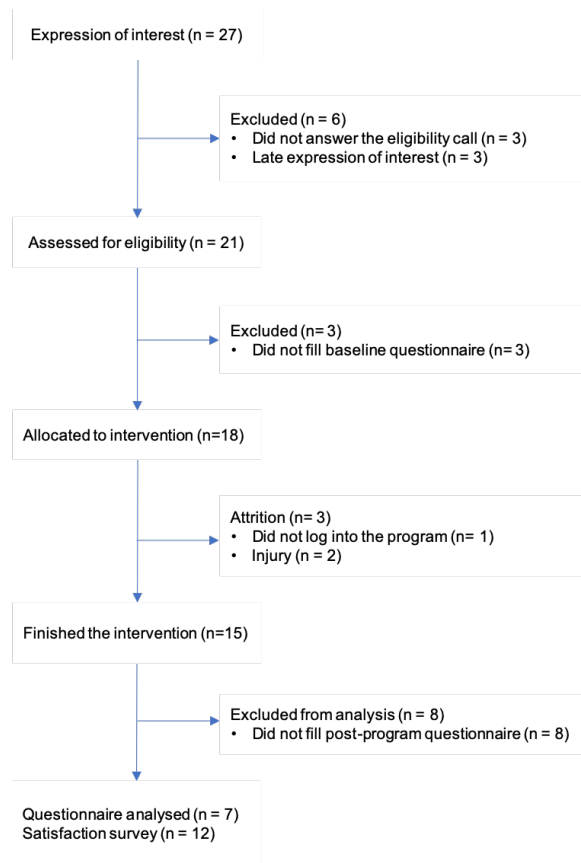


Figure 5. CONSORT diagram

Participants (N = 18, 33% female), between 25 and 54 years-old (average 42,1 yrs.), were generally self-perceived as healthy (94%), highly educated (78%), and lived mostly in the Lisbon area (83%). Participants reported to run an average of 27 km and 4,4 hours per week. Running experience ranged from 1 month to 30 years (average 6,3 yrs.). Most participants (88,9%) wore a running monitoring device to keep track of their running, social sharing and coaching, and 94,4% included other types of exercise in their training regime, such as warm-up and stretching, weight training or calisthenics, exercise classes or biking. A total of 61,1% used social media for motivation, education, interaction and coaching purposes.

Pilot adherence and program usage

From the 18 participants allocated to the intervention, 17 (94,4%) logged at least once, 50% logged once, and 22,2% twice. Only 6 (33,3%) completed the first session. Participants'

session completion decreased at sessions two (N = 5; 27,8%), five (N = 4; 22,2%), and only three participants (16,7%) completed sessions from eight to eleven. During the course of the program 12 participants (66,7%) logged at least one race (1-15 races, average 5,2), and the average run lengthened 9,4 Km (4-14 Km).

Pilot program evaluation: Participant satisfaction

Overall, participants understood the purpose of the study, the concepts underlying the questionnaires and the toolkit, and felt supported by the research team. Most participants (83.3%) found the questionnaire too long. Participants generally found the toolkit website to be attractive and user friendly, classifying their overall experience with the study as positive. Most of the interviewed participants already used a running monitoring app, so they found the program to be less intuitive, repetitive in some questions and missing out important aspects such as *“time of day, speed/ pace, and altimetry”*. Additionally, participants reported problems with platform adjustment that led to *“information overlap when used on cellphone”*, the fact that *“it didn’t keep data inserted in previous sessions”* and *“errors in google docs that forced them to restart the questionnaire”*.

Three participants suffered injuries during the intervention period (25%). Two had muscular running-related injuries in the lower limbs and one had a foot trauma injury while playing football.

This pilot study had limitations that need to be considered. Due to recruitment constraints, the final sample included long time runners, which may differ from beginners, targeted by the RCT protocol. The low sample size and the absence of follow-up hindered further interpretation about the efficacy of the toolkit as it is.

Ethics and dissemination

The study protocol was approved by the Ethics Committee of the Faculty of Human Kinetics, University of Lisbon (CEFMH 3/2018) and will be conducted in accordance to the declaration of Helsinki for human studies (World Medical Association, 2013). All participants will be informed about the possible risks of the investigation before giving their written informed consent to participate. Data from google forms (questionnaires), the intervention quizzes and toolkit analytics will be handled and stored in excel and SPSS files in a secure faculty server for ten years. Data will then be destroyed. All personal data will be anonymised at source. There will be no names or other identifiers in the manuscripts and qualitative descriptions whatsoever. Data will only be linked back to the individual via a separately stored coding system. Interventions will be discontinued if they are reported detrimental. Protocol deviations, violations and serious adverse events will be recorded by trial staff and monitored by the principal investigator (PJT) (MRC, 2017).

Discussion

This paper presents the rationale, development, study design, methods and pilot application of the KOR trial, aimed at testing the effect of the intervention on the maintenance of recreational running behavior over time, after being voluntarily initiated by community-dwelling adults in the previous 3 months. This “light-touch” intervention is unique in that it approaches running behavior and its sustainability, delivered in a digital format, and based on strong theoretical foundations.

We hypothesize that the sustainability of running behaviors will be higher in the SRM groups compared to the control group. Change in running behavior (e.g., frequency and minutes of

running per week) and secondary outcomes related to the quality of the running experience (e.g., passion, flow, vitality) will be used as the dependent variables.

Additionally, the results of the pilot feasibility study, intended at testing intervention adherence, participant satisfaction, and questionnaire acceptance, were also presented.

Overall, the pilot study indicated that the intervention has good acceptability, feedback was very positive, but toolkit interaction decreased after the first weeks, which is common in web-based interventions (Baumel & Yom-Tov, 2018). Moreover, the generalized use of other running-related devices, applications and communities may have overlapped with the anticipated content of the toolkit, challenging participants' interaction. The completion ratio of the post-program questionnaire was low, maybe due to its extension and burden, but also because its timeline ended near the summer break.

The main trial should reduce questionnaire length and burden, and include interface with usual monitoring gadgets and apps (APIs), to increase data detail and prevent “unnecessary” data insertion by the participants. Features such as feedback and social sharing, added to the goal setting features already integrated in the toolkit, may also increase attractiveness (Hosseinpour & Terlutter, 2019).

Conclusion

This paper describes the rationale, the process of developing, study design, methods, and the pilot study of the KOR intervention. Valuable lessons are taken from the pilot feasibility study and adjustments will be made in the intervention and in its delivery, in order to improve adherence and overall experience. Results from the RCT will test the efficacy of this approach, contribute to the understanding of recreational running sustainability, and can be used in the development and optimization of future interventions aimed at physical activity promotion.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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CHAPTER 5

General Discussion

Overview

While benefits of regular physical activity (PA) and exercise is well established [1, 2], insufficient PA and the prevalence of sedentary behavior remain challenges in health promotion [3, 4]. Although research suggests that behavior change interventions can increase PA over the course of an intervention, these effects are generally not persistent after the intervention ends [5].

The rising popularity of recreational running provides an opportunity to study the underlying processes of its maintenance [6, 7]. Regardless of running participation rates, acceptance and convenience, running-related research is still tendentially focused in the understanding of injuries, its risk factors [8, 9], and treatment [10], as well as health benefits [11] and addiction to running [12]. Studying the correlates of running, as well as the efficacy of different types of interventions to promote running sustainability, will enhance the understanding of the phenomenon, possibly creating new insights into the effective promotion of PA maintenance. This thesis addressed this issue by i) portraying recreational running in Portuguese adults; ii) examining psychological antecedents and consequences of recreational running; iii) investigating how recreational running can be effectively promoted in the long term.

Gaps identified in the literature inspired the three empirical studies incorporated in the present thesis, which provide a unique contribution to the body of knowledge regarding recreational running sustainability. A detailed discussion of theoretical and practical implications of each study's main findings was integrated in the respective chapters.

Therefore, the purpose of this general discussion is to integrate and combine the contributions of the three studies, summarizing its results, and reflecting on insights and implications for future research and practice.

Main research findings

What is the expression of recreational running in Portugal (i.e. how many runners, who they are and how they behave)?

The first study (**Chapter 2**) was designed to estimate the prevalence of recreational running, and explore demographic, behavioural and psychological characteristics of Portuguese runners. This study was developed to provide a better picture of running in Portugal, because there was no representative data available on how many people were running, how and why. For this purpose, a definition of recreational running was achieved: “running at least 2 days per week or at least 60 minutes per week, over the past 3 months, excluding any preparation for competitive sports”. Then, a telephone-based survey was implemented, targeting 1084 individuals. Results showed that the prevalence of recreational running in Portugal was 10.6%. The prevalence was higher in men when compared with women (14.6% vs. 6.6%) and in younger than in older participants (13.6% vs. 7.7%). Runners reported running 3.4 ± 1.3 sessions/week, 20.0 ± 10.7 km/week, and 3.0 ± 2.3 h/week. 73% of the participants prefer to run alone (vs. 13% preferring a “running group”), 69% also do other physical activities (of which 58% reported doing warm-up and stretching exercises), 69% use technology during running sessions (of which 45% use a watch and music feature), 68% report running in a natural setting (of which 58% run “on roads”). General health orientation (88%), self-esteem (63%), and life meaning (57%) were the most predominant motives for running, while time was the most prevalent barrier (43%). Runners reported more vigorous PA ($d = .49$), and higher likelihood of engaging in non-sedentary activities ($d = .19$).

After the more descriptive data from the first study, concerning recreational running in Portugal, the next reasonable step was to better understand the running behaviour itself, by reviewing the literature about psychological correlates of recreational running.

What is known about the behavioral and psychological correlates of recreational running?

The second study (**Chapter 3**) aimed to systematically synthesize the published literature describing the psychological and behavioural correlates of recreational running in adults. To our knowledge, this is the first systematic review providing such a comprehensive perspective. Fifty-six articles reporting 58 studies met the eligibility criteria and were included. There were 27 cross-sectional studies, 12 longitudinal studies, and 19 trials (8 non-controlled trials, 5 controlled trials and 6 randomized controlled trials) ($n = 37501$, 18 to 77 years old, 43% women). Twenty-eight studies assessed antecedents of running behavior, and 25 studies used running behavior as treatment or predictor of a given effect or outcome. Four studies examined both predictors and outcomes of running. Thirty-one studies showed poor quality, while 20 had fair and 7 good quality. Motives were the most frequently studied antecedent of running behavior ($k = 19$), and results suggest that the highest ranked or more prevalent motives were physical health, psychological motives, and personal achievement. Additionally, perceived control, attitude towards running, intention and subjective norms, self-efficacy and social support may also played a role in the adoption of recreational running. Moreover, improvements in mood ($k = 10$) and wellbeing ($k = 10$) were the most frequently reported positive outcomes of running. Reductions in depression, anxiety, and stress were also reported in included studies.

Overcoming the descriptive nature of the first and second studies, the next logical stage was to better understand how to build and deliver an intervention to impact running motivation.

How can an online intervention to impact running motivation be built and delivered?

The third study (**Chapter 4**) aimed to describe the rationale, development, study design and methods of the Keep on Running study, meant at test the effect of the intervention on the

likelihood that recreational running was maintained over time, after being voluntarily initiated by community-dwelling adults in the previous 3 months. It specifically aimed to test intervention adherence, fidelity of intervention delivery and participant satisfaction, through a pilot study. This study is unique in that it approaches running behavior and its sustainability through a “light-touch” intervention, delivered in a digital format, and based on strong theoretical foundations. Grounded on self-determination and self-regulation theories, this intervention was also informed by results of the two previous studies (chapter 2 and 3), and was inspired and partially adapted from the motivational and self-regulation arm of the NoHoW study [13], a study designed to change physical activity, diet and body weight. The pilot focused on testing intervention adherence, fidelity of intervention delivery and participant satisfaction in order to establish the feasibility and acceptability of the web-based intervention toolkit. Eighteen healthy, high educated participants (33% female, 25 to 54 yrs.), living in the Greater Lisbon area, participated in the pilot study. Overall, the intervention seemed to have acceptability and the feedback was very positive, but toolkit interaction decreased markedly after the first weeks. Furthermore, the generalized use of other running-related devices and apps may have overlapped with the content of the toolkit, challenging participants’ attention. The completion ratio of the post-program questionnaire was also low, maybe due to its extension and burden, but also because of its deadline ending near the summer break.

Theoretical and practical implications and future directions

Running to reduce the physical inactivity burden

In chapter 2 we present prevalence data about running behavior that confirm the important role of running among PA options. Almost 11% of Portuguese adults claimed to run at least

60 minutes and two weekly sessions, 15% run at least 60 minutes per week. Taken the contemporary 26% of Portuguese PA prevalence into consideration [14], it seems reasonable to state that runners represented approximately half of the physically active population, which points out the relative significance of running behavior in overall PA. Hence, national PA promotion policies should target running not only to support those who already started running, but also present an opportunity to involve others to engage in this well accepted PA mode.

The representation provided in this chapter stresses the need to address gender inequalities. A decrease in inactivity levels of 4.8% points among women across the world would achieve the World Health Organization target of reducing global levels of inactivity by 10% [15]. Injuria prevention and running conditioning programs can also be included, as many runners perform complementary physical activities, such as warm-up and stretching. Surveyed runners used technology for self-monitoring, music, training planification and coaching support, and social media. ACSM's fitness trends survey [16] have been recently conveyed that technology was one of the top preferences among the health and fitness community. Campaign schemes can be broadcasted through and involving the use of technology devices and applications with built-in behaviour change techniques.

Sustainable change comes from within

To achieve and maintain behavior change is a complex process. Sustained behavior change and maintenance remains a challenge, as many people struggle to keep up their behavior for longer than 6 months [17, 18]. Research on the characterization of people who are physically active [19, 20] and manage to sustain their PA behavior [21] is extensive, but only a few studies addressed the psychological mechanisms of behavior maintenance [22]. Chapters 2

and 3 contribute for the understanding of processes associated with recreational running behavior maintenance. Data from the first study suggested intrinsic motives, such as general health orientation, self-esteem, and life meaning were the highest ranked motives, and autonomous behavior regulations had higher mean scores (relatively to controlled regulations) among regular recreational runners. Results from the systematic review of correlates of recreational running (chapter 3) are in agreement and suggest that intrinsic motives are key antecedents of long term running. Additionally, data from the cross-sectional study suggest an association between intrinsic motives and autonomous behavior regulations with positive psychological outcomes, such as dispositional flow and vitality. On the opposite, it is noteworthy to verify the absence of associations between psychosocial variables and running behavior, when represented in a quantified manner (e.g., average distance or time). As in other settings, the overall association between quality of motivation and behavior sustainability, confirms SDT [23] as a valid framework to understand running continuance [24, 25]

Data from the second study (chapter 3) indicate that individual's ability, beliefs, attitudes, norms, perceived behavior control and intention positively predicted running, which matched the central principles of the Theory of Planned Behavior [26]. At the same time, previous behavior, and self-efficacy also predicted future participation, which in turn is reflected in Social Cognitive Theory [27]. The role of action planning, coping planning, and action control for predicting running behavior was also identified, suggesting self-regulation skills may play an important role in running maintenance [28]. Finally, a considerable research on the association between exercise and its positive psychological outcomes was identified, and it was hinted that these gains may play a role in future running behavior [29]. The development of the intervention (described in chapter 4) was grounded in these results.

Individual tailoring

According to the data in the first study (chapter 2), few runners prefer to run in an organized group. These findings agree with previous data, reporting runners preferentially act alone and in non-organised settings [30]. Additionally, study 2 and 3 (chapter 3 and 4) reported large differences in motives for running between groups defined by gender, age, running experience and ability. These results point out the need for tailoring running promotion campaigns to facilitate individual behaviour, as well as group dynamics. Tailoring is a process by which the delivery of the intervention is individualized to the user characteristics [31]. It involves an assessment of participants' characteristics, and is conducted by either a human or a computer, that uses algorithms to select content. Tailoring strategies can range from simply employing the user's name or allowing the participant to freely navigate and interact with the intervention content, to the more complex, for instance dynamically adapting content to personally relevant variables [32]. Studies provide support for tailoring as a strategy for use in health behavior-change interventions, indicating that web-based, tailored interventions effected significantly greater the improvement in health outcomes as compared to control conditions, both at post-testing and at follow-up [31].

To better adjust running behavior promotion interventions, it is crucial to understand the uniqueness of factors that predispose them to engage in this activity. Lessons learned from the first two studies (chapter 3 and 4) were used to build the Keep on Running web-based intervention. Tailoring was accomplished via previously inserted data integration in implementations, and the autonomy of navigating through the sessions and of interacting with its content, at one's own pace.

New running tech everyday

The exponential growth of mobile health development and use, followed by the fast pace of society evolution, creates a good opportunity to improve behavior change interventions, reaching a broad and otherwise unapproachable audience of users. In Portugal, like any developed countries, the implementation of digital behavior change interventions is facilitated by the fact that the majority of the population (76.2%) having internet connection [33] and (61%) internet on the smartphone [34]. Further, it seems that exercisers increasingly rely on mobile technology (e.g., wearable sensors) to track their activity [16]. Web-based PA interventions offer an opportunity to reach a large number of people, at a relatively low cost, and are, in some degree, effective in changing behavior. However, the understanding of how certain design features align with constructs of behavior theories remain limited. In some cases, apps are ineffective or even harmful [35, 36]. Prompts and cues, techniques of personalization, feedback and monitoring, goal setting and action planning were most commonly used strategies in effective mobile health interventions [36].

Study 3 (chapter 4) describes the development and pilot testing of the Keep on Running web-based intervention. This intervention was based on both SDT and self-regulation theory, informed by results of the two previous studies (chapter 2 and 3), and adapted from the motivational and self-regulation arm of the NoHoW study [13]. Due to challenges in the recruitment for the pilot, the eligibility criteria was more flexible, including participants with more than three months of running experience. Overall, the pilot study pointed that the intervention seemed to have acceptability and the feedback was very positive. Nevertheless, toolkit interaction decreased after the first weeks, which is common in web-based interventions [37]. Engagement with digital behavior change interventions is considered

important for their effectiveness [38], and it was targeted during the development process. We hypothesized that the long-term runners' generalized use of other running-related devices, applications and communities may have overlapped the anticipated content of the toolkit, challenging participants' attention. These results suggest that an integrated platform that uses data from other devices and apps will allow a greater flexibility as technology around the running phenomenon evolves. As a result of its findings, the intervention could be adjusted (delivery, toolkit, and interface with other apps), and results from the RCT should test the efficacy of the approach and could be used in the development and optimization of future interventions aiming physical activity promotion.

Limitations and future research directions

The methodological limitations of each particular study were addressed separately within the respective chapter. This section aims to describe more general topics, arising from the limitations, but also from some unanswered questions and opportunities for research.

In terms of external validity of the findings, we believe data from study 1 and 2 characterize runners and its behaviors reasonably well. However, as mentioned earlier, runners have a specific set of motivational traits which allows them to manage their schedule and persevere against adversities, during long hours of training and competition. Therefore, caution should be used when generalising results into broader physical activity promotion, specially when less endurance exercises are involved. Another threat to results' generalization dwells in the thin line separating the recreational and competitive runner. We aimed to study only recreational runners but, regardless of age, a recreational runner can easily evolve into a more serious competitor, and even develop addiction-like behaviours. So caution is necessary in the generalization of our findings.

Another limitation is due to the use of self-reported measures throughout the studies, which are vulnerable to response bias (e.g., interpretation, memory difficulties, social desirability, over- and underestimations). Nevertheless, many of the questionnaires used in this thesis are well validated and reliable to study the population of interest and were used in previous research. Similarly, the cross-sectional nature of data collected in study 1 limits our causal understanding of running sustainability to the longitudinal findings from the systematic review.

Finally, the efficacy of the intervention is yet to be tested. The initial plan included a randomized controlled trial to evaluate both the process and efficacy of the intervention but due to delays in the development of technological support, time and budget constraints, it was postponed. Taking the findings from study 3 into consideration, adjustments should be made so a future intervention can be delivered and tested.

Reflecting upon the limitations, but also to satisfy growing scientific curiosity, new research ideas emerge to continuously improve the understand of the recreational running and inform future interventions. For example: 1) repetition of the epidemiological study on the prevalence of recreational data to access its evolution and associated behavioural patterns; 2) follow-up of runners identified in study 1 to longitudinally study the influence of behavioural and motivational qualities on running behaviour; and finally 3) test the efficacy of the Keep on Running intervention and identify the psychological mechanisms that can contribute to recreational running sustainability.

Final Remark

After such a long, beautiful and insightful journey, I aspire that these findings can be translated into ideas to influence health enhancing physical activity promotion practices, and stimulate reflection and discussion in research community, leading to more successful interventions and ultimately increased adherence and satisfaction.

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APPENDICES

Self-report instruments used in this thesis

Keep on Running. Inquérito de Atividade Física e Hábitos de Corrida

Este questionário faz parte de um estudo da Faculdade de Motricidade Humana. Pretende-se estudar os hábitos e as experiências de atividade física dos portugueses, incluindo a prática de corrida recreativa (caso se aplique).

Grupo I - Elegibilidade

Idade: _____ anos

Sexo: Masculino Feminino

Sofre de alguma doença crónica que lhe impossibilite fazer atividade física moderada a vigorosa? (Atividades físicas VIGOROSAS requerem um grande esforço físico e uma respiração muito mais forte que o normal. As MODERADAS requerem apenas respirar de maneira um pouco mais forte que o habitual)

- Sim, Qual? _____
- Não

[A próxima pergunta destina-se apenas a MULHERES]

Está grávida ou está a amamentar?

- Sim
- Não

Em que distrito vive? _____

Nos últimos 3 meses, praticou corrida pelo menos 2 vezes por semana (Por corrida entende-se corrida contínua na rua, num parque, etc. e não a que se faz num desporto como o futebol ou ténis. P.f. considere apenas os últimos meses em que não esteve lesionado/a nem teve outro tipo de impedimento)?

- Sim
- Não, passar para grupo IV - Atitudes sobre a Atividade Física.

E, nestes últimos 3 meses, fez corrida pelo menos 60 minutos no total da semana?

- Sim
- Não, passar para grupo IV - Atitudes sobre a Atividade Física.

Grupo II - Hábitos de Corrida

As próximas perguntas referem-se aos seus hábitos de corrida.

1. Onde corre habitualmente (na maior parte das vezes)? (mais que uma opção)

- a) Rua, estrada, ou passeio pedonal Sim, Não.
- b) Trail, bosque, campo Sim, Não.
- c) Ginásio/*health club* Sim, Não.
- d) Parque Sim, Não.
- e) Praia Sim, Não.
- f) Outro? Qual? _____

2. Considera que a sua zona habitual de corrida é um cenário natural, próximo da natureza? Sim, Não.

3. Com quem corre habitualmente? (mais que uma opção)

- a) Sozinho(a) Sim, Não.
- b) Familiar..... Sim, Não.
- c) Amigo Sim, Não.
- d) Grupo de corrida (formal ou informal)..... Sim, Não.

4. Qual a hora a que habitualmente corre? (mais que uma opção)

- a) Madrugada (0h00 ao nascer do sol)..... Sim, Não.
- b) Manhã (nascer do sol às 12h00) Sim, Não.
- c) Hora de almoço (12h00 às 15h00) Sim, Não.
- d) Meio da tarde (15h00 às 18h00)..... Sim, Não.
- e) Final da tarde (18h00 às 20h00)..... Sim, Não.
- f) Noite (20h00 às 24h00) Sim, Não.

5. Que tipo de corrida habitualmente faz? (mais que uma opção)

- a) Corridas longas (>1h) Sim, Não.
- b) Colinas (subidas e descidas)..... Sim, Não.
- c) Intervalada (variação da velocidade) Sim, Não.
- d) Séries (corridas curtas com pausas) Sim, Não.
- e) Treinos de ritmo (cumprir um tempo para um distância) Sim, Não.

6. Quantos dias por semana corre, numa semana típica? |__| dias/semana

7. Qual a sua distância semanal total (em média) de corrida? |__|_|__|_|__| km

8. E quantos minutos por semana, em média? |__|_|__|_|__| minutos

9. Há quanto tempo corre de forma regular? |__|_|__|_|__| anos ou meses (riscar o que não interessa)

10. Teve interrupções na sua prática regular, durante os últimos 12 meses?

Sim, Não (passe à 11).

10.1. Qual o tempo de interrupção? |__|__| meses ou semanas (riscar o que não interessa)

11. Se utiliza equipamento tecnológico durante a corrida, indique qual ou quais.

- a) Cronómetro Sim, Não.
b) GPS (ou outro sistema, que meça distância) Sim, Não.
c) Cardíofrequencímetro (para medir a frequência cardíaca)..... Sim, Não.
d) Aparelho de Música Sim, Não.

12. Utiliza alguma aplicação ou *website* para monitorizar a sua prática de corrida?

Sim, Qual a que utiliza preferencialmente? _____

Não.

13. Nos últimos 12 meses, quantas lesões teve devido à prática da corrida? |__|__|

13.1. Em que local do corpo se lesionou, considerando as lesões acima enumeradas?

<input type="checkbox"/> Pé/ tornozelo	<input type="checkbox"/> Pé/ tornozelo	<input type="checkbox"/> Pé/ tornozelo
<input type="checkbox"/> Perna	<input type="checkbox"/> Perna	<input type="checkbox"/> Perna
<input type="checkbox"/> Joelho	<input type="checkbox"/> Joelho	<input type="checkbox"/> Joelho
<input type="checkbox"/> Coxa	<input type="checkbox"/> Coxa	<input type="checkbox"/> Coxa
<input type="checkbox"/> Anca	<input type="checkbox"/> Anca	<input type="checkbox"/> Anca
<input type="checkbox"/> Coluna	<input type="checkbox"/> Coluna	<input type="checkbox"/> Coluna
<input type="checkbox"/> Braços	<input type="checkbox"/> Braços	<input type="checkbox"/> Braços
Outro local _____	Outro local _____	Outro local _____

13.2. Nos últimos 12 meses, quanto tempo esteve sem poder correr, devido a lesões? |__|__| meses

Grupo III - Motivação para a Corrida

As seguintes afirmações estão relacionadas com a forma como encara a sua prática de corrida. Classifique até que ponto cada uma das afirmações seguintes é verdadeira para si, atribuindo o valor de 1 a 5, em que 1 representa totalmente falso, 2, falso, 3, nem verdadeiro nem falso, 4, verdadeiro e 5 representa totalmente verdadeiro.

	Totalmente falso	Totalmente verdadeiro
1. Corro para ter tempo sozinho(a) para resolver assuntos	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
2. Corro para me sentir mais confiante	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
3. Corro para me sentir em paz	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
4. Corro para prolongar a minha vida com saúde	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
5. Corro para ajudar a controlar o meu peso	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
6. Corro para socializar com outros corredores	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
7. Corro para que as pessoas me tomem como um exemplo	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
8. Corro para obter melhores tempos que os meus amigos	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
9. Corro para tentar correr mais rápido	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
10. Corro para me concentrar nos meus pensamentos	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
11. Corro para melhorar o sentimento de autoestima	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
12. Corro para que a minha vida fique mais completa	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
13. Corro para prevenir a doença	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
14. Corro para me sentir mais magro(a)	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
15. Corro para conhecer outras pessoas	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
16. Corro para receber elogios de outros	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
17. Corro para melhorar a minha velocidade de corrida	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	
18. Corro para ganhar a alguém a quem nunca ganhei antes	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>	

**Totalmente
falso****Totalmente
verdadeiro**

- | | | | | | |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 1. Corro porque outras pessoas dizem que o devo fazer. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 2. Sinto-me envergonhado(a) quando falto a uma sessão de corrida. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 3. É importante para mim correr regularmente. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 4. Considero que a corrida faz parte da minha identidade. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 5. Corro porque é divertido. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 6. Sinto-me pressionado(a) pela minha família e amigos para correr. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 7. Sinto-me em falha grave comigo próprio/a quando não corro durante algum tempo. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 8. Penso que é importante fazer um esforço por correr regularmente. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 9. Corro porque é uma parte fundamental da pessoa que sou. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 10. Fico bem disposto(a) e satisfeito(a) por correr. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |

Por favor, responda às seguintes afirmações relacionadas com a frequência de alguns pensamentos e emoções durante a sua prática de corrida. Responda usando 1 para nunca, 2 para raramente, 3 às vezes, 4 frequentemente e 5 para sempre.

	Nunca	Sempre
1. Durante a corrida, sinto-me alerta e ativo(a)	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
2. Durante a corrida, sinto-me com energia	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
3. Durante a corrida, sinto-me competente para lidar com a exigência da situação	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
4. Habitualmente, corro espontânea e automaticamente, sem ter de pensar no que faço	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
5. Durante a corrida, tenho uma noção muito clara daquilo que quero fazer	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
6. Durante a corrida, tenho a noção clara de que estou a ter um bom desempenho	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
7. Durante a corrida, estou completamente focado na tarefa	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
8. Durante a corrida, tenho a sensação de controlo total sobre aquilo que estou a fazer	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
9. Durante a corrida, não me deixo preocupar com o que os outros possam estar a pensar de mim	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
10. Durante a corrida, a forma como o tempo passa parece-me diferente da normal	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>
11. A corrida é uma atividade muito gratificante	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>

As próximas questões são sobre os planos que pode ou não formular para gerir a sua corrida. Classifique até que ponto concorda com cada uma das seguintes afirmações, atribuindo o valor de 1 a 5, em que 1 representa discordo totalmente, 2, discordo, 3, nem concordo nem discordo, 4, concordo e 5 representa concordo totalmente.

- | | Discordo
totalmente | Concordo
totalmente | | | |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 1. Habitualmente, faço planos concretos para a minha corrida (ex. quando, onde e com quem vou correr). | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 2. Habitualmente, tenho planos para lidar com potenciais obstáculos à minha corrida. | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 3. Habitualmente, monitorizo e guardo registos da minha corrida | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |
| 4. Costumo estabelecer objetivos concretos para a minha corrida | 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |

Barreiras

1. Qual é a principal barreira à sua prática de corrida? _____

Grupo IV - MOVE

As questões apresentadas seguidamente estão relacionadas com o tempo que gastou sendo fisicamente ativo/a nos últimos 7 dias. Pense nas atividades que realiza no trabalho, em casa, no jardim/quintal, nas deslocações de um lugar para outro e no seu tempo livre, em situações de lazer, exercício ou desporto.

1. Pense em todas as atividades VIGOROSAS que praticou nos últimos 7 dias. Considere apenas as atividades que realizou durante pelo menos 10 minutos seguidos de cada vez.

Nos últimos 7 dias, em quantos dias realizou atividades VIGOROSAS, como por exemplo transportar pesos, cavar, praticar ginástica, correr, nadar, jogar futebol ou andar de bicicleta com rapidez? Não inclui andar.

Nenhum dia	<input type="checkbox"/> [passar à questão 3]
1 dia	<input type="checkbox"/>
2 dias	<input type="checkbox"/>
3 dias	<input type="checkbox"/>
4 dias	<input type="checkbox"/>
5 dias	<input type="checkbox"/>
6 dias	<input type="checkbox"/>
Todos os dias	<input type="checkbox"/>
Não sabe	<input type="checkbox"/> [passar à questão 3]

2. Na totalidade quanto tempo gasta em atividade física VIGOROSA num desses dias, habitualmente?

|__|__| horas por dia

|__|__| minutos por dia,

Não sabe/Não tem a certeza

3. Agora, pense em todas as atividades MODERADAS que praticou nos últimos 7 dias. Considere apenas as atividades que realizou durante pelo menos 10 minutos seguidos de cada vez.

Nos últimos 7 dias, em quantos dias realizou atividades MODERADAS, como por exemplo, transportar pesos leves, andar de bicicleta devagar, limpar a casa ou cuidar do jardim? Não inclui andar.

Nenhum dia	<input type="checkbox"/> [passar à questão 5]
1 dia	<input type="checkbox"/>
2 dias	<input type="checkbox"/>
3 dias	<input type="checkbox"/>

4 dias	<input type="checkbox"/>
5 dias	<input type="checkbox"/>
6 dias	<input type="checkbox"/>
Todos os dias	<input type="checkbox"/>
Não sabe	<input type="checkbox"/> [passar à questão 5]

4. Na totalidade quanto tempo gasta em atividade física MODERADA num desses dias, habitualmente?

|__|__| horas por dia

|__|__| minutos por dia,

Não sabe/Não tem a certeza

5. Pense no tempo que dedicou a CAMINHAR nos últimos 7 dias. Inclua o tempo a andar no trabalho ou em casa, a deslocar-se de um lugar para outro, outro tipo de caminhada que faça por lazer, desporto ou exercício.

Nos últimos 7 dias, em quantos dias CAMINHOU durante pelo menos 10 minutos seguidos de cada vez?

Nenhum dia	<input type="checkbox"/> [passar à questão 7]
1 dia	<input type="checkbox"/>
2 dias	<input type="checkbox"/>
3 dias	<input type="checkbox"/>
4 dias	<input type="checkbox"/>
5 dias	<input type="checkbox"/>
6 dias	<input type="checkbox"/>
Todos os dias	<input type="checkbox"/>
Não sabe	<input type="checkbox"/> [passar à questão 7]

6. Na totalidade quanto tempo CAMINHA num desses dias, habitualmente?

|__|__| horas por dia

|__|__| minutos por dia,

Não sabe/Não tem a certeza

7. Esta questão relaciona-se com o tempo que permaneceu SENTADO(A) durante os dias de semana (e não de fim de semana) nos últimos 7 dias. Inclua ainda o tempo gasto com atividades como estar sentado a uma secretária, estar de visita em casa de amigos, ler, estar sentado ou em repouso a ver televisão ou ouvir música. Inclua o tempo gasto deitado(a), mas acordado(a). **Nos últimos 7 dias, quanto tempo em geral passou SENTADO/A num dia de semana?**

|__|__| horas por dia

|__|__| minutos por dia,

Não sabe/Não tem a certeza

8. Quantas horas costuma dormir em média por dia?

Durante a semana |__|__| h |__|__| min

Fins de semana |__|__| h |__|__| min

9. As questões seguintes descrevem atividades do dia-a-dia. Por favor, indique quantas vezes, no último mês, escolheu cada uma das atividades descritas.

	Nunca	Poucas vezes	Algumas vezes	Muitas vezes	Sempre que possível	Não aplicável
1. Subir escadas em vez de utilizar elevadores ou escadas rolantes (p. ex. no seu prédio, em centros comerciais, no local de trabalho, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Escolher estar em pé em situações em que podia estar sentado/a (p. ex. em casa, enquanto fala ao telefone, enquanto espera em locais públicos, espera pelo transporte, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Escolher caminhar quando habitualmente costumava ir de carro ou transportes (p. ex. ir às compras, deslocar-se no bairro ou em percursos pequenos equivalentes a 5-10 min de carro, ir aos correios ou à farmácia, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Estacionar o carro (ou outro veículo) num local mais distante da entrada (p. ex. centros comerciais, lojas, cinema, trabalho, etc.) para poder caminhar mais até à entrada.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Escolher fazer manualmente o que antes fazia com auxílio de máquinas automáticas (p. ex. lavar o carro, lavar janelas, etc.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Fazer pausas durante o trabalho/estudo ou ocupação habitual (se esta implica passar muito tempo sentado) e utilizar as pausas para caminhar, estar em pé ou movimentar-se mais.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Grupo V - Atitudes sobre a Atividade Física

As próximas questões são sobre as suas atitudes face à atividade física. Responda se concorda ou discorda com cada uma das seguintes frases.

	Concordo	Discordo
1. Há cada vez mais pessoas a fazer exercício/atividade física.	<input type="checkbox"/>	<input type="checkbox"/>
2. Há cada vez mais campanhas e iniciativas a incentivar à prática de desporto e atividade física.	<input type="checkbox"/>	<input type="checkbox"/>
3. Promover a prática da atividade física dos portugueses é atualmente uma prioridade da Direção-Geral de Saúde e do Ministério da Saúde.	<input type="checkbox"/>	<input type="checkbox"/>
4. É muito importante que mais pessoas utilizem os transportes públicos e a bicicleta nas suas deslocações diárias.	<input type="checkbox"/>	<input type="checkbox"/>
5. A Educação Física é uma disciplina tão importante como todas as outras, incluindo o Português e a Matemática.	<input type="checkbox"/>	<input type="checkbox"/>
6. Praticar atividade física regularmente melhora a qualidade de vida.	<input type="checkbox"/>	<input type="checkbox"/>
7. A inatividade física é tão prejudicial para a saúde como o consumo de tabaco e de álcool em excesso.	<input type="checkbox"/>	<input type="checkbox"/>
8. Subir escadas ou estar mais tempo em pé não é fazer atividade física.	<input type="checkbox"/>	<input type="checkbox"/>
9. Gosto de praticar exercício/ desporto/ atividade física.	<input type="checkbox"/>	<input type="checkbox"/>
10. Atualmente, sinto-me incapaz de praticar algum tipo de exercício físico.	<input type="checkbox"/>	<input type="checkbox"/>
11. Tenho um grupo de amigos ou conhecidos com quem posso praticar desporto ou fazer exercício.	<input type="checkbox"/>	<input type="checkbox"/>
12. Pratico exercício/ desporto/ atividade física regularmente.	<input type="checkbox"/>	<input type="checkbox"/>
<u>12.1.Caso não pratique...</u>	<input type="checkbox"/>	<input type="checkbox"/>

Tenciono fazer atividade física nos próximos meses.

13. Quantas horas / minutos de atividade física moderada
(ex. desporto, marcha rápida ou corrida leve) deve
uma pessoa adulta acumular numa semana? _____ horas _____ minutos por
SEMANA

13.1.1. Mesmo não praticando, se tivesse que
escolher uma AF para fazer, qual seria?...

(resposta aberta)

Se pratica...

13.1.2. A sua atividade física favorita é...

(resposta aberta)

13.1.3. Faz atividade física num:

____ ginásio ou academia
____ grupo desportivo
____ circuito(s) ao ar livre
____ grupo de corrida/ ciclismo/ etc.
____ outro. Qual? _____

	Concordo	Discordo
14. Costumo monitorizar a atividade física que faço com recurso a tecnologias digitais.	<input type="checkbox"/>	<input type="checkbox"/>
15. Mesmo para quem queira, não existem muitas opções gratuitas para a prática de exercício físico.	<input type="checkbox"/>	<input type="checkbox"/>
16. No seu dia-a-dia, existem espaços, situações ou pessoas que o incitam a mexer-se mais.	<input type="checkbox"/>	<input type="checkbox"/>
17. Atualmente, é relativamente fácil e seguro ir para o emprego a pé ou de bicicleta, pelo menos uma parte do percurso.	<input type="checkbox"/>	<input type="checkbox"/>
18. Para crianças/adolescentes, é relativamente fácil e seguro ir para a escola a pé ou de bicicleta, pelo menos uma parte do percurso.	<input type="checkbox"/>	<input type="checkbox"/>
19. Teve uma consulta médica nos últimos 2 anos?	<input type="checkbox"/>	<input type="checkbox"/>
19.1. Se sim, o médico perguntou-lhe se fazia atividade física?	<input type="checkbox"/>	<input type="checkbox"/>
19.2. Se sim, aconselhou-o a fazer mais atividade física?	<input type="checkbox"/>	<input type="checkbox"/>
19.3. Se sim, qual a especialidade do referido médico?	<hr style="width: 100%;"/>	

(resposta aberta)

	Concordo	Discordo
20. Já ouviu falar da profissão de Fisiologista do Exercício?	<input type="checkbox"/>	<input type="checkbox"/>
21. Nos últimos 2 anos, teve algum contacto profissional com um Técnico de Exercício Físico (p.ex., <i>Personal Trainer</i> , Instrutor de <i>Fitness</i>)?	<input type="checkbox"/>	<input type="checkbox"/>

Grupo IV - Questionário Geral

De seguida, irá encontrar algumas perguntas sobre aspetos gerais da sua vida. Relembramos que as suas respostas são anónimas e os dados confidenciais.

1. **Nasceu em que país?** _____
2. **Qual é a sua nacionalidade?** _____
3. **Qual é o seu estado marital atual?**

Solteiro(a)	<input type="checkbox"/>
Divorciado(a)	<input type="checkbox"/>
Viúvo(a)	<input type="checkbox"/>
Casado(a) ou a viver em união de facto	<input type="checkbox"/>

4. **Qual foi o nível de escolaridade mais elevado que completou?**

Ensino básico 1º ciclo (4º ano, antigo ensino primário, 4ª classe)	<input type="checkbox"/>
Ensino básico 2º ciclo (6º ano, antigo ciclo preparatório)	<input type="checkbox"/>
Ensino básico 3º ciclo (9º ano, antigo 5º ano do liceu)	<input type="checkbox"/>
Ensino secundário (12º ano, antigo 7º ano do liceu)	<input type="checkbox"/>
Ensino Pós-secundário Não Superior (ex. curso profissional)	<input type="checkbox"/>
Ensino Superior (Bacharelato, Licenciatura, Mestrado, Doutoramento)	<input type="checkbox"/>
Sem escolaridade	<input type="checkbox"/>
Não sabe	<input type="checkbox"/>
Prefere não responder	<input type="checkbox"/>

5. **O seu agregado familiar tem quantos membros (incluindo o próprio) com...:**

5.1. ... menos de 7 anos _____ [Registar 0, se nenhum]

5.2. ... entre 7 e 17 anos _____ [Registar 0, se nenhum]

5.3. ... entre 18 e 64 anos _____ [Registar 0, se nenhum]

5.4. ... com 65 ou mais anos _____ [Registrar 0, se nenhum]

6. Qual das seguintes opções representa o rendimento mensal total do seu agregado familiar (incluindo vencimentos, subsídios, abonos, pensões e outros benefícios regulares) após deduções para impostos, segurança social, etc.?

Menos de 485 €	<input type="checkbox"/>
485-970€	<input type="checkbox"/>
971-1455€	<input type="checkbox"/>
1456 - 1940 €	<input type="checkbox"/>
1941 - 2425 €	<input type="checkbox"/>
2426 - 2910 €	<input type="checkbox"/>
2911 - 3395 €	<input type="checkbox"/>
3396 - 3880 €	<input type="checkbox"/>
3881 - 4365 €	<input type="checkbox"/>
Mais de 4365 €	<input type="checkbox"/>
Não sabe	<input type="checkbox"/>
Prefere não responder	<input type="checkbox"/>

ESTADO DE SAÚDE

7. Em geral, como define o seu estado de saúde?

Excelente	<input type="checkbox"/>
Bom	<input type="checkbox"/>
Razoável	<input type="checkbox"/>
Fraco	<input type="checkbox"/>
Muito fraco	<input type="checkbox"/>

Não sabe	
Prefere não responder	<input type="checkbox"/>

Está disponível para ser contactado(a) outra vez, no âmbito de outro estudo acerca da corrida que está a ser conduzido pela Faculdade de Motricidade Humana?

Sim , contacto preferencial: _____

Não .

Muito obrigado pela sua participação!

Questionário KEEP ON RUNNING

Programa digital baseado na evidência científica para a adoção sustentada da corrida recreativa

***Required**

Consentimento Informado livre e esclarecido

A resposta a este conjunto de questionários deverá ter a duração de 30 minutos e não existe qualquer tipo de risco associado ao seu preenchimento.

Não há respostas certas ou erradas relativamente a qualquer um dos itens. Caso esteja inseguro(a) em como responder, por favor, tente responder o melhor que puder. Este questionário é de natureza confidencial. O tratamento deste, por sua vez, é efetuado de uma forma global, não sendo sujeito a uma análise individualizada, o que significa que o seu anonimato é respeitado.

Seja qual for a sua decisão, agradecemos o tempo despendido.

1. Li e aceito as condições de resposta a estes questionários *

Mark only one oval.

Aceito

Não aceito *Skip to section 18 (Obrigado pela sua participação)*

2. Número de identificação fornecido pela equipa de investigação *

Escala de
Identidade parao
Exercício

Por favor, responda com base naquilo que pensa acerca da sua corrida.
Utilize a escala abaixo para as suas respostas.

3. Eu considero-me um corredor

Mark only one oval.

1 2 3 4 5

Não concordo nada Concordo totalmente

4. Quando falo de mim a outras pessoas, habitualmente falo do meu envolvimento na corrida

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

5. 3) As outras pessoas vêem-me como um corredor

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

Índice de Funcionamento Autónomo

As afirmações seguintes refletem diferentes formas de estar quando temos de decidir fazer algo. Por favor, responda a cada uma das afirmações com base no modo como se sente habitualmente, de acordo com a escala indicada.

6. As minhas decisões baseiam-se nos meus valores e sentimentos mais importantes

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

7. Faço determinadas coisas para evitar sentir-me mal comigo próprio(a)

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

8. Costumo pensar nas razões que me fazem reagir de determinada forma

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

9. Identifico-me fortemente com as coisas que faço

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

10. Faço muitas coisas para evitar sentir-me culpado(a) por não as fazer

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

11. Gostava de perceber melhor porque existem situações às quais reajo com medo e ansiedade

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

12. As minhas ações são congruentes com a pessoa que realmente eu sou

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

13. As minhas decisões são totalmente orientadas por aquilo que procuro ou valorizo

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

14. Concordo com certas coisas para que os outros gostem de mim

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

15. Tenho interesse em compreender as razões das minhas ações

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

16. Gosto de perceber os meus sentimentos

Mark only one oval.

	1	2	3	4	5	
Discordo totalmente	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

Questionário de
Satisfação das
Necessidades
Psicológicas para o
Exercício

Este questionário descreve diferentes experiências que as pessoas têm quando fazem corrida. Por favor, responda com base naquilo que habitualmente sente quando corre, de acordo com a escala indicada.

17. Sinto que consigo completar exercícios físicos que são um desafio para mim

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

18. Sinto-me próximo das pessoas com quem faço exercício porque estas me aceitam tal como eu sou

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

19. Sinto que partilho algo em comum com pessoas que são importantes para mim quando fazemos exercício juntos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

20. Sinto-me confiante em realizar mesmo aqueles exercícios físicos que constituem um grande desafio

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

21. Sinto que existe camaradagem entre mim e os meus parceiros de exercício físico pois praticamos exercício pelas mesmas razões

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

22. Sinto-me confiante na minha capacidade de praticar exercícios que me desafiam

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

23. Sinto-me próximo dos meus parceiros de exercício que reconhecem que praticar exercício é difícil

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

24. Sinto-me livre de praticar exercício à minha própria maneira

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

25. Sinto-me livre de tomar as minhas próprias decisões quanto ao exercício físico

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

26. Sinto-me capaz de completar exercícios que constituem um desafio para mim

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

27. Sinto que sou eu quem decide quando e onde praticar exercício

Mark only one oval.

1 2 3 4 5

Não é verdade para mim Muitas vezes é verdade para mim

28. Sinto que sou capaz de realizar exercícios que representam um grande desafio

Mark only one oval.

1 2 3 4 5

Não é verdade para mim Muitas vezes é verdade para mim

29. Sinto que sou eu quem determina os exercícios que faço

Mark only one oval.

1 2 3 4 5

Não é verdade para mim Muitas vezes é verdade para mim

30. Sinto-me pessoalmente ligado(a) às pessoas com quem interajo quando faço exercício

Mark only one oval.

1 2 3 4 5

Não é verdade para mim Muitas vezes é verdade para mim

31. Sinto-me bem pelo facto de conseguir realizar exercícios que desafiam as minhas capacidades

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

32. Sinto que mantenho boas relações com as pessoas com que pratico exercício físico

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

33. Sinto-me livre para escolher em que tipo de exercícios físicos meenvolver

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

34. Sinto que sou eu que decido que exercícios fazer

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

Escala de
Frustração das
Necessidades
Psicológicas para o
Exercício

Este questionário descreve diferentes experiências que as pessoas têm quando fazem corrida. Por favor, responda com base naquilo que habitualmente sente quando corre, de acordo com a escala indicada.

35. Sinto que faço a maioria das coisas nas sessões de exercício porque “tenho que as fazer”

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

36. Nas sessões de exercício, sinto-me excluído(a) do grupo de colegas com que gostaria de trabalhar

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

37. Tenho sérias dúvidas sobre se consigo fazer bem as tarefas nas sessões de exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

38. Sinto-me forçado(a) a fazer muitas coisas nas sessões de exercício que não escolheria fazer

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

39. Tenho a impressão de que os meus colegas não gostam de mim

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

40. Sinto-me decepcionado(a) com muitos dos meus desempenhos nas sessões de exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

41. Sinto-me pressionado(a) a fazer muitas coisas nas sessões de exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

42. Nas sessões de exercício, sinto que o treinador e os colegas com quem trabalho são distantes e frios comigo

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

43. Sinto-me um(a) fracassado(a) quando penso nos erros que cometo nas sessões de exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

44. Sinto que as atividades nas sessões de exercício são uma série de obrigações

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

45. Sinto que as relações pessoais que tenho com o treinador e com os colegas são superficiais

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

46. Sinto-me inseguro(a) das minhas capacidades durante as sessões de exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

**Inventário de
Motivos
Relacionados
com o
Exercício**

Nas páginas seguintes encontra-se um conjunto de afirmações relacionadas com as razões que as pessoas frequentemente dão para correr. Por favor leia cada afirmação cuidadosamente e indique se cada uma das afirmações é verdadeira ou falsa para si, de acordo com a escala indicada.

47. Pessoalmente, eu corro para manter-me magro(a)

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

48. Pessoalmente, eu corro para evitar doenças

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

49. Pessoalmente, eu corro porque me faz sentir bem

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

50. Pessoalmente, eu corro para parecer mais jovem

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

51. Pessoalmente, eu corro para demonstrar aos outros o meu valor

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

52. Pessoalmente, eu corro para me dar tempo para pensar

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

53. Pessoalmente, eu corro para ter um corpo saudável

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

54. Pessoalmente, eu corro para ter maisforça

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

55. Pessoalmente, eu corro porque gosto da sensação de me exercitar

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

56. Pessoalmente, eu corro para passar tempo com os amigos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

57. Pessoalmente, eu corro porque o meu médico me aconselhou a fazer exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

58. Pessoalmente, eu corro porque gosto de tentar ganhar nas atividades desportivas

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

59. Pessoalmente, eu corro para ser/tornar-me mais ágil

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

60. Pessoalmente, eu corro para ter objetivos para atingir

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

61. Pessoalmente, eu corro para perder peso

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

62. Pessoalmente, eu corro para prevenir problemas de saúde

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

63. Pessoalmente, eu corro porque acho que o exercício é revigorante

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

64. Pessoalmente, eu corro para ter um bom corpo

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

65. Pessoalmente, eu corro para comparar as minhas capacidades com as de outras pessoas

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

66. Pessoalmente, eu corro porque ajuda a reduzir a tensão

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

67. Pessoalmente, eu corro porque quero manter uma boa saúde

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

68. Pessoalmente, eu corro para aumentar a minha resistência

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

69. Pessoalmente, eu corro porque fazer exercício é gratificante em si mesmo

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

70. Pessoalmente, eu corro para gozar os aspetos sociais do exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

71. Pessoalmente, eu corro para ajudar a prevenir uma doença que corre na minha família

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

72. Pessoalmente, eu corro porque gosto de competir

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

73. Pessoalmente, eu corro para manter a flexibilidade nos meus músculos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

74. Pessoalmente, eu corro para ter desafios para vencer

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

75. Pessoalmente, eu corro para ajudar a controlar o peso

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

76. Pessoalmente, eu corro para evitar doenças do coração

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

77. Pessoalmente, eu corro para “recarregar asbaterias”

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

78. Pessoalmente, eu corro para melhorar a minha aparência

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

79. Pessoalmente, eu corro para ser reconhecido(a) pelos meus feitos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

80. Pessoalmente, eu corro para ajudar a controlar o stress

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

81. Pessoalmente, eu corro para me sentir mais saudável

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

82. Pessoalmente, eu corro para ser mais forte fisicamente

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

83. Pessoalmente, eu corro para gozar a experiência de fazer exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

84. Pessoalmente, eu corro para me divertir e ser ativo(a) com outras pessoas

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

85. Pessoalmente, eu corro para me ajudar a recuperar de uma doença ou lesão

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

86. Pessoalmente, eu corro porque gosto da competição física ou desportiva

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

87. Pessoalmente, eu corro para ser/tornar-me mais flexível (para ficar com músculos mais flexíveis)

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

88. Pessoalmente, eu corro para desenvolver competências pessoais

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

89. Pessoalmente, eu corro porque o exercício me ajuda a queimar calorias

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

90. Pessoalmente, eu corro para parecer mais atraente

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

91. Pessoalmente, eu corro para conseguir coisas que os outros não são capazes

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

92. Pessoalmente, eu corro para aliviar a tensão

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

93. Pessoalmente, eu corro para desenvolver os músculos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

94. Pessoalmente, eu corro porque me sinto no meu melhor quando me exercito

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

95. Pessoalmente, eu corro para fazer novos amigos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

96. Pessoalmente, eu corro porque as atividades físicas são divertidas especialmente quando envolvem competição

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

97. Pessoalmente, eu corro para me comparar comigo mesmo(a)

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

**Inventário de
Ganhos
Relacionados
com o
Exercício**

Esta secção só deve ser preenchida por pessoas que tenham experiências de corrida atuais ou recentes. Estas afirmações estão relacionadas com os ganhos que obteve realmente ao correr. Isto pode ser igual ou diferente do que originalmente idealizava ou desejava. Por favor leia cada afirmação cuidadosamente e indique se cada uma das afirmações é verdadeira ou falsa para si, de acordo com a escala indicada.

98. Perdi peso através do exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

99. Apreciei a experiência de fazer exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

100. Tive a possibilidade de desenvolver competências pessoais

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

101. Achei o exercício gratificante em si mesmo

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

102. Mantive-me/tornei-me mais ágil

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

103. Permitiu-me conseguir coisas que os outros não são capazes

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

104. Ajudou-me a manter a flexibilidade

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

105. Achei as atividades físicas divertidas, especialmente quando envolviam competição

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

106. Fiz novos amigos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

107. Ajudou-me a ter um corpo melhor

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

108. Ajudou-me a ficar mais forte fisicamente

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

109. Permitiu-me manter-me magro(a)

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

110. Deu-me desafios para vencer

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

111. Senti-me no meu melhor quando estava a fazer exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

112. Reduziu o meu risco de doenças do coração

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

113. Ajudou-me a reduzir atensão

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

114. Eu segui os conselhos do meu médico para fazer exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

115. Deu-me possibilidade de competir

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

116. Ajudou-me a ter um corpo saudável

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

117. Consegui desenvolver os meus músculos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

118. Consegui controlar o stress

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

119. Aumentei a minha condição física

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

120. Consegui manter-me/tornar-me flexível

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

121. Consegui evitar doenças

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

122. Permitiu-me comparar as minhas capacidades com as de outras pessoas

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

123. Deu-me tempo para pensar

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

124. Permitiu-me passar tempo com amigos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

125. Ajudou-me a ficar mais atraente

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

126. Deu-me objetivos para atingir

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

127. Desenvolvi a minha força física

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

128. Permitiu-me comparar-me comigo mesmo(a)

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

129. Tive a possibilidade de apreciar a competição física

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

130. Ajudou-me a manter-me saudável

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

131. Ajudou-me a prevenir problemas de saúde

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

132. Gostei de competir

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

133. Ajudou-me a controlar o meu peso

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

134. Ajudou-me a “recarregar baterias”

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

135. Ajudou-me a recuperar de uma doença ou lesão

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

136. Senti-me mais saudável

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

137. Diverti-me a fazer exercício com outras pessoas

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

138. Obtive reconhecimento pelos meus feitos

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

139. Consegui melhorar a minha aparência

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

140. Consegui demonstrar aos outros o meu valor

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

141. Consegui aliviar a tensão

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

142. Senti-me bem através do exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

143. Ajudou-me a queimar calorias

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

144. Gostei da sensação de autossuperação

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

145. Ajudou-me a parecer mais novo(a)

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

146. Ajudou-me a reduzir o risco de doenças que correm na família

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

147. Achei o exercício revigorante

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

148. Apreciei os aspetos sociais do exercício

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

**Questionário de
Regulação
Comportamental
para o Exercício**

Este questionário interroga-o acerca das várias razões que o levam ou podem levar a correr. Para cada item, escolha a resposta que melhor o(a) descreve, de acordo com a escala indicada.

149. Sinto-me culpado(a) quando não faço exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

150. Dou valor aos benefícios/vantagens do exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

151. Faço exercício porque isso está relacionado com os meus objetivos de vida.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

152. Não percebo porque é que tenho de fazer exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

153. Participo no exercício porque os meus amigo(a)s/família dizem que devo fazer.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

154. É importante para mim fazer exercício regularmente.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

155. Gosto das minhas sessões de exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

156. Não percebo o objetivo de fazer exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

157. Faço exercício porque os outros vão ficar insatisfeitos comigo se não fizer.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

158. Sinto-me fracassado(a) quando não faço exercício durante algum tempo.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

159. Penso que é importante fazer um esforço por fazer exercício regularmente.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

160. Considero que fazer exercício é uma parte fundamental daquilo que eu sou.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

161. Acho o exercício uma atividade agradável.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

162. Penso que o exercício é uma perda de tempo.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

163. Sinto-me pressionado(a) pela minha família e amigos para fazer exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

164. Sinto-me ansioso(a) se não fizer exercício regularmente.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

165. Considero que fazer exercício está em harmonia com os meus valores.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

166. Fico bem disposto(a) e satisfeito(a) por praticar exercício.

Mark only one oval.

	1	2	3	4	5	
Não é verdade para mim	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Muitas vezes é verdade para mim

**Questionário
de Auto-
Eficácia para
o Exercício**

Este questionário descreve diferentes experiências que as pessoas têm quando fazem corrida. Por favor, responda com base naquilo que habitualmente sente quando corre, de acordo com a escala indicada.

167. Quando está a sentir-se cansado(a)

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

168. Quando está a sentir-se pressionado(a) ou sobre stress

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

169. Quando está mau tempo

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

170. Quando está de mau humor

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

171. Depois de ter uma lesão

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

172. Quando está ocupado(a)

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

173. Quando tem outros compromissos sociais ou familiares

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

174. Quando não tem apoio da sua família ou amigos

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

175. Quando tem compromissos detrabalho

Mark only one oval.

	1	2	3	4	5	
Certamente não seria capaz	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Certamente seria capaz

**Escalas de
Competências
Autorregulatórias**

Por favor, responda com base naquilo que habitualmente sente quando corre, de acordo com a escala indicada. Utilize a escala abaixo para as suas respostas.

176. Eu fiz um plano detalhado em relação a quando, onde, como e com que frequência fazer exercício

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

177. Eu fiz um plano detalhado em relação ao que fazer se algo interferir com os meus planos

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

178. Eu fiz um plano detalhado sobre como lidar com eventuais imprevistos

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

179. Eu fiz um plano detalhado sobre o que fazer em situações difíceis de forma a agir de acordo com as minhas intenções (iniciais)

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

180. Eu fiz um plano detalhado sobre que boas oportunidades para a ação considerar

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

181. Eu fiz um plano detalhado para alturas em que tenho de prestar uma atenção adicional para prevenir recaídas

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

182. Durante as últimas 4 semanas, monitorizei a minha atividade física para perceber se foi suficientemente regular

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

183. Durante as últimas 4 semanas, verifiquei cuidadosamente se treinei pelo menos 30 minutos com a intensidade adequada

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

184. Durante as últimas 4 semanas, os meus objetivos/intenções de atividade física estiveram presentes na minha mente com frequência

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

185. Durante as últimas 4 semanas, estive sempre consciente dos meus planos de treino/atividade física

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

186. Durante as últimas 4 semanas, esforcei-me para fazer atividade física regularmente

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

187. Durante as últimas 4 semanas, esforcei-me para agir de acordo com os meus objetivos de atividade física

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

Índice de Autorrelato da Automaticidade do Hábito

Por favor, responda com base naquilo que habitualmente sente quando corre, de acordo com a escala indicada. Utilize a escala abaixo para as suas respostas.

188. Quando corro, eu faço-o automaticamente

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

189. Quando corro, eu faço-o sem ter que me lembrar conscientemente

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

190. Quando corro, eu faço-o sem precisar de pensar

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

191. Quando corro, eu começo a fazê-lo antes de me aperceber disso

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo totalmente

Escala
de
Flow

As afirmações seguintes estão relacionadas com os pensamentos e emoções que pode sentir durante a sua corrida. Por favor, responda com base naquilo que habitualmente sente quando faz essa atividade, de acordo com a escala indicada. Utilize a escala abaixo para as suas respostas.

192. Sinto-me suficientemente competente para lidar de forma eficaz com as elevadas exigências da situação

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

193. Faço as coisas, espontânea e automaticamente, sem ter de pensar nelas

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

194. Tenho uma noção muito clara daquilo que quero fazer

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

195. Durante a atividade, tenho a noção clara de que estou a ter um bom desempenho

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

196. Estou completamente focado na tarefa

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

197. Tenho a sensação de controlo total sobre aquilo que estou a fazer

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

198. Não me deixo preocupar com o que os outros possam estar a pensar de mim

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

199. A forma como o tempo passa parece-me diferente da normal

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

200. A atividade que realizo é muito gratificante

Mark only one oval.

	1	2	3	4	5	
Nunca	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Sempre

Escala de
Vitalidade
Subjetiva

Por favor, responda a cada uma das afirmações com base no modo como se sente habitualmente, de acordo com a escala indicada.

201. Neste momento, sinto-me vivo(a) e com vitalidade

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

202. Não me sinto com muita energia neste momento

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

203. No momento presente, sinto-me tão vivo(a) que sinto que vou explodir de energia

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

204. No momento presente, sinto-me com energia e boa disposição

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

205. No momento presente, encaro cada novo dia com vontade

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

206. No momento presente, sinto-me alerta e desperto(a)

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

207. Neste momento sinto-me com energia

Mark only one oval.

	1	2	3	4	5	
Totalmente falso	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Totalmente verdadeiro

Escala
de
Paixão

Por favor, responda com base naquilo que habitualmente sente quando corre, de acordo com a escala indicada. Não há respostas certas ou erradas relativamente a qualquer um dos itens.

208. Esta atividade permite-me viver uma variedade de experiências

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

209. Não consigo viver sem ela

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

210. As coisas novas que eu descobro com esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

211. A ânsia é muito forte. Não consigo evitar realizar esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

212. Tenho dificuldade em imaginar a minha vida sem esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

213. Esta atividade permite-me viver experiências memoráveis

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

214. Esta atividade reflete as qualidades que gosto em mim

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

215. Estou emocionalmente dependente desta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

216. Esta atividade está em harmonia com outras atividades da minha vida

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

217. Tenho dificuldades em controlar a minha necessidade de realizar esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

214. Esta atividade reflete as qualidades que gosto em mim

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

219. Tenho um sentimento quase obsessivo por esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

220. O meu estado de espírito depende da minha capacidade de realizar esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

221. Estou completamente envolvido(a) por esta atividade

Mark only one oval.

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

Comportamento de
Corrida

As próximas perguntas referem-se aos seus hábitos de corrida.

222. ~~Quanto tempo prefere as corridas de longa distância serem feitas por semana?~~

~~Mark only one oval.~~

1 1 2 3 4 5

 2 Não concordo nada Concordo fortemente

 3
 4
 5
 6
 7

223. Qual a sua distância semanal total (média de Km) de corrida?

224. Qual o tempo semanal total (média de horas) de corrida?

225. Há quanto tempo corre de forma regular (meses)?

226. Se utiliza equipamento tecnológico durante a corrida, indique quais as funções (pode assinalar várias)

Tick all that apply. 1 2 3 4 5

 Cronómetro Concordo fortemente
 GPS (ou outro sistema, que meça distância)
 Cardíofrequencímetro (para medir a frequência cardíaca)
 Aparelho de Música
 Aplicação de corrida
 Other: _____

227. Esta atividade reflete a qualidade tecnológica e o motivo de uso da tecnologia e/ou aplicações de telemóvel que usa enquanto corre? (pode assinalar várias)

Tick all that apply.

	1	2	3	4	5
<input type="checkbox"/> Não Distração da corrida	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="checkbox"/> Registo da estatística da corrida					
<input type="checkbox"/> Orientação do treino					
<input type="checkbox"/> Partilha nas redes sociais					
<input type="checkbox"/> Comparação com outros corredores					
<input type="checkbox"/> Partilha com treinador					
Other: <input type="checkbox"/>	_____				

228. Que outro tipo de exercício físico realiza além da corrida (como forma de preparação para a corrida ou com outro objetivo)? (pode assinalar várias)

Tick all that apply.

- Nenhum
- Aquecimento e alongamento
- Treino com pesos ou máquinas
- Caminhada
- Ciclismo ou BTT
- Yoga ou Pilates
- Treino de alta intensidade
- Natação
- Aulas de grupo com música
- Crossfit

Other: _____

229. Utiliza redes sociais relacionada com a sua corrida? 5

Mark only one oval.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente
<input type="radio"/>	Sim				
<input type="radio"/>	Não				

230. **Esta opinião reflete a sua atitude para com o relacionamento nas redes sociais? (pode assinalar várias)**

Mark only one oval.

Tick all that apply.

Solidariedade para com causas humanitárias 1 2 3 4 5
 Motivação
 Não concordo nada Concordo fortemente
 Educação, conselhos e conhecimentos
 Contacto com outros corredores
 Acompanhamento de eventos e corredores
 Partilha de fotos e percursos
 Acompanhamentos de amigos
 Other: _____

Questionário de Comportamento Sedentário

Indique o tempo de comportamento sedentário (repouso mas acordado) associado às seguintes situações. Por favor, responda com base naquilo que habitualmente faz na sua semana. Não há respostas certas ou erradas relativamente a qualquer um dos itens.

231. Meios de transporte (e.g., carro, autocarro, metro) dia de semana

Example: 8.30 a.m.

232. Meios de transporte (e.g., carro, autocarro, metro) fim-de-semana

Example: 8.30 a.m.

233. No emprego (e.g., à secretária, ao computador) dia de semana

 1 2 3 4 5

Example: 8.30 a.m.
 Não concordo nada Concordo fortemente

234. No emprego (e.g., à secretária, ao computador) fim-de-semana

Example: 8.30 a.m.

235. A sua atividade reflete as qualidades que gosto em mim

Mark only one oval.

Example: 8.30 a.m.

1 2 3 4 5

236. Não concordo nada Concordo fortemente

Example: 8.30 a.m.

237. A utilizar computador em casa (e.g., e-mail, jogos) dia de semana

Example: 8.30 a.m.

238. A utilizar computador em casa (e.g., e-mail, jogos) fim-de-semana

Example: 8.30 a.m.

239. Em outras atividades de lazer (e.g., conviver com amigos, cinema) que não incluam televisão e computador dia de semana

Example: 8.30 a.m.

240. Em outras atividades de lazer (e.g., conviver com amigos, cinema) que não incluam televisão e computador dia de semana fim-de-semana

Example: 8.30 a.m. 1 2 3 4 5

Não concordo nada Concordo fortemente
De seguida, irá encontrar algumas perguntas sobre aspetos gerais da sua vida.
Relembramos que as suas respostas são anónimas e os dados confidenciais.

Questionário
Geral

241. Qual é a sua naturalidade?

242. Qual a sua visão de refletir as suas qualidades que gosto em mim

Mark only one oval.

1 2 3 4 5

243. Qual é o seu estado civil atual?

Não concordo nada Concordo fortemente

Mark only one oval.

- Solteiro(a)
- Divorciado(a)
- Viúvo(a)
- Casado ou em união de fato

244. Que idade tem?

245. Qual foi o nível de escolaridade mais elevado que completou?

Mark only one oval.

- 1º ciclo do ensino básico (4º ano, antigo ensino primário, 4ª classe)
- 2º ciclo do ensino básico (6º ano, antigo ciclo preparatório)
- 3º ciclo do ensino básico (9º ano, antigo 5º ano do liceu)
- Ensino secundário (12º ano, antigo 7º ano do liceu)
- Ensino Pós-secundário Não Superior (ex. curso profissional)
- Ensino Superior (Bacharelato, Licenciatura, Mestrado, Doutoramento) Sem escolaridade
- Não sabe 1 2 3 4 5

Não concordo nada Concordo fortemente

246. 5. O seu agregado familiar tem quantos membros (incluindo o próprio)?

247. ~~Está a atividade que reflete as condições de seu agregado familiar~~ Qual a atividade que reflete as condições de seu agregado familiar (incluindo vencimentos, subsídios, abonos, pensões e outros benefícios regulares) após deduções para impostos, segurança social, etc.?

1 2 3 4 5

Mark only one oval.

Não concordo nada Concordo fortemente

Menos de 485 €

485-970€

971-1455€

1456 - 1940 €

1941 - 2425 €

2426 - 2910 €

2911 - 3395 €

3396 - 3880 €

3881 - 4365 €

Mais de 4365 €

Não sabe

248. Qual é o seu peso?

249. Qual é a sua idade?

1 2 3 4 5

Não concordo nada Concordo fortemente

250. Em geral, como define o seu estado de saúde?

Mark only one oval.

Excelente

Bom

Razoável

Fraco

Muito fraco

Não sabe

251. Está disponível para ser contactado(a) outra vez, no âmbito de outro estudo acerca da corrida que está a ser conduzido pela Faculdade de Motricidade Humana?

Mark only one oval.

Sim

Não

252. Contato preferencial

Obrigado pela sua participação

2

3

4

5

Não concordo nada

Concordo fortemente

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Google Forms

Appendices: Self-report instruments used in this thesis

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

Appendices: Self-report instruments used in this thesis

	1	2	3	4	5	
Não concordo nada	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Concordo fortemente

APPENDICES

Abstracts of communications related to the thesis

Pereira HV, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2020). Running prevalence in Portugal: Demographic, behavioral and psychosocial characteristics. *Journal of Leisure Research* (submitted).

Introduction: The purpose of this study was to cross-sectionally estimate the prevalence of recreational running in Portugal and describe characteristics of adult runners. *Material and methods:* A nationally representative sample of 1068 Portuguese adults was selected through a probabilistic sample of telephone numbers. Demographic information, weekly physical activity habits and running behavior were assessed. For those classified as recreational runners, motivations, vitality, flow and barriers for running were also assessed. *Results:* The prevalence of recreational running in Portugal was 10.6%. It was higher in men (14.6% vs. 6.6%, $p=.024$) and in younger participants (13.6% vs. 7.7%, $p = .026$). Runners ran on average 3 times, 20 kilometers and 3 hours per week. General health orientation (88%), self-esteem (63%), and life meaning (57%) were the most predominant motives for running, while time was the most prevalent barrier (43%). Runners reported more vigorous PA ($d = .49$), and higher likelihood of engaging in non-sedentary activities ($d = .19$). *Discussion:* This first Portuguese running prevalence study with a representative sample, indicates that almost 11% of Portuguese adults ran regularly, and describes some social and motivational determinants of running initiation and maintenance in the Portuguese population, which could be used to inform future running promotion interventions.

Pereira HV, Palmeira AL, Encantado J, Marques MM, Santos I, Carraça EV, Silva CS, Teixeira, PJ (2020). Systematic review of psychological and behavioral correlates of recreational running. *Psychology of Sport and Exercise* (submitted).

The aim of this review was to systematically synthesize the published literature describing the psychological and behavioral correlates of recreational running in adults. Quantitative studies published in peer-reviewed journals until December 2018 in English were included. Studies were identified through MEDLINE, PsycINFO, SPORTDiscus, and Web of Science, and were selected for this review if they 1) studied recreational running, 2) included healthy adult samples (18 years or older, without a diagnosed medical condition or metabolic disorder), and 3) examined psychological or behavioral correlates of recreational running. Forty-five articles reporting 47 studies met the eligibility criteria and were included. There were 17 cross-sectional studies, and 30 longitudinal studies (8 non-controlled trials, 5 controlled trials and 6 randomized controlled trials) (n = 30744, 19 to 66 years old, 43% women). Twenty-three studies assessed antecedents of running behavior, and 25 studies used running behavior as treatment or predictor of a given effect or outcome. One study examined both predictors and outcomes of running. Motives were the most frequently studied antecedent of running behavior (k = 13), and studies suggest that the highest ranked or more prevalent motives were physical health, psychological motives, and personal achievement. Moreover, improvements in mood (k = 10) and wellbeing (k = 8) were the most frequently reported positive outcomes. To our knowledge, this is the first systematic review on this topic. The identification of behavioral and psychological correlates of recreational running across populations can contribute to inform and guide a public policy agenda, focused on helping people sustain regular physical activity, through a modality they have chosen and appear to enjoy.

Pereira HV, Palmeira AL, Encantado J, Marques MM, Carraça EV, Silva MN, Santos I, Teixeira PJ (2020). Keep on Running - Evidence-based digital randomized controlled trial for the sustained adoption of Recreational Running: Rationale, Design and Pilot Feasibility Study. *International Journal of Behavioral medicine* (submitted).

Thousands of health applications are available world-wide for smartphones, and represent a unique opportunity to reach a broad audience of users, and promote physical activity and other health behaviors. Additionally, running clubs/groups may provide a novel test-bed for understanding why people adopt recreational running and how motivational factors can support PA maintenance. This paper describes the rationale, intervention development, study design, methods and pilot study of the Keep on Running (KOR) trial. KOR aims to test a web-based brief theory-based intervention, targeting maintenance of recreational running behavior over time (i.e. relapse preventing). The pilot study was implemented to measure intervention adherence, fidelity of intervention delivery and participant satisfaction, in order to establish the feasibility and acceptability of the web-based intervention toolkit. Valuable lessons are taken from the pilot feasibility study. Adjustments will be made in the intervention and in its delivery, in order to improve adherence and overall experience. Results from the RCT will test the efficacy of this approach, contribute to the understanding of recreational running sustainability, and can be used in the development and optimization of future interventions aimed at physical activity promotion.

Pereira HV, Palmeira AL, Silva MN, Santos I, Rovisco R, Morgado J, Teixeira PJ (2016).

Associations between needs satisfaction and behavioral regulations in a sample of recreational runners. The 6th International Conference on Self-Determination Theory 2016.

Considering the popularity of recreational running and its potential to improve health and well-being, understanding motivation for running is a relevant research topic. The purpose of this cross-sectional study was to analyze the association between needs satisfaction and motivational regulations in a sample of Portuguese recreational runners.

Ninety-four recreational runners (39% women, 41.0±8.5 yrs.) were recruited from running groups via social media. Participants answered a running profile questionnaire and filled out an adapted version of the Behavioral Regulation In Exercise Questionnaire-3 (BREQ-3) and the Psychological Need Satisfaction in Exercise Scale (PNSE).

Participants had 7.1±7.6 years of running experience, and reported completing 43.3±20.3 km/week. Results showed a positive correlation between

competence and relatedness satisfaction with autonomous regulation (integrated and intrinsic, all $p < 0.01$). Competence was also positively correlated with identified regulation and negatively correlated with external regulation (all, $p < 0.05$). Regression analysis showed that higher scores in identified regulation ($p < 0.05$) and lower scores in introjected regulation ($p = 0.01$) predicted more years of running. No other associations were significant.

Results provide support of the motivational processes proposed by SDT in this sample of runners, showing that competence and relatedness need satisfaction are associated with autonomous regulations, especially identified motivation, which in turn appear(s) to foster maintenance of running behavior.

Keywords: Running, Self-determination, Regulations, Needs Satisfaction, Motivation

Pereira HV, Palmeira AL, Carraça EV, Marques MM, Silva MN, Teixeira PJ (2018) Keep on Running: Evidence-based digital intervention for the sustained adoption of recreational running: study protocol. Center for Behavior Change Conference 2018.

Rationale

Recreational running is becoming increasingly popular, constituting the ideal opportunity to scientifically explore why people run, and more importantly, to inform and drive a public policy agenda focused on helping people sustain regular PA, through an activity they have chosen and appear to enjoy. Research suggests that if interventions are to be effective in promoting sustained health behavior change, they should use theory- and evidence-based techniques. One of the most well-established theories for understanding and promoting sustained physical activity behavior is the Self-Determination Theory. In addition, self-regulation skills have been identified as important mediators of long-term physical activity and as core features of effective behavior change/maintenance interventions. Digital interventions have the potential for wide reach and low-cost interventions, offering attractive tools for the implementation of effective behavior change techniques.

Aims

The central aim of the Keep on Running (KOR) project is to test the efficacy of a new “light-touch” digital intervention based on the Self-Determination and Self-Regulation Theories, in promoting continued participation in recreational running after initial voluntary adoption in two different settings: an organized group cohesion-based community (Programa Nacional de Marcha e Corrida - PNMC), and free recreational runners (FRR). Additionally, this project seeks to identify relevant theory-based mediators involved in sustained running adherence.

Methodology

We will employ a 2x2 randomized controlled trial comprising combinations of two conditions – PNMC vs. FRR, and self-regulation/motivation intervention vs. no intervention. The brief digital-based intervention, using several technological implementations (e.g. mini-apps and video scribes) will be informed by the guidelines for the development of complex behavior change interventions and principles applied in previous theory-based behavior change interventions, using a systematic approach to the translation of theory and evidence to digital intervention components. A systematic review and a national running survey were also conducted to inform the content of the motivational/self-regulation intervention. All participants in the study will be monitored with ambulatory assessments, and digitally complete valid psychosocial measures. Given that the primary outcome is expected to have a medium effect size (Cohen’s $d=0.50$), and expecting a dropout rate of 15% at follow-up, we estimate that approximately 55 subjects/group are needed at baseline (for $p=0.01$). Thus, recruiting 220 participants will ensure high statistical power for the primary analyses.

Primary outcome is running maintenance at follow-up (12 months) and is expected that both intervention groups (PNMC and FRR) will show higher values. The KOR methodology is innovative because it will formally test the intervention in two different settings to promote maintenance of recreation running. As to our knowledge this is the first trial comprehensive digital behavior change trial for this population. Furthermore, the widespread availability and advances of remote technologies are explored in this project, as they allow for a wider reach and if effective, elements from KOR trial

can potentially be exploited to existing industry solutions, therefore augmenting its effects. At this time, the submission to the Faculty ethical board is being prepared and the intervention toolkit content being developed.

Pereira HV, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2018).

Motivation of Portuguese recreational runners: The Keep on Running national survey.

International Society of Behavioral Nutrition and Physical Activity Annual Meeting 2018.

Purpose:

The aim of this study is to estimate the prevalence of recreational running and describe the associated motivational characteristics in a representative sample of Portuguese adults.

Methods

Recreational running was defined as running for the past 3 months, at least 2 days and 60 minutes per week, and without a competitive affiliation (i.e., sports federation), except injuries/life events. A nationally representative sample of Portuguese adults, aged between 18 to 65 years, was selected through a probabilistic (random) sample of telephone numbers. The sample was stratified by gender and age. Besides demographic information, weekly physical activity habits, running behavior, running motivations, vitality, flow, barriers for running and self-regulation strategies were assessed. Short versions of previously validated scales representing the different constructs were adapted for usage in epidemiological surveys through phone interview.

Results/ findings

The prevalence of recreational running was 10.6% (18-40y: 13.6%; 41-65y: 7.7%; Men: 14.6%; Women: 6.6%, both $p < 0.05$). Participants ran an average of 3.4 days, covered 20 km (Men: 21.3km; Women: 16.4km, $p < 0.05$) and 3h each week. 57% of the participants had interruption in their regular running in the past 12 months (ranging from 1 week to 9 months, with an average of 2 months), and the most prevent barrier was lack of time (43%, $n=49$). The motives for running with highest score were general health orientation ($p=0.000$), followed by self-esteem, and life meaning ($p=0.000$), suggesting that these are particularly important motives for the participants running behavior. It was observed a correlation between “life meaning” and “general health orientation” subscales, with vitality ($r(112) = .221$, $p < 0.05$ and $.255$, $p < 0.01$) and with flow ($r(111) = .251$, $p < 0.01$ and $.371$, $p=0.000$). Additionally, data revealed a strong correlation between the autonomous subscales of the BREQ (identified, integrated and intrinsic), vitality ($r(111) = .331 - .515$, $p=0.000$) and with flow ($r(111) = .314 - .437$, $p=0.000$).

Conclusions:

Although there was no relationship between motivational variables and running behavior, measures of autonomous motivation (identified, integrated, and intrinsic), along with “Life Meaning” and “General Health Orientation” motives were more strongly related with measures of behavior quality, such as vitality and flow. These results with recreational runners confirm previous studies on physical activity motivation, and encourage longer prospective studies to clarify how controlled and autonomous motivations for physical activity develop and whether they respond to interventions designed to increase physical activity maintenance.

Pereira HV, Palmeira AL, Carraça EV, Santos I, Marques MM, Teixeira PJ (2018).

Prevalence of recreational running and behavioral characteristics of Portuguese runners: The Keep on Running national survey. VII International Society for Physical Activity and Health Congress, 2018.

Introduction:The aim of this study was to estimate, in a representative sample of Portuguese adults, the prevalence of recreational running and describe the associated demographic and behavioral characteristics.

Method:Recreational running was defined as running without a competitive affiliation (i.e., sports federation), at least two days and 60 minutes/week, for the past 3 months. A nationally representative sample of Portuguese adults (n=1084; 50% women), aged between 18 to 65y, was selected through a probabilistic random sample of telephone numbers. We assessed weekly physical activity habits and running behavior (including frequency, distance, setting: environment and groups, and the monitoring equipment used).

Results:The prevalence of recreational running was 10.6% (18-40y: 13.6%; 41-65y: 7.7%, $p<0.05$; Men: 14.6%; Women: 6.6%, $p<0.05$). On average, participants ran 3h, in 3.4 days, covered 20 km/week (Men: 21.3km; Women: 16.4km, $p<0.05$). Fifty-seven percent of the participants interrupted their regular running in the past year (averaging 2 months), and the most prevalent barrier was lack of time (43%). They reported preference to run alone(73%), in the street (53%), and use wearables for time monitoring (44%) and music (45%).

Conclusions:Overall, about one tenth of Portuguese adults ran at least two days and 60 minutes/week which is similar to other European countries. The prevalence was superior in men and in the younger age group. More than half of the runners had an interruption in the past year. Considering the accessibility, low cost of this activity and its known health benefits, physical activity promotion in Portugal should consider running related activities.

Pereira HV, Palmeira AL, Encantado E, Marques MM, Santos I, Carraça EV, Teixeira PJ (2019). Validation of the motives of recreational runners scale – MORS. 7th International Conference on Self-Determination Theory 2019.

Introduction: The motivation of marathoners' scale (MOMS) was developed and validated to measure motives in marathon runners, albeit without a clear theoretical background (Masters, 1993). The original 56 items was used to establish a new factorial structure according to self-determination (SDT) theory tenets (Zachs, 2015). In order to study the motivational processes underlying the running phenomena observed in several countries, this study sought to validate an SDT-based, short version of MOMS to measure motives for recreational running.

Methods: As part of a national recreational running phone survey, 115 runners answered to a MOMS short-version, with item adjustments to recreational running conducted by experts. Exploratory factor analysis was performed to test factorial solutions for the data. The newly developed scale comprises 12 items that assesses six motives for engaging in recreational running: health, psychological coping, affiliation, weight management, social comparison, and goal achievement. A subsequent confirmatory factor analysis was performed on another sample of 406 recreational runners. Cronbach's alpha was used to evaluate internal consistency. External validity was analysed by using exercise behavioural regulations and goal content questionnaires.

Results: The scale adjustment presented a good fit: $\chi^2(39) = 123.70, p < .001$; RMSEA ($< .10$) = .073; CFI ($> .90$) = .95; GFI ($> .90$) = .95. Good internal consistency was achieved for all subscales ($\alpha > .77$) except for weight management ($\alpha = .67$). MORS items, when compared to Goal Content for Exercise Questionnaire, showed face validity, and its subscales were overall associated with exercise behaviour regulations as postulated by SDT.

Conclusion: The newly hypothesized model for MORS presented good fit to a second independent data set, suggesting the plausibility of using an SDT framework to this questionnaire. Such a scale may be helpful for future studies due to its broader scope of application with recreational runner and its suitability to theory-based interventions. Scale reduction reduces administration time, useful to its use in both face-to-face and digital questionnaires. Further improvements will be discussed.

Pereira HV, Encantado E, Palmeira AL, Teixeira PJ (2019). Systematic review of psychological and behavioural correlates of recreational running. International Society of Behavioral Nutrition and Physical Activity Annual Meeting 2019.

Objective:

Recreational running is becoming increasingly popular, but the study of its correlates is scarce. Therefore, the aim of this review is to systematically synthesise the published literature describing the psychological and behavioural correlates of recreational running in adults.

Methods:

Quantitative studies published in peer-reviewed journals until December 2018 in English were included. Studies were identified through MEDLINE, PsychINFO, SPORTDiscus, and Web of Science, and were selected for this review if they 1) studied recreational running, 2) included healthy adult samples (18 years or older, without a diagnosed medical condition or metabolic disorder), and 3) examined psychological or behavioural correlates of recreational running. Two independent researchers identified eligible studies, and are currently extracting data and assessing the methodological quality of each study, using the NHLBI – NIH Quality Assessment Tool.

Results:

Forty-nine articles reporting 52 studies met the eligibility criteria and were included. Ten were controlled trials, 14 had a longitudinal design and 28 a cross-sectional design (overall, n=31330; 42% women; 36.0±10.9 years). Studies reported: 1) psychological and behavioural determinants of recreational running (motives, k=12; intention, k=4; self-efficacy, k=5; attitudes and norms, k=3; goals, pride and shame, social support, action and coping planning, k=1), and 2) psychological outcomes (mood, k=12; wellbeing, affect, enjoyment, k=6; cognitive function, depression, k=5; anxiety, k=4; flow, stress, k=3; vitality, engagement, skills, mental health, emotional regulation, k=1). Data regarding recreational running correlates is being extracted and conclusions will be drawn based on a narrative synthesis. If appropriate, meta-analytical techniques will be conducted.

Conclusions:

To our knowledge, this is the first systematic review presenting a methodical analysis of recreational running from the perspective of those actively engaging in it. Systematically identifying and summarizing relevant information on behavioural and psychological correlates of recreational running across populations can contribute to inform and guide a public policy agenda focused on helping people sustain regular PA, through an activity they have chosen and appear to enjoy.