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## The role of positive orientation and positive affect in training engagement and sport performance

Ph.D. dissertation thesis

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To my beloved wife, Sylwia. No matter the challenges, you are always with me.

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### **Abstract in English**

The main aim of this thesis was to enhance knowledge concerning the role of positive orientation and positive affect in training engagement and sport performance of recreational runners. Based on existing theories and previous research, it was expected that positive orientation—understood as a general, positive outlook towards oneself, life, and future—and positive affect—considered both as a stable disposition and a state—would be associated with training engagement—in both its psychological and behavioral dimensions. Additionally, the research examined how the relationships between these variables relate to sport performance. According to the conservation of resources theory, it was postulated that positive orientation and positive affect act as personal resources that enhance training engagement and contribute to achieving better sport performance. Furthermore, the study explored the dynamic relationships between these personal resources and training engagement. To verify these theoretical propositions, three quantitative empirical studies were conducted. The research was conducted on three independent samples of recreational runners.

Study 1 aimed to analyze the relationships between positive orientation, the behavioral dimension of training engagement, and marathon performance. The data was gathered from a sample of 204 amateur runners participating in a marathon race. Structural equation modeling revealed that positive orientation was a significant predictor of training engagement, which, in turn, was positively associated with sport performance, namely marathon results. Additionally, training engagement mediated the relationship between positive orientation and sport performance. These results supported the relationship between positive orientation, training engagement, and sport performance postulated in the theoretical model.

Study 2 expanded the model by incorporating trait and state positive affect, as well as the psychological dimension of training engagement. It was hypothesized that positive orientation and trait positive affect would predict training engagement and the pre-race state of positive affect, while these two variables would be associated with sport performance. The data was gathered from 192 half-marathon participants. Results demonstrated that positive orientation was related to training engagement but was not significantly associated with the pre-race positive affect. In contrast, trait positive affect predicted the pre-race positive affect but not training engagement. As expected, training engagement predicted both the sport performance and pre-race positive affect, with the latter being negatively related to sport performance. These findings showed the role of positive orientation and positive affect in training engagement and sport performance.

Study 3 was designed to test three alternative theoretical models of the dynamic relationships among positive orientation, positive affect, and training engagement. The data was gathered from 128 recreational runners in a three-wave longitudinal study with a seven day interval between measurements. Structural equation modeling was used to compare alternative models of relationships between variables. The best-fitting model assumed a pathway from training engagement to positive affect, which was then related to positive orientation. The results provided insight into the dependencies between the variables, demonstrating the significant role of training engagement in strengthening positive affective experiences and positive orientation of recreational runners.

The results of these three studies contribute to a better understanding of the role of positive orientation, positive affect, and training engagement in sport performance and provide a better explanation of the psychological consequences of training engagement. This knowledge can serve as a foundation for developing psychological interventions that may be used by professionals supporting recreational runners in their sport development.

Keywords: positive orientation, positive affect, training engagement, sport performance, positive psychology

### **Abstract in Polish**

Głównym celem niniejszej rozprawy była analiza zależności pomiędzy pozytywną orientacją, pozytywnym afektem, zaangażowaniem w trening i wynikami w sporcie u biegaczy amatorów. Na podstawie teorii oraz wcześniejszych badań oczekiwano, że pozytywna orientacja – rozumiana jako ogólne, pozytywne nastawianie do siebie, świata i przyszłości – oraz pozytywny afekt – ujmowany jako trwała dyspozycja oraz jako stan – będą powiązane z zaangażowaniem w trening – ujmowany w wymiarze psychologicznym i behawioralnym. Ponadto zweryfikowano jak zależności pomiędzy tymi zmiennymi wiążą się z wynikiem sportowym. Zgodnie z teorią zachowania zasobów postulowano, że pozytywna orientacja oraz pozytywny afekt są zasobami osobistymi, które wzmacniają zaangażowanie w trening oraz sprzyjają uzyskiwaniu lepszych wyników sportowych. Testowano także dynamiczne zależności pomiędzy tymi zasobami a zaangażowaniem w trening sportowy. W celu weryfikacji postulowanych teoretycznie zależności, przeprowadzono trzy badania empiryczne, o charakterze ilościowym. Badania zrealizowano na trzech niezależnych próbach biegaczy amatorów.

Celem Badania 1 była analiza związków pozytywnej orientacji z behawioralnym wymiarem zaangażowania w trening oraz wynikami uzyskiwanymi w maratonie. Zebrano dane od 204 biegaczy amatorów, uczestników maratonu. Analiza równań strukturalnych pokazała, że pozytywna orientacja jest istotnym predyktorem zaangażowania w trening, które z kolei wiąże się dodatnio z wynikami maratonu. Ponadto zaangażowanie w trening mediowało związek pomiędzy pozytywną orientacją a uzyskanym wynikiem w biegu. Rezultaty tego badania wskazują na związek pozytywnej orientacji z zaangażowaniem sportowym oraz uzyskiwanym wynikiem sportowym, co postulował model teoretyczny.

Badanie 2 rozszerzało testowany model o cechę i stan pozytywnego afektu, a także psychologiczny wymiar zaangażowania w trening. Postulowano, że pozytywna orientacja wraz z cechą pozytywnego afektu będą predyktorami zaangażowania w trening oraz stanu pozytywnego afektu przed biegiem, a te dwie zmienne będą wiązać się z uzyskanym wynikiem. Dane zostały zebrane od 192 uczestników półmaratonu. Wyniki pokazały, że pozytywna orientacja wiąże się z zaangażowaniem w trening, ale nie wiąże się istotnie z pozytywnym afektem przed biegiem. Z kolei cecha pozytywnego afektu była predyktorem stanu pozytywnego afektu przed biegiem, ale nie zaangażowania w trening.

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Zgodnie z oczekiwaniami, zaangażowanie w trening przewidywało wynik sportowy oraz stan pozytywnego afektu przed biegiem, który z kolei był negatywnie związany z wynikiem sportowym. Rezultaty tego badania pokazały rolę pozytywnej orientacji oraz pozytywnego afektu dla zaangażowania w trening oraz uzyskanego wyniku sportowego.

Celem Badania 3 była weryfikacja trzech alternatywnych modeli dynamicznych zależności pomiędzy pozytywną orientacją, pozytywnym afektem a zaangażowaniem w trening. Dane od 128 biegaczy amatorów zostały zebrane w trzykrotnym pomiarze, z siedmio-dniowym odstępem pomiędzy pomiarami. Analiza równań strukturalnych pozwoliła na porównanie alternatywnych modeli zależności między zmiennymi. Najlepsze dopasowanie uzyskał model postulujący relacje od zaangażowania w trening w kierunku pozytywnego afektu, a następnie pozytywnej orientacji. Wyniki badania dostarczyły wiedzy na temat zależności pomiędzy zmiennymi, wskazując na znaczącą rolę zaangażowania w trening we wzmacnianiu pozytywnych doświadczeń afektywnych oraz pozytywnych przekonań u biegaczy amatorów.

Rezultaty trzech zrealizowanych badań poszerzają wiedzę na temat roli pozytywnej orientacji, pozytywnego afektu oraz zaangażowania w trening dla uzyskiwanych wyników sportowych oraz wyjaśniają psychologiczne konsekwencje zaangażowania w trening sportowy. Wiedza ta może stanowić podstawę do budowania programów interwencji psychologicznych, które mogą być wykorzystywane przez osoby wspierające biegaczy amatorów w rozwoju sportowym.

Słowa kluczowe: pozytywna orientacja, pozytywny afekt, zaangażowanie w trening, wykonanie sportowe, psychologia pozytywna

## Preface

Sports activity plays an important role in healthy life. Research shows that regular training is necessary for maintaining good physical and mental condition (Warburton & Bredin, 2017; White et al., 2017). Between 2000 and 2022, a significant increase in the number of insufficiently physically active individuals was observed and it is estimated that 31.3% of the global population currently falls into this category (Strain et al., 2024). In research conducted in Poland, it was observed that 66% of individuals engage in physical activity at least once a month, while 34% do not exercise at all. Moreover, among physically active individuals, 75% try to exercise, but fail to maintain motivation throughout the year (Mind & Roses & IRCenter, 2024). Issues related to motivation for engaging in sport are thus a key area of research in sport psychology.

One of the main aims of sport and exercise psychology is to understand how participation in sports impacts an individual's psychological development and how psychological factors affect their physical performance (Weinberg & Gould, 2014). Accordingly, scientific research in this area aims to provide knowledge that professionals can use to support better human functioning and development in sport. Recently, new insights have emerged from positive psychology, which focus on human strengths, positive subjective experiences and positive individual traits (Seligman & Csikszentmihalyi, 2000). This dissertation aimed to analyze the role of positive beliefs and positive affect in training engagement and sport performance. The positive orientation (Caprara et al., 2009), positive affect (Fredrickson, 2001), and engagement (Schaufeli et al., 2008) analyzed in this dissertation are constructs drawn from the field of positive psychology (Lyubomirsky et al., 2005). Insights from this area of research may be crucial for supporting athletic development.

The research presented in this dissertation integrates knowledge from the fields of sport, motivation, personality, and positive psychology. The proposed research seeks to draw conclusions that are significant for both theoretical advancements and practical applications. Research in sport psychology often focuses on explaining the mechanisms that lead to sport mastery and the factors determining success among athletes (Łuszczyńska, 2014). Analyzing how psychological characteristics translate into sport performance has facilitated a better understanding of the psychological mechanisms responsible for achieving optimal arousal before a competition. As Hanin (2000) pointed out, optimal pre-competition arousal depends on various positive and negative factors that

influence sport performance during competition. To date, most attention has been directed toward examining the negative dimensions of arousal (Ruiz et al., 2017). My research, however, focuses on constructs rooted in positive psychology, which has gained increasing prominence in the sport context in recent years (Brady & Grenville-Cleave, 2017). By determining the role of positive affect and positive orientation in relation to training engagement and, subsequently, to performance outcomes, this study attempts to identify the role of these constructs during runners' training and performance.

To achieve the main research aim, I designed and conducted three separate studies, which address the three specific research questions posed. Based on the strategy of systematically modified auto-replications (Wojciszke, 2002), the research plan was structured to test the replicability of individual effects while expanding the scope of inquiry to include additional aspects of the phenomenon under investigation. Study 1 aimed to explore the relationships between positive orientation, training engagement, and performance among participants of a mass road marathon. In Study 2, I expanded the scope of analysis to include the state-trait distinction of positive affect and an additional dimension of training engagement. The data was gathered during a half-marathon competition. In Study 3, I applied a longitudinal research design with three measurements of state positive orientation, state positive affect, and psychological and behavioral indicators of training engagement, specifically through weekly assessments. The procedure for all conducted studies received approval from the university's ethics committee (approval no. KEBN\_19/2020).

The dissertation consists of five chapters. Chapter 1 provides a general theoretical introduction, explaining the relationships between the constructs, and outlines the research questions posed in each study. Chapters 2 through 4 contain the descriptions of the three separate studies conducted. Each study includes its own theoretical introduction, method, results, and discussion sections. Due to this structure, I would like to note that the introductions to the subsequent studies may contain partially overlapping content. They were planned as independent articles. The final conclusions are presented in Chapter 5, which offers a general summary of all the research findings, a broader discussion and practical implications drawn from the entire research project. At the end of the dissertation, there is an appendix where I have included key technical details of the studies, which in my opinion enhance the understanding of the applied analyses and obtained results.

The studies included in this thesis have already been published in co-authorship with my supervisor (Study 1) and two other ones have been prepared for publication with my supervisors as co-authors. Therefore, I have decided to use plural form 'we' instead of 'I' in the descriptions of the following studies to make the entire text more cohesive and highlight the contributions of my supervisor and co-supervisor to this project. However, this does not change the fact that I carried out the vast majority of the work, which allows me to use this data for my doctoral dissertation. I am also the first and corresponding author of all papers presenting individual studies. Nevertheless, when describing the elements of this dissertation (e.g., in the introductions to each part), I use the singular 'I' as I am the sole author of this dissertation.

Writing this dissertation has been a true marathon for me. However, I never ran it alone—I was fortunate to receive support from many wonderful people along the way. Now, as I reach the finish line, I would like to express my deepest gratitude to those who accompanied me on this journey.

First and foremost, I want to thank my supervisor, Mariola Laguna. I am profoundly grateful for her time, academic guidance, research expertise, and for continuously motivating me to move forward. It is important to emphasize that without her support, completing this dissertation would not have been possible.

I would also like to express my gratitude to my co-supervisor, Ewelina Purc, for her invaluable insights into data analysis and for sharing her expertise in scientific research. I am also grateful that she always found time to talk about the challenges of academic work.

Science is a collaborative effort, and I have no doubt that this dissertation is the result of the support of many people, especially those with whom I had the opportunity to work closely and expand my methodological knowledge. I am sincerely grateful to the entire Social Personality Psychology Lab team, led by Mariola Laguna, including Wiktor Razmus, Emilia Mielniczuk, Ewelina Purc, Zofia Mazur-Socha, and Natalia Łukawska.

I extend my heartfelt thanks to my parents, Małgorzata and Roman Kędra, as well as my brothers, Witold and Filip Kędra, for their unwavering emotional support and their belief in my abilities.

I am also deeply grateful to all my friends who stood by me throughout my studies and the writing of this dissertation. Their optimism and encouragement strengthened my confidence. A special thanks to Karol Ostrowski and Emil Żak, who reminded me of the importance of rest and maintaining a work-life balance in academia. Additionally, I would like to express my appreciation to all the athletes I had the opportunity to meet during this project, especially those who agreed to participate in my research. A special thanks goes to the Fundacja Rozwoju Sportu w Lublinie for allowing me to conduct my research during their organized events. I would also like to thank everyone involved in data collection.

I am also grateful to the scientific community with whom I had the opportunity to share my findings at various events. I appreciate all the researchers, students, coaches, and athletes who engaged in discussions with me and contributed to the development of my work.

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## Chapter 1 General theoretical introduction

This chapter provides a general introduction to the topic of positive resources and their role in engagement in sport activities. It begins by presenting the overall significance of engaging in physical activity and striving to improve performance. Next, the theoretical model underlying the conducted studies is discussed, and the analyzed constructs are explained. Finally, the specific research objectives are presented.

#### **1.1. Sport activity participation**

According to the recommendations of the World Health Organization, adults aged 18 to 64 should spend at least 150 minutes a week doing moderate sports activities or at least 75 minutes a week doing intensive activities (Bull et al., 2020). However, according to *Special Eurobarometer 472 Sport and Physical Activity* (2018) conducted in 28 EU countries, 46% of respondents never exercise or play sport. Therefore, one of the main goals of global action plan for 2018–2030, according to WHO (2018), is to promote actions aimed at increasing positive experiences associated with physical activity. This is because, in addition to improving people's health, engaging in various sports has integrative, educational, recreational and leisure functions (Łuszczyńska, 2014). Furthermore, this issue has gained importance in the situation of Covid-19 pandemic lockdown, which badly affected people's physical and mental health.

Statistics show that among active individuals the most popular sport discipline is running (Scheerder et al., 2015). This type of activity involves individual training, but also participation in organized running events. As a result, the growing popularity of road races (also known as mass running events) is leading many people to take on increasingly difficult running challenges. For example, from 2008 to 2018 there was a 57% increase in the number of participants in road running races worldwide (Andersen, 2020). Despite the various reasons for participating in running events, such as better physical health, fun, challenge, fundraising and the high accessibility of this form of sport activity (Buman et al., 2008), it is interesting to see what psychological factors foster engagement in running among amateur athletes.

As shown by literature, there are some crucial differences between recreational (i.e. amateur) and elite (i.e. professional) athletes (Day, 2019). Hurd & Anderson (2010, p. 9) define recreation as "an activity that people engage in during their free time, that people enjoy, and that people recognize as having socially redeeming values. The activity performed is less important than the reason for performing the activity, which is the outcome". The group of amateur runners should therefore be distinguished from professional runners, who are characterized mainly by high level of performance, international/national participation, talent, focus on competing with others (Swann et al., 2015). In amateur running, the achievement of valuable results is related to competing with oneself and overcoming one's own weaknesses rather than competing with rivals (Day, 2019). Due to this fact, issues related to increasing training engagement are more

appropriate for investigation in amateur group because they have more space for increasing training volume than highly motivated professionals with individual training plans (Lochbaum et al., 2022). However, the goal that is common to both groups of runners is to improve one's own sport performance (the personal best). A systematic review of research on training methods conducted by Keneally et al. (2018) shows that similar training methods aimed at improving endurance performance are employed both by amateur and professional athletes. Research shows that recreational athletes should also be distinguished based on their physical activity objectives—those who engage in sport solely to stay active and those who participate in competitive sports (Lipowski & Ussorowska, 2018). It is important to emphasize that in this thesis, I will focus on recreational runners who take part in competitive sport, specifically running, meaning they pursue this discipline in their leisure time and some of them for the purpose of competing in races.

Throughout its long tradition, from 1890 to the present day, one of the most explored areas of research and practice in sport psychology has been athletic performance (Kornspan, 2012). Since the first research in the field, psychologists have studied factors that may enhance athletic performance, e.g. reaction time (Kornspan, 2007). A general definition of performance psychology describes human performance in relation to achieving specific goals, which may pertain to various aspects of daily life. Thus, "performance psychology is a domain in which researchers and practitioners describe, explain, and predict human behavior" (Raab, 2020, p. 1115). It is important to emphasize that the term "performance" in sport can be used in two ways: as a particular dimension of human behavior and as a specific action or outcome (Nitsch & Hackfort, 2016). In other words, there are various indicators of sport performance, which can be subjective (e.g., evaluation of a competition performance) or objective (e.g., achieved results). It is worth noting that the main focus of this thesis will be on endurance performance, which is an emerging field of sport performance research in psychology (Meijen & Marcora, 2019). Endurance performance refers to sports such as running, cycling, and swimming, which involve maintaining continuous effort for a specified period of time (McCormick et al., 2015). For these types of activities the main objective indicator of performance is time-based result achieved in a given event. Therefore, in my thesis, I will focus on measuring the objective indicator of endurance performance, expressed as the result obtained during a specific running event. Such conceptualization and measurements have

been successfully used in other studies that also tested the role of psychological factors in achieving sport results (e.g., Stoeber et al., 2009; Waleriańczyk & Stolarski, 2021).

#### **1.2.** Positive orientation, positive affect and training engagement

Sport performance is influenced by various factors, which can broadly be categorized as physiology, biomechanics, psychology, tactics, and lifestyle-related factors (Smith, 2003). These factors can be divided into those that are teachable (e.g., tactics), those beyond the athlete's control (e.g., genetics), and those that can be developed (e.g., psychological skills). From this perspective, psychological factors serve as personal resources, the possession and development of which can be crucial in sport. According to the principles of the conservation of resources theory (Hobfoll, 1989, p. 516), resources are defined as "those objects, personal characteristics, conditions or energies that are valued by the individual or that serve as a means for the attainment of these objects, personal characteristics, conditions, or energies." The theory posits that individuals invest their resources to protect against loss, resulting in spirals of gains and losses, where resource gains are weaker and slower in development than resource loss. Furthermore, resources do not exist in isolation but rather as interconnected resource caravans (Hobfoll et al., 2018).

This research is also inspired by the beliefs–affect–engagement (B-A-E) model, explaining engagement and perseverance in action (Laguna, 2019), which I adapted in my research to explain engagement in sport activities. The model postulates that positive beliefs, further referred to as positive orientation (Caprara et al., 2010), are associated with the positive affect (Fredrickson, 2001) experienced by a person, which in turn makes it possible to predict the level of engagement and perseverance (Figure 1.1). However, recent analyses suggest that the model may also include potential reverse directions between these constructs (Laguna, 2025), leading from engagement to positive affect and positive orientation. As the constructs presented in the model are described in detail in the introduction sections of the independent studies, I will present only their general definitions below.

#### Figure 1.1

*The Beliefs–Affect–Engagement Model* 



Note. Source: Laguna, 2019.

Positive orientation is defined as a basic personality trait reflecting a general tendency to approach life experiences with a positive attitude (Caprara et al., 2009). The research findings on positive orientation indicate that it is a higher order latent construct that comprises three lower-order psychological constructs: self-esteem, life satisfaction, and optimism (Figure 1.2; Caprara et al., 2010). A review of studies on positive orientation indicates that it is not quite clear in what way positive beliefs motivate human behavior (Caprara et al., 2019). Therefore, extending this evidence, I assume that one of the factors motivating individuals to engage in selected behaviors may be the affective experiences that accompany their positive beliefs.

#### Figure 1.2

The latent structure of positive orientation



The term "affect" refers to consciously accessible feelings that are not focused on a specific object; it includes moods and emotions (Fredrickson, 2001). Research has shown that the experience of positive affect is associated with the experience of psychological well-being (Fredrickson et al., 2000). However, affect is not only described using the valence dimensions (negative-positive) but can also be depicted by another dimension conceptualized as activation level (low vs high, Watson & Tellegen, 1985). According to the discussion on different approaches to measuring affect in sport, the circumplex model of affect (Figure 1.3) is the most frequently studied and well-developed model for studying affect in the context of exercise (Ekkekakis & Petruzzello, 2002). Research on the associations of physical activity with positive affect has shown that high activated positive affect plays the most significant role in this context (Reed & Buck, 2009). It is also of interest in this thesis.

#### Figure 1.3

The circumplex model of affect



Note. Adapted from Watson & Tellegen, 1985.

For a long time, affect was believed to be a response to events and to progress in goal achievement (Carver & Scheier, 1999). In more recent analyses, however, it is pointed out that affect may also be linked to the processes taking place before a specific activity is started and may build motivation to act (Fredrickson et al., 2020). Moreover, in a theory on the significance of emotions experienced before sport competitions, Hanin (2000) explained that in addition to the regulation of negative emotions (anxiety, anger), positive emotions (joy, happiness, interest) play an important role in maintaining an optimal level of pre-competition arousal, which contributes to an increase in the athlete's performance. Therefore, in my dissertation, I intend to test the role of positive affect not only in training engagement but also in building the resources necessary to cope with performance challenges.

The construct of "engagement" is defined in many different ways, depending on what domain it concerns. In my thesis, I will use a construct adapted from the field of work engagement. Schaufeli et al. (2008) defined work engagement as a positive motivational state characterized by vigor, dedication, and absorption. This definition was successfully adapted in the sport domain, describing engagement in relation to sport-related activities and the feelings associated with participation in such sport (Guillen & Martínez-Alvarado, 2014). However, taking into account training engagement in sport, there is also a second aspect of engagement, referred to as the behavioral aspect (i.e., the activities actually undertaken; Busseri et al., 2011). In this case, one of the indicators could be the number of training sessions over a certain period of time (e.g., week, month), which can be described as training frequency (Nigg et al., 2020). According to Smith (2003), frequency is one of the fundamental elements of training, especially in endurance sports. Therefore, I aimed to analyze these two indicators of engagement, psychological engagement and the objective indicator of training frequency, which I will refer to as training engagement in the following sections.

The B-A-E model presented above postulates a distinction between the traits and states of positive orientation, positive affect, and engagement (Laguna, 2019). States are experienced as feelings tied to a specific situation and point in time, differing from traits, which are relatively stable characteristics of an individual that develop over time through experiences (Spielberger & Reheiser, 2009). In sport psychology, traits enable predictions about an athlete's future behavior, whereas states provide insight into how an athlete reacts to a specific situation (Ziegler et al., 2009). Additionally, states can manifest in relation to a single workout session as well as during longer training periods. The distinction between states and traits allows for an exploration of their roles in relation to sport performance. In other words, the constructs included in the B-A-E model can be viewed as resources that athletes use to cope with various challenges, including the physical demands of training, fatigue, and maintaining motivation. Thus, it can be expected that resources-such as positive orientation, positive affect, and engagement-will occur together as resource caravans (Hobfoll, 2011). Moreover, their interrelationships will reflect the presence of gain and loss spirals (Hobfoll et al., 2018). The relationships between these variables may be of significant importance in sport due to their potential to predict an athlete's capacity to engage in training, as well as to identify strategies for improving perseverance and, consequently, performance.

#### **1.3. Project contribution**

More than 30 years ago, while outlining the future direction of sport psychology research, Strean & Roberts (1992, p. 59) noted that "we don't need sport-specific theories, but we do need to test how general theories or models function in the context of sport". Thus, the main goal of psychologists conducting research in the field of sport is to transform general psychological knowledge and test how it works in the sport environment (Blecharz, 2006). The theoretical model I propose is based on theories developed in personality psychology, positive psychology and research on motivation, such as models explaining the relationship between positive orientation, positive affect and engagement verified in other domains (e.g. Laguna & Razmus, 2019). Therefore, this research project contributes to the development of sport psychology and also to the development of broader psychological theories that can be adapted to explain factors related to training engagement and sport performance.

The research also expands our understanding of the role that positive orientation, together with positive affect, plays in stimulating activity. Broadening knowledge about the role of positive orientation in various areas of human activity provides an opportunity to further develop this theory. In personality psychology, researchers have analyzed positive orientation as a factor distinct from the Big Five (Caprara et al., 2019). Some refer to this variable as "positive thinking", emphasizing its cognitive aspect (Caprara & Steca, 2005). Studies in other fields have shown that positive orientation reduces stress (Litwic-Kamińska et al., 2023), supports goal achievement (Laguna et al., 2017), and strengthens resilience (Milioni et al., 2016) and performance (Livi et al., 2015). This provides a foundation for linking this theory with phenomena occurring in sport. Therefore, analyzing the role of positive orientation in sport can offer new insights into the significance of this construct in fostering performance among athletes.

The thesis also contributes to the debate on the role of positive affect in sport and physical activity, which is one of the key research areas in sport psychology (Ekkekakis, 2012; Ekkekakis et al., 2013). The relationship between emotions and sport performance is well documented (Beedie et al., 2000; Lane, 2016). In a systematic review of 30 metaanalyses on sport performance, eight addressed topics related to mood, emotional intelligence, or anxiety (Lochbaum et al., 2022), but none specifically examined positive affect or emotions, which may indicate a lack of research in this area (McCarthy, 2011). In studies on the role of emotions in sport performance, initial research focused only on the role of pre-competition anxiety, however, as research progressed, the significant role of positive emotions was also recognized (Ruiz et al., 2017). This means that the role of positive affect still requires further exploration and remains unclear, especially in the context of physical activity engagement and endurance performance. This research not only examines the relationships between positive affect, positive orientation, engagement, and performance but also identifies potential directions of influence among these variables. This aligns with research trends in sport psychology, which suggest that positive emotions related to performance should be tested in conjunction with other constructs important for sport (McCarthy, 2011).

The project also introduces a distinction between behavioral and psychological training engagement. From the perspective of sport, this is an important element to consider both the subjective experiences related to activity and the actual physical engagement in it (Busseri et al., 2011). This approach enhances the understanding of training engagement, especially in recreational endurance athletes, for whom frequent training sessions may not be an obvious choice, even if they feel deeply absorbed in their sport. Recreational endurance athletes may experience many psychological demands related to their participation in sport, including training challenges, fatigue, finding time to train, or sacrifices made for the sport (McCormick et al., 2018). All of these issues can significantly hinder engagement in sport. Therefore, exploration of both behavioral and psychological aspects of engagement will help better understand training engagement.

In this research project there are traits and states of the constructs distinguished allowing for more nuanced explanation of their role. The distinction between trait and state is not obvious for every psychological construct. In the case of affect, this distinction has been present in the literature for a long time (Spielberger & Reheiser, 2009). Positive orientation, by contrast, was originally analyzed as a stable disposition, a personality trait manifesting itself in specific behaviors (Caprara et al., 2010). However, recent studies show that positive orientation may depend on contextual factors and experiences (Caprara et al., 2019; Caprara et al., 2025). Similarly, engagement can be understood as a one-time experience associated with a particular activity or as repeated, long-term striving for a goal (Breevaart et al., 2012). The distinction between the trait and state aspects of the variables to be investigated in the proposed project will allow for a complex exploration of the relations between them.

Positive psychology has a broad application in physical activity, from motivating action and maintaining engagement to supporting athletes in achieving better results (Wilczyńska & Makurat, 2016). Research in the field of positive psychology has a lot in common with sport psychology, as it effectively explains actions aimed at facilitating human functioning (Gould, 2002). In merging these two domains of psychology, some researchers use the term 'positive sport psychology' which represents a new research trend focused on elements that support athletic development (Mann & Narula, 2017). Research in this area is becoming increasingly popular, especially among recreational endurance athletes (Meijen, 2019). The constructs included in this project originate from the field of positive psychology and align with the broad definition of well-being, which, according to Seligman (2000), encompasses engagement, positive emotions, and meaning. This project is therefore an attempt to adapt theories developed in positive psychology to a sport psychology context. Previous studies conducted among amateurs have focused on testing hypotheses postulating that participation in races is a kind of psychological therapy that leads to an improvement in well-being (Malchrowicz-Mośko & Poczta, 2018). Cypryańska & Nezlek (2019) referred to mass running races as a kind of positive psychological intervention that many people take part in. It is therefore worth testing which factors are significant for increase in training engagement and for improvement of performance-and, consequently, for the achievement of positive outcomes regarding well-being in competitive runners. Moreover, research shows that experiencing well-being and satisfaction in sport characterizes individuals who maintain persistence in elite-level sport for a longer time (Siekanska & Blecharz, 2020). Therefore, it is important to examine how well-being may contribute to sustained participation in sport among recreational athletes. Research will make it possible to broaden the knowledge about specific mechanisms, distinct from those found in professional athletes.

Summing up, the main focus of the proposed research is to explain the associations between positive orientation, positive affect, training engagement, and their impact on sport performance among amateur runners. Yet, most people who do sport such as running are amateurs (Andersen, 2020) and the increasing popularity of running among amateurs (Scheerder et al., 2015) encourages research on their motivation. Moreover, a recent review on determinants of endurance performance has shown that 63% reviewed studies was conducted in laboratory settings (McCormick et al., 2015), which creates problem with ecological validity and transfer of achieved results to sport environment. The proposed research aims to close this gap through three studies conducted in the real-life context of training and competition. Some authors also suggest that there is a need to consider the moderators and mediators in research on endurance performance (Meijen & Marcora, 2019). Each study in this thesis answer to this issue by analyzing at least the indirect effects of positive orientation, positive affect, and training engagement in theoretical models with running performance.

#### **1.4. Research objectives**

The present dissertation aims to enhance knowledge concerning the role of positive beliefs, positive affect, and engagement in sport performance, whose significance is not yet fully understood in the sport context. For this reason, a general research question was formulated:

*General research question*: What is the role of positive beliefs and positive affect in training engagement and sport performance?

To address this question, three specific research objectives were formulated. Each of these objectives will be verified based on a separate study conducted as part of this dissertation. The first and second research objectives focus on verifying the role of positive beliefs and positive affect in training engagement and sport performance (Figure 1.4), whereas the third objective pertains to the dynamic relationships between the states of these variables and training engagement (Figure 1.5).

The first specific objective is to verify the role of positive orientation in behavioral training engagement and sport performance. As indicated by the adopted B-A-E model (Laguna, 2019), which is rooted in findings from other areas of research, it is possible to predict the level of engagement in a particular activity based on positive orientation. Therefore, the following research question was formulated:

*Research Question 1*: What is the role of positive orientation in predicting training engagement and sport performance?

To answer this question, Study 1 was conducted among marathon participants. Previous research showed that completing such events requires solid preparation, which is closely related to regularity in training (Hanson et al., 2015; Tanda, 2011). We therefore hypothesized that positive orientation, as a latent trait, may act as an important personal resource which promotes behavioral engagement in training, and through this, contributes to race performance (Figure 1.4).

The second objective of this dissertation is to broaden previous analyses by including the traits and states of positive affect as well as the psychological dimension of training engagement. The theoretical model postulates that trait positive orientation and trait positive affect translate into training engagement (psychological and behavioral), into the experience of state positive affect directly before the competition, and then into actual performance in a road race. The second research question reflects this objective.

*Research Question 2*: What is the role of positive orientation and positive affect (as a trait and as a state) in predicting training engagement and sport performance?

Study 2 extends the analysis by adding new variables to the model. Moreover, the study was conducted among participants of a different race distance, namely a half marathon.

#### Figure 1.4

The conceptual model of hypothesized relationships in Study 1 and 2



*Note*. blue arrows = Study 1, red arrows = Study 2.

The third research aim is to explore the dynamic relations between the states of positive orientation, positive affect, and training engagement, postulated by the B-A-E model (Laguna, 2019). Training engagement, which can change depending on the levels of positive orientation and positive affect, can also lead to many positive experiences in the form of positive beliefs and positive affect (Laguna, 2025). These states are dynamic and may change over time. This prompts the question concerning the links between positive orientation, positive affect, and training engagement.

*Research question 3:* What are the relationships between the states of positive orientation, positive affect, and training engagement?

Study 3 tested three alternative longitudinal models, with three repeated measurements of positive orientation, positive affect and training engagement (Figure 1.5). We proposed three alternative models determining the directionality of relationships between the variables: from positive orientation to positive affect, to psychological

training engagement, and to behavioral training engagement (Model 1: *Be Positive and Run*); reversed relationships (Model 2: *Run and Be Positive*), and reciprocal relationships between the variables (Model 3: *Reciprocal Model*). The distinction between two aspects of training engagement will make it possible to test the models in explaining not only psychological engagement but also behaviors associated with taking up sport training.

#### Figure 1.5



Alternative models of relationships between variables tested in Study 3

*Note.* black arrows = associations between measurement points, red arrows = model 1, blue arrows = model 2, blue and red arrows = model 3.

Connections between the first and third measurements were not presented in the figure.

## **Chapter 2**

## Relationship between positive orientation, training engagement and running performance (Study 1)

This chapter<sup>1</sup> presents Study 1, which aimed to provide an answer to the research question:

*Research Question 1:* What is the role of positive orientation in predicting training engagement and sport performance?

The results of this study will contribute to the development of further models of relationships, enriched with positive affect and other dimensions of engagement (Study 2 and 3).

<sup>&</sup>lt;sup>1</sup> The content of this chapter is an modified version of the article that has been already published: Kędra, M., Laguna, M. (2022). Be positive and engage in training: Positive orientation and marathon performance. *Annals of Psychology*, 25(3), 223-237. https://doi.org/10.18290/rpsych2022.0015

#### 2.1. Introduction

As a big challenge, taking part in a marathon requires thorough preparation; sport research has shown that not only physical but also psychological strengths are indispensable for successful running performance (Joyner, 2017; Waśkiewicz et al., 2019). Researchers have identified personality traits that have a vital effect on sport achievement, for example recent research has shown that a personality disposition such as perfectionism is associated with performance in long distance running of 10 km and half marathon (Waleriańczyk & Stolarski, 2021). However there is limited evidence concerning psychological factors important for running performance in the case of recreational runners, who are a group distinct from professional runners (Buman et al., 2008).

In recent mapping review Laborde et al. (2020) have developed 15 higher-order themes of 64 personality traits crucial in sport and exercise research, of which anxiety, perfectionism, self-efficacy were the most popular, but some (e.g., optimism) did not map well to any one particular facet. It is therefore essential to extend exploration of the relationship between another personality traits possibly related to sport performance (Coulter et al., 2016). In an attempt to explore this gap in research we hypothesized positive orientation as one of the factors which might be important in recreational running performance (Caprara et al., 2009).

Thus, the main purpose of the study was to test a model explaining the role of positive orientation in training engagement and running performance. Moreover, a better understanding of the psychological dispositions stimulating training engagement and running performance may offer new insights into personality and individual differences in the case of sport psychology.

#### 2.1.1. Positive orientation and marathon performance

Baker & Horton (2004) claim that a high level of sport performance depends on numerous factors, which can be divided into those that have primary and secondary influence. The authors classify psychological, training, and genetic factors as primary influences on sport performance. From a psychological perspective, the achievement and manifestation of high performance requires specific characteristics. Obviously there are unique psychological requirements in different sports, but there are also common factors that predict high performance in any sport— for example, some personality traits (Piedmont et al., 1999). The identification of important psychological factors is needed especially in demanding disciplines, such as marathon, which depends on numerous training sessions and requires huge effort during the competition itself (Tanda, 2011). Researchers explain successful sport performance as stemming from positive attitudes and thoughts, strong determination, and engagement (Harmison, 2006). Based on earlier findings, we expected that high marathon performance would depend on personal resources important for optimal functioning.

Optimal functioning across different life domains (e.g., health, achievement, job performance) is associated with individual personal resources. Among a wide range of personal resources self-esteem, optimism, and life satisfaction are crucial for optimal functioning (Caprara et al., 2019). These three variables are related to each other and together make up a higher order latent dimension named positive orientation, also referred to as positivity (Caprara et al., 2009). Positive orientation is defined as a general tendency to interpret reality and experiences in a positive way (Caprara et al., 2010). This cognitive capacity refers to a general propensity to think positively about oneself, life, and the future (Caprara et al., 2019). Research findings show that positive orientation is moderately heritable, but it differs from other dispositions, being a basic disposition to cope with life's challenges (Caprara et al., 2009). For example Caprara et al. (2012) showed that positive orientation is a separate construct from the Big Five traits, whose role has been reviewed in the context of long distance running activity (Waleriańczyk & Stolarski, 2021).

Moreover, positive orientation influences team work performance (Livi et al., 2015) and is associated with personal goal realization (Laguna et al., 2016). Studies on the relationships between positive orientation and health shown that positivity increases healthy habits and counters the effect of stress (Caprara et al., 2019). Positive orientation has also been found to increase after successful marathon completion (Gorczyca et al., 2016), and recreational runners' participation in mass street races improves their wellbeing and reinforces positive emotions (Cypryańska & Nezlek, 2019). There is, however, no evidence on whether positive orientation is related to running performance. Based on all these research results, we expected that positive orientation might be important in predicting running performance of recreational runners participating in marathon race. We did not, however, expect a direct relationship but an indirect strengthening effect of positive orientation on running performance through training engagement.

#### 2.1.2. Positive orientation and training engagement

Preparation before a marathon should be systematic and start sufficiently early (Gordon et al., 2017). As Busseri et al. (2011) observed, training engagement may be assessed based on behavioral indicators such as training frequency and the amount of time invested. Multiple training sessions are necessary to improve performance by providing better endurance and improving physiological parameters (e.g., maximal oxygen uptake; Tanda, 2011). However, in contrast to competition, training does not lead to immediate reward after this activity (Ericsson, 2006), and training sessions are exhausting not only physically but also mentally. It is documented that behavioral training indicators are highly interrelated with psychological factors, such as positive thoughts and feelings about the chosen activity (Busseri et al., 2011). This means that the maintenance of regular training engagement requires psychological resources, which foster engagement in regular and demanding training activity. We posited that positive orientation was this kind of psychological resource, associated with training frequency and that positive beliefs might support persistence and higher training frequency. Our hypothesis was based on research demonstrating that positive orientation and its components (Caprara et al., 2019) predicted work engagement (Laguna & Razmus, 2019). Behavioral training engagement is to some extent similar to psychological work engagement (Schaufeli et al., 2008), which is why we expected a similar effect. Thus, in our conceptual model we posited a link between positive orientation and training engagement:

Hypothesis 1: Positive orientation is positively related to training engagement.

#### 2.1.3. Training engagement and marathon performance

High performance is an outcome of an increasing number of training sessions (Smith, 2003). In our study we focus on training frequency as the key behavioral factor that leads to high marathon performance. It is well documented that running performance is an outcome of training engagement and preparations before the race (Gordon et al., 2017; Tanda & Knechtle, 2015). Research has shown robust positive correlations between the undertaking of training activities and performance (Baker & Horton, 2004). Taking part in regular running effort is correlated with average distance run per week. Training frequency has been treated as a predominant factor in the adaptive process of achieving race progression (Gordon et al., 2017). Similarly, engagement measurement conducted using the sport-specific version of the Utrecht Work Engagement Scale showed that vigor predicts positively performance in a half-marathon run (Stolarski et al., 2020). Therefore,

we expected that training engagement-that is, engagement in workout estimated as the number of training sessions per week would be associated with subsequent marathon result. We formulated the following hypothesis:

Hypothesis 2: Training engagement is positively related to marathon performance.

# 2.1.4. Training engagement as a mediator between positive orientation and marathon performance

Higher training frequency is known to be related to achieving better marathon results (Gordon et al., 2017), but the role of positive orientation in marathon performance has not been determined yet. We expected that positive orientation, as an important personal resource, would stimulate the workout process by stimulating training engagement and thus contribute to the final results achieved in running. In other words, rather than a simple direct effect, positive orientation was expected to have an indirect effect on sport results—namely, on running performance in a marathon competition—by increasing training engagement. Positive evaluations of oneself, life, and the future are important for optimal functioning in different life domains (Caprara et al., 2019; Laguna, 2019). Longitudinal research has demonstrated that positive orientation contributes to work engagement and thereby to organizational success (Laguna & Razmus, 2019), and that it is positively related to personal goal realization (Laguna et al., 2016). Similarly, Alessandri et al. (2015) found that positive orientation predicted work engagement and next job performance in an indirect way. In the light of these findings, positive orientation appears to play a crucial role in engagement in activities and, consequently, in strengthening performance. We hypothesized that also training engagement depends on the positive beliefs one holds, and that in this indirect way positive orientation might finally modify sport performance level. In other words, we hypothesized that:

*Hypothesis 3*: Training engagement is a mediator between positive orientation and marathon performance.

#### 2.1.5. Control variables

Research findings show that anthropometric parameters are associated with running results. As a combination of body mass and height, body mass index (BMI) is a good indicator in predicting running performance. BMI plays a key role in running economy (mechanical efficiency; Morgan et al., 1989) and energy cost of running (Bourdin et al., 1993). It was found that the best long distance runners in the world had

low BMI (Marc et al., 2014). Sedeaud et al. (2014) compared athletes' BMI level across different running distances and track and field disciplines. They found that the longer distance runners have lower BMI level. We therefore controlled for BMI, expecting that a lower level of BMI would predict better marathon performance.

Another factor that may be significant in explaining marathon performance is previous marathon experience, defined as participation in another marathon race before. Waśkiewicz et al. (2019) compared people who had already had at least one experience of running a marathon and those without such experience. The results showed that marathoners trained more frequently than inexperienced runners. In the light of this result, it seemed reasonable to control for previous marathon experience as potentially having a positive effect on training engagement.

#### 2.2. Method

#### 2.2.1. Procedure

The data were gathered during a marathon event, with approximately 700 participants. We used a study design with two measurement times: Time 1 before the marathon race and Time 2 after the race. Race organizers gave permission for pollsters to collect data at the race office, which opened two days earlier. Before the race runners who received a starter pack completed a paper-and-pencil questionnaire and reported their bib number (which is obligatory to take part in this kind of event). Participants were informed that their time in the race would be used for analyses. Participation in the study was voluntary and no remuneration was given for it. Only those who agreed to complete the questionnaire and to provide their bib number took part in the study.

#### 2.2.2. Participants

The study included 204 runners (180 men; 88.2%), who completed the race. The participants' mean age was 36.87 years (SD = 9.97; range: 19 to 70 years). Their running experience was very diverse and ranged from 1 to 55 years (M = 6.98, SD = 7.41).

#### 2.2.3. Measures

To measure positive orientation, we used the Positivity Scale (Caprara et al., 2012). Runners were asked before the race to rate eight statements (e.g., *I look forward to the future with hope and enthusiasm*) using a 5-point scale (from 1 = strongly disagree to 5 = strongly agree). For this scale an internal consistency  $\alpha = .89$  was obtained.

Training engagement was measured by means of a question about the weekly training frequency (*How many times a week do you train?*). The indicator was the number of usual training sessions per week.

Marathon performance was measured by an objective marathon results. Using the bib number provided by each participant, we checked their finish time on the official results list after the marathon. Due to the large number of participants, we used net time for the analysis, which is measured from the moment a runner crosses the starting line rather than the official race start. This approach was necessary because, given the high number of participants, crossing the starting line can take several minutes for all runners. We converted these time results into seconds. Next, to make the interpretation of results more straightforward, we reversed time values so that better (faster) results were represented by higher indicators.

BMI was evaluated based on the weight (in kilograms) and height (in meters) reported by participants. The score was calculated as weight divided by square of height.

Previous marathon experience was determined before the race. The participants were asked: *Have you ever run a marathon*? and answered yes = 1 or no = 0 to this question.

#### 2.2.4. Data analysis strategy

We applied confirmatory factor analysis (CFA) and structural equation modelling using AMOS 27 for data analysis. According to Kline (2011), the typical sample size for studies using structural equation modelling is about 200 cases. The current sample is big enough for such analyses, takin into account that we tested relatively simple model.

First, to examine the factorial structure of positive orientation as a latent factor loaded by eight observable indicators, we performed a CFA. Next, we analyzed descriptive statistics and correlations between variables. Then, we used structural equation modelling to test the postulated model of relationships between positive orientation, training engagement, and running performance (Figure 2.1). We controlled for BMI and previous marathon experience. Parameters were estimated using maximum likelihood estimation. Missing data were handled using the regression imputation method.

To assess model fit, we used the chi-square ( $\chi^2$ ) goodness of fit statistic, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). CFI values of .95 or higher indicate a good fit, values of .90 to .95 indicate a acceptable fit, and values below .90 indicate a

poor fit (Hu & Bentler, 1998; MacCallum et al., 1996). RMSEA and SRMR values of .05 or less indicate a good fit, values of .06 to .08 show a acceptable fit, and values > .10 attest to a poor fit (Browne & Cudeck, 1993).

Finally, we performed a mediation analysis. Indirect effect was estimated using bias-corrected bootstrapping with 5,000 repetitions and a 95% confidence interval (CI). A statistically significant effect is the case when CI does not include zero.

#### 2.3. Results

#### 2.3.1. Preliminary analysis

We applied CFA to test the factorial structure of positive orientation. Analyses were performed for eight items of the Positivity Scale. The results show that the model is reasonably fitted to the data ( $\chi^2_{(20)} = 52.835$ , p = .001, CFI = .945, RMSEA = .090, SRMR = .053), with RMSEA lower than .10 but higher than .08. As RMSEA often falsely indicates poor fit for models with small degrees of freedom (*df*; Breivik & Olsson, 1993; Kenny et al., 2015), we based our decision on CFI and SRMR indices. The absolute values of factor loadings of the eight items ranged from .29 to .85.

#### 2.3.2. Descriptive statistics and correlations

Descriptive statistics and correlations for all variables are reported in Table 2.1. For positive orientation, the values of the latent construct are reported (raw scores ranged between 1.88 and 5.00; M = 4.01, SD = 0.57). Training engagement varied from 0 to 9 workout sessions per week (M = 3.44, SD = 1.48). Table 2.1 also shows marathon performance results converted into seconds; presented in the standard format, the best time was 2:42:17 and the worst one was 6:07:35 (M = 4:10:51, SD = 00:34:59). Of all runners, 55 ran their first marathon (27%), and 149 participants had run other marathon before (73%). The lowest BMI was 13.71 and the highest was 30.86.

As expected, training engagement was significantly and positively correlated with positive orientation (r = .22) and even more strongly correlated with marathon performance (r = .48). Previous marathon experience was not correlated with marathon performance, which was negatively correlated with BMI (r = -.19).

#### Table 2.1

	Variables	М	SD	1	2	3	4	5
1	Positive orientation	0.00	0.68	1				
2	Training engagement	3.44	1.48	.22***	1			
3	Marathon performance <sup>a</sup>	15 051.25	2099.35	.05	.48***	1		
4	Pervious marathon <sup>b</sup>	0.27	0.44	.05	06	10	1	
5	Body Mass Index	23.52	2.39	03	07	19**	.06	1

Descriptive statistics and correlations between variables

*Note.*  ${}^{*}p < .05$ ,  ${}^{**}p < .01$ ,  ${}^{***}p < .001$  (two tailed); a – higher marathon performance (in seconds) indicators represent better (faster) results; <sup>b</sup> – previous marathon was coded: 1 = yes, 0 = no.

#### 2.3.3. Hypotheses testing

We performed structural equation modelling to test the model with latent factor of positive orientation as a predictor, training engagement as a mediator, and marathon performance as a dependent variable (Figure 2.1). Additionally, we controlled for the effect of previous marathon experience on training engagement and for the effect of BMI on marathon performance. This model had a good fit to the data ( $\chi^2_{(53)} = 84.217$ , p = .004, CFI = .952, RMSEA = .054, SRMR = .052).

#### Figure 2.1.

Mediation model of positive orientation, training engagement and marathon performance



*Note.* \* p < .05; \*\* p < .01; \*\*\* p < .001; standardized path coefficients reported.
The results showed that positive orientation did not directly predict marathon performance (path estimate = -.06, SE = 213.65, p = .395), but it was a statistically significant predictor of training engagement (path estimate = .21, SE = .15, p = .004). Moreover, there was a statistically significant path between training engagement and marathon performance (path estimate = .48, SE = 98.28, p = .001).

Results concerning control variables showed that only BMI was significantly and negatively related to marathon performance (path estimate = -.15, SE = 59.38, p = .011), whereas first marathon did not predict training engagement (path estimate = -.07, SE = .23, p = .326).

Mediation analysis revealed an indirect effect of positive orientation on marathon performance via training engagement (path estimate = .10, 95% CI [.02, .20]). The 95% CI does not include zero, which confirms the mediation effect.

#### 2.4. Discussion

#### 2.4.1. Summary and discussion of the results

To sum up, the results confirm all of our hypotheses. They clearly show that positive orientation is positively related to training engagement (H1), which predicts marathon performance (H2). Mediation analysis indicates that training engagement mediates the relationship between positive orientation and marathon performance, thereby confirming H3. The results also demonstrate that BMI is negatively related to marathon performance, although prior participation in a marathon is unrelated to engagement in training.

Our study provided empirical support that positive orientation is a disposition important for training engagement and, in consequence, for marathon performance. Previous studies focused on positive orientation in predicting job performance (Laguna & Razmus, 2019) and health behaviors (Caprara et al., 2019), but not on sport performance or training activity. Our study demonstrates that runners with a higher level of positive orientation engage more frequently in workout before the marathon competition and have better race results, even when BMI and previous experience in marathon competition is controlled for. This result suggests that positive beliefs give runners more energy which they may use to face the difficulties involved in training and in competing during the race.

Moreover, our results demonstrate that positive orientation is related not only to the evaluation of the results achieved in first marathon (Gorczyca et al., 2016) but also to the training process before running a race. Viewed from a broader perspective, our results extend the findings reported by Cypryańska and Nezlek (2019), who found that running in mass road races induces positive emotions and thinking in participants. We have demonstrated that such positive beliefs have an effect also on running performance in such races.

Our research offers also theoretical implications for personality psychology. The results show the important role of dispositional positive orientation in predicting the frequency of training activities and, through this variable, its significance for sport (marathon) results. We have identified psychological predictors of marathon performance, extending knowledge about personality traits in sport and exercise (Laborde et al., 2020; Piedmont et al., 1999). Positive orientation, in addition to perfectionism (Waleriańczyk & Stolarski, 2021), is related to long-distance running performance; however, our results suggest an indirect rather than direct relationship. Positive beliefs give runners energy to persist in action, to continue demanding trainings. Their actual sport performance depends on training parameters (Tanda & Knechtle, 2015), which are obtained thanks to persistent actions, stimulated and maintained due to positive personality characteristics.

The study affords a new insight into the role of personal characteristics of recreational marathon runners, which may be different than those of elite performers and still not explored enough (Buman et al., 2008). Moreover, our findings extend the positive orientation theory (Caprara et al., 2019), demonstrating that it may be applied also in sport psychology.

#### 2.4.2. Limitations and directions for future studies

As any research, our study has some limitations. We focused on marathon runners. The results may not be generalizable to all runners (e.g., those running shorter distances) and to other sport disciplines, because marathon runners have specific characteristics and motivations (Buman et al., 2008). In addition, the purpose of our study was to collect data from recreational runners, meaning that it may not be generalizable to elite athletes who participate in professional preparation prior to competition (Nikolaidis et al., 2018). Analyses revealed an indirect association of positive orientation with marathon performance; however, it is not the only factor, so further research on predictors of training engagement and performance is needed.

As a relatively stable trait, positive orientation was included in the model as an

independent variable, but its measurement took place at the same time point as the measurement of a mediator (i.e., training engagement). Due to this, it is not possible to test causal effects. Further research with three separate time points is needed to fully investigate the mediation mechanism. Moreover, reciprocal relationships between variables may be tested—even if positive orientation is considered a trait-like disposition (Caprara et al., 2009), engagement in sport activity may with time change its level, similarly to reinforcing positive emotions and well-being (Cypryańska & Nezlek, 2019). Future longitudinal studies are needed to uncover such potential dynamic mechanisms.

#### 2.4.3. Implications for practice

In spite of these limitations, our study extends the understanding of psychological mechanisms important in marathon performance. The results suggest recommendations for runners and trainers, identifying the factors related to maintaining effort and coping with fatigue during training (Baker & Horton, 2004). Runners with more personal resources namely, with higher positive orientation, are more ready to engage in training and, thanks to that, perform better in marathon. Thus, an optimal level of positivity should be maintained during the training sessions before the competition and immediately before the marathon.

### Chapter 3.

## Positive orientation and positive affect in explaining training engagement and running performance (Study 2)

In this chapter, I aim to the answer to the next research question:

*Research Question 2:* What is the role of positive orientation and positive affect (as trait and as state) in predicting training engagement and sport performance?

This study examines the relationship between positive orientation, positive affect, training engagement, and sport performance. Compared to the previous study, the role of positive affect as both a trait and a state is considered, and measurements are made of not only the behavioral but also the psychological dimension of training engagement. Moreover, the study was conducted among half-marathon participants.

#### 3.1. Introduction

The primary goal of positive sport psychology is to strengthen an individual's positive resources to help them cope during training and competition (Scholes, 2017). This objective is relevant at all levels of sport performance, where athletes might face specific challenges. For instance, during competition preparation, athletes encounter obstacles such as managing multiple training sessions, fatigue, and also motivation deficits (Smith, 2003). Research reviews on factors influencing half-marathon performance, especially among recreational runners, predominantly emphasize physiological, anthropometric, and training-related aspects (Nikolaidis & Knechtle, 2023), often overlook the role of psychological factors that could be pivotal in building the resources needed for coping and enhancing performance levels.

In a study on regulatory strategies used one hour before the race, it was found that runners maintain positive thinking related to their past training, focus on the enjoyment of the run, and sustain general positivity about the upcoming event (Stanley et al., 2012). These findings suggest that when identifying predictors of sport performance, it is essential to consider constructs that may help the athletes to cope with competition challenges and give them energy to perform better. However, in domain of endurance performance the most explored factors include negative emotions and strategies related to cope with negative thinking (McCormick et al., 2015). Therefore, research on positive factors that influence endurance performance demand further exploration. Within the context of positive psychology in sport, several key positive dispositions (e.g., resilience, optimism) have been studied but the field still lacks comprehensive research into how these traits interplay with other psychological constructs to influence performance outcomes (Peris-Delcampo et al., 2024).

Considering the processes involved in preparing for and achieving goals in sport performance, mental resources seem vital for dealing with these challenges. Our approach builds on the conservation of resources (COR) theory (Hobfoll, 1989), proposing that the personal resources athletes develop and utilize during their preparation could combine into resource caravans and subsequently translate into improved performance outcomes. In our study, we focused on factors that could build resources and enhance mental resilience throughout the training process and performance. Therefore, we aimed to investigate the role of two kinds of personal resources: positive beliefs and positive affect in fostering engagement in training and sport performance.

#### **3.1.1. Runner's personal resources**

In light of the various challenges that may arise during preparation for a specific race, one of the key elements can be personal resources that may help a runner cope with the different challenges and difficulties that may occur. These resources may manifest as positive beliefs, associated with a positive vision of the present and future. Caprara (2009) referred to such positive beliefs as positive orientation (or positivity), which is a higherorder latent construct that encompasses high levels of self-esteem, optimism, and life satisfaction (Caprara et al., 2010). This means that positive orientation comprises cognitive evaluations related to self, one's life and actions, and beliefs about a good future (Caprara et al., 2019). It is a kind of believe that life is valuable and the future is promising despite various challenges and failures. Longitudinal studies show that positive orientation is a relatively stable disposition, partially inherited (Alessandri et al., 2012), but it can also be viewed as a state depending on the situations a person experiences (Alessandri et al., 2014; Caprara et al., 2019). For runners who during a long time prepare for race, positive orientation appears to play a role as a stable tendency to perceive various training challenges in a positive way and to reinforce the belief that their participation in competitions will be successful. In other domains, positive orientation has been a predictor of work engagement and personal goal realization (Alessandri et al., 2015; Laguna, Alessandri, et al., 2017), which similarly may be applied to engagement and performance in sport.

Apart from beliefs runners hold, it is important to consider what they feel before a race and what are their general affective dispositions. In studies on the significance of emotions experienced before sport competitions, Hanin (2000) noted that maintaining an optimal level of pre-competition arousal involves not only regulating negative emotions (such as anxiety and anger) but also positive emotions (such as joy, happiness), which contribute to enhancing athletes' performance. These positive emotional experiences can be defined as positive affect, covering consciously accessible feelings, emotions, and moods (Fredrickson, 2001). Such positive affect broadens thought-action repertoires (Fredrickson, 2013), essential for maintaining motivation and coping with various challenges, and may be important also in preparation for sport competitions.

The last few decades of research on the role of affect in physical activity context have shown a growing interest in the circumplex model of affect (Evmenenko & Teixeira, 2022), which describes affect in terms of activation (high vs. low) and pleasure (pleasant vs. unpleasant; Watson & Tellegen, 1985). Research shows that for sport activity, high activated positive affect plays the most significant role in coping and long-term resource building process (Thompson et al., 2021). It is well documented that the prolonged experience of high activated positive affect predicts frequency of physical activity (Garcia et al., 2012), supports effective psychological coping (Lyubomirsky et al., 2005), and is associated with the outcomes of aerobic training (Reed & Buck, 2009).

Considering the specific nature of preparation for competition, we distinguished between two types of positive affect: trait and state. The trait positive affectivity may be associated with engaging in activities, exercising, and building a positive mindset, while state positive affect is responsible for temporary physiological arousal, coping with experienced stress, and facing challenges (for review see Pressman & Cohen, 2005). Research on the distinction between trait and state affect in sport suggests that, in general, state positive affect is associated with greater performance, however, this relationship is even stronger for individuals with high trait positive affect (Yeo et al., 2014). Moreover, a qualitative analysis of various emotion regulation strategies before participating in a race revealed that some runners focus on stable emotions related to their general running experiences (e.g. knowledge, trainings), while others amplify their current positive states associated with the actual situation (Stanley et al., 2012). This allows us to conclude that the trait positive affect is relatively stable within an individual and may contribute to building long-term resources necessary for maintaining training activity (Fredrickson, 2001). On the other hand, feeling the situation-specific state of positive affect, which occurs just before the start, may give energy in coping with the competition challenges. Therefore, in our study, we will consider both the trait and state of high activated positive affect.

#### 3.1.2. Training engagement

In the sport activity context, within the concept of training engagement two primary aspects are distinguished: psychological and behavioral engagement (Bohnert et al., 2010). Psychological engagement refers to mental engagement and concentration on training, while behavioral engagement refers to the duration or frequency of training activities (Bohnert et al., 2010). Separating the sense of engagement from behaviors is particularly important in predicting sport performance, where not only mental resources matter but also the work done during preparation (Busseri et al., 2011). However, both are two distinct aspects or indicators of training engagement which is responsible for sport performance.

When defining psychological training engagement researchers refer to Schaufeli's (2006) definition of work engagement, which posits that it is a positive motivational state characterized by vigor, dedication, and absorption. In the basic understanding adopted from work psychology, the definition of engagement has been adapted to the sport context (Guillen & Martínez-Alvarado, 2014; Stolarski et al., 2020). In this conceptualization vigor is characterized by a high level of mental resilience during activity, which manifests in the effort to perform, even when athletes face difficulties. Dedication refers to having a strong sense of meaning and importance in the task at hand; it involves committing oneself to the task with a sense of challenge. Absorption is the state of complete concentration on the task, during which time seems to pass quickly, and the athlete becomes fully engrossed in the activity. These three components form together psychological sense of sport engagement, which in context of training may manifest as psychological training engagement.

Behavioral training engagement relates to behaviors associated with completing specific training sessions. In the training process leading to sport performance, intensity, frequency, and duration of training are distinguished as crucial parameters (Smith, 2003). Research among recreational runners shows that to improve performance, one should increase distance, running speed, and frequency of training sessions (Nikolaidis & Knechtle, 2023). In the case of recreational running, training frequency seems to be the most objective indicator of behavioral engagement, considering that not every runner tracks data related to the duration of activity, running distance or speed.

# **3.1.3.** Positive orientation, positive affect, training engagement, and sport performance

The research results indicate that there are connections between personal resources and engagement, which may translate into performance. In this section, we present various studies that form the basis for the hypotheses proposed in our theoretical model in sport. Predictors of psychological engagement include personal resources such as optimism or self-esteem (Schaufeli et al., 2008), which are components of positive orientation (Caprara et al., 2010). Although positive orientation is often encompassed with positive affect, empirical research distinguishes these two constructs (Alessandri et al., 2014; Caprara et al., 2025). In our study, we assumed that both, positive orientation

and trait positive affect are resources that contribute to greater training engagement. This is also supported by the results related to the work environment, where significant connections between these variables and work engagement have been demonstrated in the longitudinal study (Laguna & Razmus, 2019). Furthermore, positive orientation was a predictor of personal goal realization (Laguna et al., 2017) and training frequency (Kedra & Laguna, 2022) which supports the hypothesis that it would also be a predictor of training engagement of runners who are focused on achieving their own training objectives.

Psychological engagement can be also strengthened by a disposition to experience positive affect, which builds thought-action repertoires, enabling individuals to have the resources needed to achieve better outcomes in their activities (Fredrickson, 2003). In a series of studies, Garcia et al., (2012) demonstrated that high activated positive affect was significantly associated with exercise frequency. Thus, the tendency to experience high activated positive affect can support runners in their engagement with training activity by enhancing motivation and by broadening resources (Fredrickson, 2003) that can be useful for managing training challenges, especially for recreational runners who balance their professional and personal lives with their hobby. Therefore, our first hypothesis postulate that:

*Hypothesis 1*: Positive orientation (H1a) and trait positive affect (H1b) predict training engagement.

To regulate emotional arousal just before the race, runners employ various strategies, many of which focus on positive thinking and positive emotions (Stanley et al., 2012). This means that affect experienced before the start may be regulated based on previous general experiences and beliefs. This suggests that the ability to positively evaluate oneself, life and future can lead to the experience of positive emotions in specific situations. Research shows that positive orientation enhances focus on the present moment (Sobol-Kwapinska & Jankowski, 2016), which can, in turn, amplify the emotions experienced at that time. Indeed, diary data shows that positive orientation is predictor of a state positive affect (Alessandri et al., 2014; Caprara et al., 2017). Furthermore, trait positive affect, as a stable disposition to reflect positive emotions over time can influence the experience of pre-race positive affect (Spielberger & Reheiser, 2009). Research on demanding tasks in sport also confirm that state-trait consistency is crucial in sport

performance (Yeo et al., 2014). Thus, we hypothesized that positive orientation together with trait positive affect would be predictors of pre-race positive affect:

*Hypothesis 2*: Positive orientation (H2a) and trait positive affect (H2b) predict pre-race positive affect.

Moreover, positive affect experienced before the start may be related directly to the run performance. Theories describing optimal functioning before a competition suggest that positive affect can contribute to better performance by influencing allocation of resources, which are utilized to meet various task demands (Hanin, 2000). Accordingly, state positive affect is associated with task performance (Yeo et al., 2014) as well as taskoriented coping and resilience (Thompson et al., 2021). Research also confirms that positive affect, particularly of high activation, such as joy, can contribute to effective physical activity goals achievement and greater effort during the activity (Cameron et al., 2018). In an experimental study on the determinants of pacing and performance during an endurance trial, it was demonstrated that positive affect serves as an effective regulator of pacing strategy and contributes to achieving faster results (Renfree et al., 2012). So, our third hypothesis follows:

*Hypothesis 3*: Pre-race positive affect predicts race performance.

The important function of training engagement may be its impact on performance outcomes (Baker & Horton, 2004). Research indicates that training engagement is a predictor of running performance (see Gordon et al., 2017; Tanda & Knechtle, 2015). Studies on psychological engagement have shown that vigor, a component of engagement, was a significant predictor of half-marathon performance (Stolarski et al., 2020). Additionally, training frequency was found to be a significant indicator of race progression (Gordon et al., 2017). Therefore, we hypothesize that training engagement may be directly associated with race performance. It is also well established that physical activity may improve mood (for review see Reed & Ones, 2006). What is more taking training exercises increases energetic arousal and reduces feelings of tension (Hall et al., 2002). Therefore, in our model, we draw connections between training engagement and pre-race positive affect,

*Hypothesis 4*: Training engagement predicts race performance (H4a) and pre-race positive affect (H4b).

The B-A-E model also explains various multidirectional relationships between positive orientation, positive affect, and engagement (Laguna, 2019). These connections can lead to goal achievement or performance outcomes (Laguna et al., 2017; Laguna & Razmus, 2019). Therefore, in our study, we aimed to test indirect effects that stem from prior hypotheses. Based on previous research suggesting that the tendency to experience positive affect is correlated with engagement in physical activity (Garcia et al., 2012; Thompson et al., 2021; Yeo et al., 2014) and, in turn, positive affective experiences appear in effect of engagement in such activity (Hall et al., 2002; Reed & Buck, 2009; Reed & Ones, 2006) we assume that training engagement serves as a mediator between trait and state pre-race positive affect. Moreover, we hypothesize that positive beliefs will enhance training engagement (Kedra & Laguna, 2022), which in turn will lead to increase in pre-race positive affect.

*Hypothesis* 5: Training engagement mediates the relationship between positive orientation (H5a) or trait positive affect (H5b) and pre-race positive affect.

The next hypothesis concerned the mediating role of pre-race affect in the relationship between training engagement and sport performance. In earlier hypotheses, we proposed a direct relationship between training engagement and performance, but an equally plausible connection involves mediation through pre-race affect. This is supported by the assumption that the positive affect experienced before an activity can be built on previous experiences related to that activity, and then influence another activity (van Woudenberg et al., 2020). This means that affect acts as a source of energy and other resources, enhanced by the sense of absorption in prior activity, which may, in turn, contribute to better performance (Fredrickson, 2013; Thompson et al., 2021). In some studies, affect related to physical activity has been found to positively predict the performance of that activity (Kiviniemi et al., 2007). This suggests that positive affect experienced before the race can mediate between training engagement and running performance.

*Hypothesis* 6: Pre-race positive affect mediates the relationship between training engagement and race performance.

#### **3.1.4.** Current study

Based on the previous research, we propose a conceptual model (Figure 3.1) in which positive orientation and positive affect are predictors of training engagement (constituted by psychological and behavioral engagement) and pre-race positive affect. We then drew connections from engagement to performance and pre-race affect, which both predict running performance. Additionally, we controlled for the body mass index (BMI) as the best anthropometric predictor of race performance, because in runners a decrease in BMI leads to an improvement in performance (Nikolaidis & Knechtle, 2023; Sedeaud

#### et al., 2014).

We conducted our study during one of the mass running events over the halfmarathon distance. This approach allowed us to measure positive orientation, positive affect and engagement dimensions in a real-life situation and verify the results based on the objective measure of the time achieved in the race. This procedure has proven effective in other studies regarding psychological predictors of performance in triathlon (e.g. Stoeber et al., 2009) and running (Waleriańczyk & Stolarski, 2021).

#### 3.2. Method

#### 3.2.1. Procedure

The study was conducted during the city half marathon in Lublin, Poland. Runners who came to collect their race packets were asked to voluntarily participate in the study. Before the race, each participant completed paper-and-pencil measures of positive orientation, training engagement, and trait positive affect, and then filled out a measure of pre-race positive affect (separated on the another page), and reported their current weight and height. Each participant was asked to enter their bib number and give consent to verify their race result based on it.

#### 3.2.2. Participants

During the data collection, we aimed to recruit at least 200 participants, which is a typical sample size for studies utilizing structural equation modeling (Kline, 2011). Initially, 216 people participated in the study, but 24 did not provide a bib number, or provided an incorrect one. Consequently, the final sample included 192 runners (84.9% male). The participants age ranged from 19 to 66 years (M = 38.48, SD = 9.60), with running experience ranging from 1 month to 30 years (M = 6.63 years, SD = 4.69). The participants rated their subjective health (on a scale from 1 - poor health to 5 - very good health) as good (M = 3.75, SD = 0.89).

#### 3.2.3. Measures

The Polish adaptation of the Positivity Scale (Łaguna et al., 2011), was used to measure positive orientation. The scale consists of eight statements (e.g., *I look to the future with hope and enthusiasm*) to which participants respond on a 5-point Likert scale (from 1 = strongly disagree, to 5 = strongly agree). The internal consistency of the scale determined by Cronbach's alpha was .82.

Trait positive affect was measured using the high activation positive affect dimension of the modified Polish version of the Warr's job-affective wellbeing measure (Mielniczuk & Laguna, 2018), adapted to capture general, not job-related feelings. Participants were asked to rate how they generally feel ("*Indicate the extent to which you usually feel* ..."). This scale consisted of three adjectives (*optimistic, enthusiastic, joyful*), rated on a 5-point scale (1 = very slightly, 5 = very strongly). The Cronbach's alpha coefficient for this measure was .82.

The behavioral dimension of engagement was measured based on the number of weekly training sessions. Participants answered the question, *How many training sessions per week did you typically perform while preparing for this race?* In the training process, such measurement seems to be a good indicator because training plans are often structured around 7-day periods (Smith, 2003).

Psychological engagement was measured using the Polish version of the Sport Engagement Scale (Stolarski et al., 2020). Given the study procedure (measurement before the race), a shorter nine-item version was used to reduce participant burden and the total score of the scale was utilized. Items were selected based on the highest factor loadings for each dimension (vigor, dedication, absorption) of the scale. This items assesses feelings related to engagement in training (e.g., *I feel happy when I am completely devoted to sports activities*) answered on a 7-point scale (1 = *almost never*; 7 = always). The Cronbach's alpha was .91.

State positive affect was measured by the modified Polish version of the Warr's job-affective wellbeing measure (Mielniczuk & Łaguna, 2018). The participants were given a modified instruction in which they rated how they feel when thinking about the upcoming race (*When thinking about the upcoming race, please indicate to what extent you feel optimistic, enthusiastic and joyful*). The reliability of this scale was .86.

The half-marathon performance was verified based on the results list published by the race organizer. The times of individual runners were recorded according to their declared bib numbers. Due to the discrepancies that occur in road races with a large number of runners from the start of the race to the moment they cross the start line, the study recorded the net time, which is measured from the moment of crossing of the start line by the participant. Before performing all analyses, the half-marathon result was recoded so that a higher value indicated a better performance. This was done by subtracting the result in seconds from a value that was one more than the slowest result (i.e., the result with the highest number of seconds).

To measure BMI, the current weight and height of the participants were recorded. The index was calculated by dividing the weight of the runners by the square of their height in meters.

#### **3.2.4.** Data analysis strategy

Prior to the data analysis, outliers were corrected by adjusting values that were 3.29 standard deviations or more above the mean. These values constituted 0.63% of all observations and were adjusted to be one unit greater than the highest non-outlier value (Tabachnick & Fidell, 2013). Moreover, the missing data were imputed using the regression imputation method (Kline, 2011).

First, to evaluate whether the assumed relationships among manifest indicators of all latent factors (psychological constructs) are in line with the empirical data, a confirmatory factor analysis (CFA) was performed, testing the measurement model. Second, descriptive statistics and correlations were analyzed. Third, to test the hypotheses postulated in our conceptual model, the structural equation modelling (SEM) was applied using AMOS Graphics version 28 (Arbuckle, 2005). The model was estimated using maximum likelihood estimation. The chi-square goodness of fit ( $\chi^2$ ), comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were used to assess the model fit, both for CFA and SEM (Kline, 2011). For CFI, values higher than .95 indicate a good fit, values between .90 and .95 indicate an acceptable fit, and values below .90 indicate a good fit, values between .06 and .08 indicate a acceptable fit, and values greater than .10 indicate a poor fit (Browne & Cudeck, 1993). Fourth, we tested the mediation mechanisms included in the

model based on bootstrap confidence intervals. To test the significance of the indirect effects, we reported 95% confidence intervals calculated on 5000 bootstrap samples.

#### 3.3. Results

#### **3.3.1.** Preliminary analyses

First, the measurement model was built, which included latent constructs of positive orientation (reflected by eight items), trait positive affect (reflected by three items), pre-race state positive affect (reflected by three items), and psychological engagement in training (reflected by nine items). Correlations between the error terms were allowed for the three pairs of respective items of the latent constructs capturing the trait and the pre-race positive affect. CFA results for the measurement model showed an acceptable fit to the data ( $\chi^2_{(220)}$  = 399.95, *p* < .001, CFI = .926, RMSEA = .065, SRMR = .063).

Second, we analyzed descriptive statistics and correlations between variables (Table 3.1). Before recoding, the mean result achieved in the race was M = 1:51:20 (SD = 00:16:35). As expected, positive correlations were observed between positive orientation, the two dimensions of positive affect, and psychological engagement. Behavioral engagement was positively correlated with psychological engagement and performance. BMI was negatively correlated with performance and behavioral engagement, which also confirms our expectations.

#### Table 3.1

	Variable	М	SD	1	2	3	4	5	6	7
1	POS	4.03	0.53	-						
2	PA <sub>(trait)</sub>	3.95	0.69	.65***	-					
3	PA(pre-race)	4.14	0.67	.48***	.55***	-				
4	PsychEng	5.61	0.87	.47***	.42***	.51***	-			
5	BehEng	3.36	1.50	.06	.05	.01	.22**	-		
6	Performance	3092.52	995.25	08	.02	09	.19**	.32***	-	
7	BMI	23.90	2.45	.01	04	.01	04	19*	34***	-

Descriptive statistics and correlations

*Note.* \* p < .05; \*\* p < .01; \*\*\* p < .001, POS – positive orientation, PA – positive affect, PsychEng – psychological training engagement, BehEng – behavioral training engagement, Performance – time achieved in race (recoded).

#### **3.3.2.** Hypotheses testing

The results of SEM are presented in Figure 3.1. Building the model, we assumed covariance between positive orientation and trait positive affect. Additionally, engagement as a general factor was built upon observable values of both psychological and behavioral engagement. Moreover, as in the CFA model, measurement errors of three pairs of respective items constituting the latent constructs of the trait and the pre-race state of positive affect were allowed to covary. The model well fitted to the data ( $\chi^2_{(123)} = 223.93$ , p < .001, CFI = .930, RMSEA = .066, SRMR = .057).

#### Figure 3.1

Results of structural equation modelling



*Note.* Dashed lines = nonsignificant paths, solid lines = significant paths. \*p < .05; \*\*p < .01; \*\*\*p < .001

The path analysis revealed that positive orientation predicts training engagement, which supports hypothesis H1a, however trait positive affect was not significantly related to training engagement, what does not support hypothesis H1b. The nonsignificant path between positive orientation and pre-race positive affect was observed, which does not support H2a. On the other hand, trait positive affect was a significant predictor of pre-race positive affect, thus H2b is supported. Contrary to our expectations expressed in hypothesis H3, pre-race positive affect was negatively associated with running performance. According to our hypotheses training engagement was expected to predict race performance (H4a) and pre-race positive affect (H4b), and these hypotheses were supported by the results. The BMI indicator was negatively associated with the race performance, which confirms previous studies indicating that lower BMI is linked to better running outcomes (Nikolaidis & Knechtle, 2023).

The analysis of indirect effects showed that training engagement mediates the relationship between positive orientation and pre-race positive affect (estimate = .17,

SE = 0.08, 95%CI [0.050; 0.412], p = .007); hypothesis H5a is thus supported. However, training engagement does not mediate the relationship between trait positive affectivity and pre-race positive affect, which does not support hypothesis H5b (estimate = 0.05, SE = 0.09, 95%CI [-.022;.369], p = .203). Additionally, contrary to hypothesis H6, the negative indirect effect between training engagement and performance via pre-race positive affect was observed (estimate = -.19, SE = 1.01, 95%CI [-3.07;-0.024], p < .001).

#### 3.3.3. Robustness check

To further examine the unexpected effect between pre-race positive affect and performance achieved in SEM, we conducted a moderation analysis with the Johnson-Neyman technique in MacroProcess (v. 4.3.) model 1 (Hayes, 2013). For better explanation of the negative relationship between pre-race positive affect and race performance, we introduce a continuous moderator namely pacing strategy. The moderator represented the difference in speed between the first and second halves of the race. Moreover, the remaining variables from the theoretical model were also included in the analysis as covariates.

The purpose of this analysis was to explore whether pre-race positive affect interacts with pacing strategy. Intuitively, we expected a stronger negative relationship between positive affect and performance among those who ran the first half of the race faster. It can be assumed that positive affect leads to overconfidence, resulting in an overestimation of one's abilities and, consequently, choosing an inadequate pacing strategy during the race.

The model was statistically significant and explained 30% of variance ( $F_{(7,184)} = 11.29, p < .001, R^2 = .30$ ). However, the interaction between positive affect and pacing strategy was non-significant (p = .807). Thus, our expectations were not confirmed. The details concerning coefficients, along with the Johnson-Neyman plot, were provided in Appendix 2.

#### **3.4. Discussion**

#### 3.4.1. Summary and discussion of the results

The aim of our study was to examine the motivational mechanisms, which explain the role of positive orientation and positive affect in training engagement and running performance. Based on previous research conducted mainly in the work context (Alessandri et al., 2015; Laguna, 2019), we expected that positive orientation and positive affect would be predictors of training engagement and then running performance. In our model, two types of positive affect were considered: trait positive affect, which is associated with building resources through the expansion of thought-action repertoires (Fredrickson, 2013), and pre-race positive affect, which is responsible for the immediate attitude just before participating in a race (Renfree et al., 2012). Our conceptual model was built based on theoretical premises of Hobfoll's (1989) COR theory and past research indicating the role of positive orientation and positive affect in engagement and performance in domains other than sport (Laguna, 2019). We expected that recreational runners could use their personal resources, namely positive orientation and positive affect, to effectively handle the challenges associated with performing necessary preparatory training and with participating in road races, pertaining to better performance. To test these hypotheses, we conducted a study during a half-marathon race. Structural equation modeling supported the proposed theoretical model and six of our hypotheses. The analysis of the results provided several interesting insights that could contribute to the development of the theory of positive orientation and positive affect in sport performance.

The study's results showed that, of the two proposed personal resources, only positive orientation predicts training engagement (H1a). Exploring the role of positive orientation in physical activity, our results document that it is a cognitive resource underlying the ability to cope with challenges and resilience-demanding activities (Alessandri et al., 2015; Milioni et al., 2016). The results of Study 1 have shown that positive orientation is significantly associated with behavioral training engagement (training frequency; Kedra & Laguna, 2022), and in this study we extended this evidence to both behavioral and psychological engagement. Moreover, our results support the hypothesis that trait positive affect predicts pre-race positive affect (H2b). This is consistent with findings that suggest a strong state-trait affect consistency in sport performance (Yeo et al., 2014).

Regarding training engagement, our results showed its connections with both, race performance (H4a) and pre-race positive affect (H4b). These results are consistent with those of other studies on running performance predictors (Tanda, 2011; Tanda & Knechtle, 2015), in which engagement directly contributed to better performance outcomes and also enhanced positive affect before the start (Reed & Ones, 2006). It is worth to noting that we refer to a higher order latent dimension of training engagement based on behavioral and psychological indicators that have not been tested before.

We anticipated that pre-race positive affect would positively predict race performance (H3), expecting that a higher level of affect energizes runners in coping with race challenges and therefore achieving better results (Cameron et al., 2018; Thompson et al., 2021). We expected this, especially because our analysis focused on high activated positive affect, which is characterized by a high level of enthusiasm and excitement (Warr et al., 2014). Contrary to our expectations, the pre-race positive affect was indeed a significant predictor of performance, but this relationship was negative, indicating that an increase in positive affect before the race led to a decrease in running performance. These results align with the results of some laboratory studies, showing that inducing strong states of positive affect increased physiological arousal, but moderate levels of positive affect were associated with better outcomes, acting as a stress buffer (Pressman & Cohen, 2005). This is also consistent with the results of a laboratory study, in which higher positive affect was observed in athletes with a more aggressive performance strategy (Renfree et al., 2012). This may suggest that strong experiences of pre-race positive affect led runners to overestimate their strength and capabilities, resulting in a performance that was worse than intended, but our additional analyses have not confirmed such reasoning. Moreover, pre-race positive affect significantly mediates the relationship between training engagement and race performance (H6). Such results show the surprising mechanism in which training engagement, by enhancing positive affect before a race, negatively influences performance outcomes. It is possible that positive affect derived from the knowledge of the training efforts and engagement causes an increase in affective arousal before the race, which in turn negatively impacts performance (Hanin, 2000).

The results of our study have not supported our hypothesis H1b, which was based on the results of other studies indicating that trait positive affect is a predictor of engagement in physical activity behaviors (Fredrickson et al., 2020; Garcia et al., 2012; Van Cappellen et al., 2018). It was a non-significant predictor of training engagement, when controlling for other variables in the model. One of the potential explanations could lie in the specificity of affect measurement. In fact, in our study, we measured trait positive affect, which refers to the general assessment of affective experiences across different contexts, and among individuals for whom sport is not a priority. Thus, the general level of positive affective experiences may not predict engagement in a leisure activity. In previous research affect was related to taking up a specific activity or being psychologically engaged (Kiviniemi et al., 2007; Laguna et al., 2017; Rhodes & Kates, 2015). Path analysis also revealed that positive orientation is not associated with pre-race positive affect (H2a). This result was surprising given previous research on the connections between positive orientation and positive affect among students (Alessandri et al., 2014) or adults (Caprara et al., 2017; Laguna et al., 2017). However, the mediation analysis showed that positive orientation was indirectly related to pre-race positive affect, by enhancing training engagement (H5a). This demonstrates the importance of positive orientation as a basic personality disposition that underlies behavior, thereby improving well-being (Caprara et al., 2019). A contrary effect was observed for trait positive affect, where a direct relationship with pre-race positive affect was demonstrated, but no mediating effect on training engagement was found (H5b). This suggests that trait positive affectivity may have a more direct influence on affective states before a race, independent of the level of training engagement. Despite numerous findings indicating that positive affect is both an antecedent and outcome of engagement (Pereira et al., 2021), no mediating effect was observed in the case of training engagement before a race.

Overall, the results provide new insights into the connections between positive psychology and sport performance, suggesting that different positive constructs can play different roles in sport outcomes achieved. The broad term 'well-being' may encompass both affective and cognitive dimensions (Lyubomirsky et al., 2005); however, in our study, we demonstrated that positive orientation, as a cognitive component, and positive affect play specific roles in the process of preparation for a competition. Moreover, our results are partially consistent with the assumptions of the B-A-E model. Previous investigations have shown that positive orientation together with positive affect influence engagement (Laguna, 2019). However, in the sport context, positive beliefs emerged as significant personal resources that directly enhances the training process and indirectly contributes to emotional regulation before a race. Positive affect, in turn, enhances positive affective experiences before the race, which may, however, hinder sport performance.

#### 3.4.2. Limitations and future directions

Despite conducting the study in ecologically valid conditions, during a real road race, the results are not free from limitations, which should be considered when interpreting the findings. Although in our study the dependent variable was measured at a different time point than the independent variables, we recommend being careful when drawing conclusions about causality. The theory-based assumptions concerning positive orientation (Caprara et al., 2019) and trait positive affectivity (Fredrickson, 2013) support the proposed model of relationships between variables and their effect on performance, but we cannot be entirely certain about the influence of one variable on another. Additionally, positive affect was assessed before the race, both as a trait and pre-race state, which may have led to high convergence in participants' responses. Although we have graphically separated their measurements within the questionnaire (Podsakoff et al., 2024) and the analyses revealed their significant but not high correlation (r = .48, p < .001) and significant differences (t = -4,01, p < .001) in the levels of trait (M = 3.95, SD = 0.69) and pre-race state (M = 4.14, SD = 0.67) of positive affect, it does not change the fact that both measurements were taken at the same time point, limiting conclusions concerning causality.

Moreover, our measurement was taken during an amateur half-marathon, which may be specific due to various challenges and training conditions, which limits our conclusions. Studies show that there are significant differences in training characteristics and athlete profiles between different distance racers (e.g., half vs. full marathon; Knechtle et al., 2016). Moreover, a review of research on training methods indicates that, regardless of the achieved results, runners generally employ similar training strategies aimed at enhancing endurance performance (Kenneally et al., 2018); however, their motivations for achieving results may differ significantly. Therefore, caution should be taken when generalizing the results to other distances or professional athletes, and other sport disciplines.

#### **3.4.3.** Practical implications

Our results provide insights that can be applied by people engaged in sport and by professionals working with athletes (e.g., sport psychologists, coaches). One of the key findings is that positive beliefs support training engagement and, consequently, performance. This highlights the importance of positive beliefs in maintaining an optimal level of arousal as a critical factor in achieving successful outcomes (Hanin, 2000).

For athletes, this may suggest that the positive beliefs accompanying training are a good indicator of potential performance improvement during competitions. However, positive affect just before the race may lead to an overestimation of their abilities and hinder sport performance. It is crucial to consider this factor when developing pre-race strategies. Coaches can also incorporate athletes' positive beliefs into the preparation process to better adapt athletes to training demands, enhance their engagement, and ultimately improve their performance.

### Chapter 4.

## Alternative models of relationships between positive orientation, positive affect and training engagement among recreational runners (Study 3)

In this chapter, I seek to answer the research question:

*Research question 3:* What are the relationships between the states of positive orientation, positive affect, and training engagement?

The aim of Study 3 was to analyze the dynamic relationships between the states of positive orientation, positive affect, and training engagement. Based on longitudinal data collected from a sample of regularly training runners, various directions of relationships between the variables were tested.

#### 4.1. Introduction

Regular sport activity is important for healthy life and well-being. The increasing number of studies shows that physical activity is necessary for both mental and physical health (White et al., 2017), especially recreational physical activity such as running (Clough et al., 1989). From various sports, recreational running is one of the most accessible activity, because of low requirements of equipment and place (Pereira et al., 2021). Recent years, in EU countries (Scheerder et al., 2015) and also worldwide (Andersen, 2020) a significant increase in running activity has been observed. Engagement in such sport activity is for many individuals not only a way to take care of their health but also a pace to personal development. Numerous studies show that engagement in running activity is correlated with different facets of well-being (for review see: Oswald et al., 2020; Pereira et al., 2021; Reed & Buck, 2009).

Despite strong evidence of a link between physical activity, especially running, and well-being, the mechanisms underlying these associations are not fully explained (Nezlek et al., 2018). In other words, it is not clear whether running increase well-being or maybe well-being strengthen running engagement. This is because most of the studies which investigated this relationship are cross-sectional, making it challenging to determine if running acts as antecedent or outcome of well-being (for review see Pereira et al., 2021).

New light on this relationship may shad longitudinal studies using the personal resources perspective and analyzing if they enable runners to cope with the various challenges related to training, or vice versa. These resources, as specific indicators of well-being (such as for example positive affect and positive evaluations of once's life), may be important not only for maintaining engagement in physical activity but also may be extended thanks to this activity, shaping individuals' well-being. Using this perspective, in our study we build on the Hobfoll's (1989) conservation of resources (COR) theory, which posits that people strive to acquire, protect, and build their resources in order to protect their losses and support gains, and that these resources play a key role in coping with stress and maintaining engagement in demanding activities (Hobfoll et al., 2018). This indicates the dynamic cycles of resource gains and losses. In sport activity, these cycles may reflect the dynamic nature of training, where increased engagement can lead to resources' gains, while periods of fatigue and lack of training engagement may result in resource depletion, which may result in engagement depletion. Therefore, we

posit that engagement in regular training may require personal resources that not only support such activity engagement but can also increase in result of performing regular training. The COR theory also suggests that different resources do not exist in isolation, but they create 'resource caravans' (Hobfoll, 2011). For example, high correlations between positive beliefs: optimism, self-esteem, and life-satisfaction could be observed (Caprara et al., 2009), and these positive beliefs are often accompanied by positive affect (Caprara et al., 2025). These resources can work together and reinforce each other, supporting engagement in sport activity, aligning with the COR theory's (Hobfoll, 2011) idea that individuals accumulate and build resource clusters that support coping with challenging situations. Using these theoretical lens and a longitudinal study design, our study offers a new dynamic perspective on recreational runners training engagement and complements the existing research by testing different motivational mechanisms related to engagement in sport activity and its effects. The study will allow to determine alternative models of the relationships between positive beliefs, positive affect, and training engagement.

#### 4.1.1 Engagement in sport activity

In general, being engaged entails a feeling of active involvement, commitment, and dedication to a particular context, activity or relationship (Schaufeli et al., 2008). The experience of engagement is characterized by a deep sense of absorption; it involves active participation, commitment, and tangible efforts in alignment with the subject of engagement. In various domains of life, the nature of engagement may manifest differently, but the core elements involve a proactive participation, a genuine interest, and a willingness to invest effort and resources (Schaufeli & Bakker, 2022). In our study, we adopt Schaufeli's (2006) definition of engagement, which describes it as a positive motivational state characterized by vigor, dedication, and absorption. This definition was initially developed in relation to work engagement, however its applicability extends to various domains, including sports, such as for example athletics or running (Guillen & Martínez-Alvarado, 2014; Stolarski et al., 2020). In the context of sport activity, we call this kind of engagement the psychological engagement.

However, psychological engagement would not be sufficient in the development of runners, if it is not transferred into actual training activity (behavioral engagement). In sport, one can expect that psychological engagement will be accompanied by specific actions, such as the actual realization of training sessions. Given the significant effort associated with long hours of training and participation in numerous running events, running requires motivation and behavioral self-regulation to maintain physical activity (Kiviniemi et al., 2007). Psychological training engagement is one of the dimensions which is positively associated with the behavioral engagement named as frequency of sport activity (Nelson et al., 2019). Psychological and behavioral sport engagement are however distinct constructs (Bohnert et al., 2010), and being engaged is not only reflected in positive psychological states but also in specific behaviors and actions. In our study, we take up this distinction between the psychological training engagement (i.e., the sense of engagement) and behavioral engagement (i.e., the performance of activities, such as training; Borresen & Lambert, 2009). This approach in sport training allows for distinguishing feelings about the activity from the actual actions taken to engage in it. Other parameters, such as training duration or intensity (Smith, 2003) also relate to behavioral characteristics, but they primarily indicate the level of effort exerted by the runner during training (Borresen & Lambert, 2009; Macey & Schneider, 2008), rather than whether the training was completed at all. Moreover, training frequency can be measured without a special equipment using a questionnaire (Janssen et al., 2020) and may be a good indicator of behavioral training engagement among amateur runners, considering the high validity of its measurement. Indeed, a study conducted by Borresen & Lambert (2006) it was demonstrated that 41% of participants made mistakes by either overestimating or underestimating the duration of their training sessions. Moreover, research indicates that weekly frequency of physical activity was associated with positive psychological benefits, whereas weekly training duration was only linked to two dimensions of negative emotions (Evans et al., 2017). Therefore, we decided to use weekly training frequency as an indicator of behavioral training engagement. Thus, treating training frequency as behavioral parameter of engagement together with psychological aspect of engagement allows us to analyze both. This approach broadens the understanding of engagement by incorporating both psychological and behavioral components. According to Matthews' et al. (2012) recommendations, in our study we measured the frequency of activity within a short recall time to increase measurement precision. This approach helped minimize measurement error and ensured compliance with guidelines for measuring physical activity (Nigg et al., 2020).

#### 4.1.2. Positive orientation and training engagement

Positive beliefs support motivation to engage in activity (Laguna & Razmus, 2019) and therefore they may be related to psychological and behavioral training engagement. A set of positive beliefs captured as positive orientation is a latent construct which comprises three lower-order psychological constructs referring to positive beliefs about oneself - self-esteem, about life in general - life satisfaction, and about the future optimism (Caprara et al., 2010). Positive orientation is a kind of cognitive orientation (Caprara et al., 2019) and the cognitive aspect seems to be dominant in the definition of the construct and underlies these positive beliefs. This positive outlook makes a person ready to cope in life despite failures and sustain motivation and engagement (Caprara et al., 2010). The level of one's positive orientation cannot be determined on the basis of observed behaviors because it includes the experience, perception, and appraisal of events, which makes it a complex latent higher-order construct (Alessandri et al., 2012). Research revealed positive links between positive orientation and physical health (Caprara et al., 2019), personal goal realization (Laguna et al., 2016), job performance and job satisfaction (Caprara et al., 2019). It is worth emphasizing that the level of positive orientation can also be changed under the influence of various events (e.g. Gorczyca et al., 2016).

#### 4.1.3. Positive affect and training engagement

On the case of recreational runners, it can be noted that the training sessions they undertake usually bring them joy and satisfaction (Pereira et al., 2021). By definition, positive affect covers consciously accessible positive feelings, moods, and emotions (Fredrickson, 2001). Based on the broaden-and-build theory of affect, one can expect that experiencing positive affect will enhance runners' range of thoughts and actions (Fredrickson, 2001). Consequently, they will have more resources available for engaging in sport activities. Positive affect may be thus a mechanism important for maintenance of training engagement, both psychological and expressed in training intensity. Such positive relationships between positive affect and physical activity engagement were observed in research, namely, daily positive affect was positively associated with engaging in physical activity on the same day, both at the between- and within-person level (Fredrickson et al., 2020).

According to the circumplex model, affect can be described using two dimensions: valence (positive and negative) and emotional activation (high and low arousal;

Russell, 1980). In research on affect associated with vigorous exercise, valence and arousal are crucial in determining the dynamics of affective experiences before, during, immediately after and in later stages after exercising (Hall et al., 2002). There is also evidence that physical activity is associated with positive high activated affect (Kanning et al., 2013; Liao et al., 2015). In studies investigating the relationship between affect and running, it has been shown that both dimensions, arousal and valence were associated with running throughout the day (Bonham et al., 2018), and high activated positive affect was positively related to exercise frequency and psychological well-being of physically active adults and children (Garcia et al., 2012). Therefore, taking into account the results of previous research, in our study we concentrate on high activated positive affect (Reed et al., 2009), namely enthusiasm (Warr et al., 2014).

# 4.1.4. The mechanisms linking positive orientation, positive affect, and training engagement

Findings on the relationships between positive orientation, positive affect and engagement have led us to explore various associations between those constructs. In this section, we will explain potential directions of these relationships and introduce the models tested in this study. Our analyses align with the beliefs-affect-engagement (B-A-E) model (Laguna, 2019), which postulates various multidirectional relationships between positive orientation, affect, and activity engagement. We discuss below three alternative explanations of potential relationships between positive beliefs, positive affect and training engagement.

The first proposed model assumes that positive orientation and positive affect reinforce the performed activity. Theoretical assumptions from B-A-E model (Laguna, 2019) explain the dynamics of positive orientation and proposes that it may predict positive affect and then activity engagement. Indeed, a review of research on positive orientation suggest that it predicts optimal functioning, positive affectivity and engagement (Caprara et al., 2019). Diary studies conducted among students supported a path leading from state positive orientation to state positive affect, but not in the reverse direction (Alessandri et al., 2014). These constructs together play also a crucial role in predicting personal goal realization (Laguna et al., 2016). Research conducted on a large sample of adults revealed that positive orientation is predictor of positive affect (Alessandri et al., 2012). Extending the model to engagement, in two longitudinal studies Salanova et al. (2011) found that efficacy beliefs are indirectly related to activity

engagement, with high-activation positive affect (enthusiasm) acting as the mediator of this relationship. However, these relationships were not directly tested in the sport context. Studies on sport activity bring some evidence that affect related to exercise is a mediator between cognitive factors and physical activity behaviors (Kiviniemi et al., 2007). One of the components of positive orientation - life satisfaction – was found to be positively correlated with orientation to running (Cypryańska & Nezlek, 2018). Based on the presented theorizing and research findings, we have built a model in which there are relationships from positive orientation toward enthusiasm, followed by psychological and behavioral training engagement. We conceptualized this model as *Be Positive and Run* (M1). According to this model positive beliefs, together with enthusiasm related to training, build personal resources caravans (Hobfoll, 1989) leading to psychological and behavioral training engagement (Figure 4.1).

#### Figure 4.1

The Be Positive and Run model



The second direction comes from the evidence suggesting that engagement in physical activity strengthens positive affect (Ekkekakis et al., 2013; Mueller, 2012). Some authors argue that it is more reasonable to expect an improvement in positive affect after training, rather than an increase in training undertaken due to positive affect (Nezlek et al., 2018). Indeed, the results of the meta-analysis showed that regular aerobic exercise programs lead to an increase in high activated affect, especially when affective state before starting the exercise is lower (Reed & Buck, 2009). A longitudinal study conducted on recreational runners found that valence and arousal of positive affect were higher on the day of a run than on the next day, and on the day after a running training than on the

following days without a training (Bonham et al., 2018). These results show that positive affective experiences occur after running. It has also been observed that physical exercises are associated with a higher level of positive mood immediately afterward (Hallgren et al., 2010). What is more, participation in intensive exercise training program led to an increase in high activated positive affect just after the training (Hall et al., 2002). Longitudinal studies on recreational runners have shown that more frequently they ran during the week, the higher were their positive experiences, namely positive affect, and two components of positive orientation: life satisfaction and self-esteem (Nezlek et al., 2018). Other studies have shown that participation in a sporting event such as running a marathon also leads to an increase in positive orientation (Gorczyca et al., 2016). It was also documented that engaging in physical activity is positively associated with subjective well-being and life satisfaction (An et al., 2020; van Woudenberg et al., 2020). Thus, results of the presented research support hypothesis that behavioral aspect of training engagement may be predictor of both, enthusiasm and positive orientation. However, there is a lack of research considering psychological engagement as a predictor of positive affect or positive orientation in the sport context. A longitudinal study on university students conducted in laboratory settings suggests that engagement increase efficacy beliefs (Llorens et al., 2007). This assumption supports a model in which participation in successive training activities strengthens positivity, both in terms of emotions and beliefs. Runners who experience more training sessions and fell more engaged to their training may be more enthusiastic, which in turn can foster their positive beliefs about oneself, life and future. This was supported by a longitudinal study, which identified such new, previously unobserved direction from positive affect to positive orientation (Caprara et al., 2025). Thus, the above reasoning provides the basis for a model in which engagement leads to the growth of personal resources, assuming caravans in which positive affect leads to an increase in positive orientation (Figure 4.2). Therefore, we have named the model describing these relationship as *Run and Be Positive* model (M2).

#### Figure 4.2



Third, in addition to two proposed directions of relationships between positive orientation, positive affect and training engagement, mutual reciprocal relationships between these constructs are also plausible. This proposition aligns with the COR theory, which assumes positive processes of resource building, conceptualized as a reciprocal cycles (Hobfoll, 1989). This theory suggests that personal resources, such as positive beliefs and positive affect, can be continuously accumulated, leading to sustained motivation and engagement in activities like sport training. For instance, in a study conducted by Laguna et al., (2017) a reciprocal relationships between self-efficacy, enthusiasm and work engagement were found. Similar reciprocal relationships were also observed in explaining the relationships between positive orientation, work engagement and business success (Laguna & Razmus, 2019). All of these studies were longitudinal, and showed that both positive orientation and positive affect tend to be reciprocally related with activity engagement. Moreover, in research on positive behavior change, it was observed that positive affect experienced during enjoyable activities enhances engagement in those activities and allows individuals to prioritize their involvement based on these experiences (Fredrickson et al., 2020; Van Cappellen et al., 2018). Positive affect experienced during exercise was also predictor of future physical activity and health-promoting behaviors (see Rhodes & Kates, 2015). In a sport context, a systematic review focusing on the antecedents and outcomes of recreational running indicated that various positive emotions served as both antecedents and outcomes of running (Pereira et al., 2021), while positive orientation was also found as a state which occurs after running event (Gorczyca et al., 2016). Based on the aforementioned studies, in this model bidirectional relationships between positivity, enthusiasm and training engagement are proposed. Consequently, a third *Reciprocal Model* (M3) explains these dynamic mechanism, capturing the mutual relationships between positive orientation, positive affect, and engagement in sport training (Figure 4.3).

#### Figure 4.3

#### The Reciprocal Model



Note. Dashed arrows = direction proposed in M1, solid arrows = direction proposed in M2.

#### 4.1.5. Current study

As it was explained above, various mechanisms of relationships between positive orientation, positive affect, and engagement are described in the literature. From the review of studies, it is not entirely clear which of these alternative explanations best reflects the relationships between these constructs in the sport context, especially due to limited number of longitudinal studies (Pereira et al., 2021). Therefore, further research is needed to test these alternative mechanisms. To achieve this, we conducted a study with three measurement points, as having at least three measurements allows us to test such relationships (Little, 2013). We test three alternative models, shading more light on these mechanisms in real-life context of recreational running training. As explained above, the first model postulates links from positive orientation to positive affect and then to training engagement (M1 – *Be Positive and Run*). As a reverse relationship is also possible, we test the second model in which training engagement has an effect on positive affect, which in turn is related to positive orientation (M2 – *Run and Be Positive*). The third model postulates the reciprocal relationships between the analyzed variables (M3 – *Reciprocal Model*). Our study allows to test each of the above models and examine

which of them best fits the data. Moreover, the distinction between two aspects of training engagement will make it possible to test the models including both, psychological and behavioral engagement.

In doing so, our research contributes to existing state of research. It draws attention to the dynamic processes, which are largely overlooked in sport engagement research. Such dynamic perspective allows to clarify mixed findings on the relationships between positive beliefs, positive affect, and engagement (e.g., Laguna, 2019; Pereira et al., 2021). Moreover, our study offers insights into the process of preserving and building personal resources within the context of physical activity (Hobfoll, 2011).

#### 4.2. Method

#### 4.2.1. Procedure

Recruitment of participants was conducted by announcements on running forums and social media platforms during the active running season (May-June). In the initial step, participants completed a recruitment form. The inclusion criteria were as follows: (1) amateur running status (i.e., not being a professional athlete) and (2) a primary focus on running (i.e., the main practiced sport is running). Individuals who met the inclusion criteria were invited to provide their email addresses, to which information about the study and all measures were sent.

The data were gathered at three measurement points (T1, T2 and T3), each separated by a seven-day interval. This is a typical interval in which runners plan and evaluate their training process. At each measurement point, participants completed all measures. Participation in the study was voluntary. Among the study participants who completed all three measurements, five awards of PLN 50 each (about USD 12) were randomly drawn.

#### 4.2.2. Participants

Out of the total sample of 209 runners at the first measurement point (T1), 158 individuals (75.6% of the T1 sample) participated in the second measurement point (T2), and 128 in the third (T3; 61.2% of the T1 sample). Only the data from 128 participants who completed all three measurements were analyzed. Among the participants who took part in all measurements, 43% were women, their age varied from 18 to 67 years (M = 34.53, SD = 9.05), and their running experience ranged from 1 month to 40 years (M = 5.40, SD = 4.53).

#### 4.2.3. Attrition analysis

To check if the sample size reduction did not cause selection bias, we tested whether the participants who took part in all three measurements (n = 128) differed from those who participated in the first measurement only (n = 81). The results showed no statistically significant differences (p > .05) in gender, age, and all variables measured in this study.

#### 4.2.4. Measures

Positive orientation was measured by the modified version of the Positivity Scale (Caprara et al., 2012), Polish adaptation by Łaguna et al. (2011). The scale consists of eight items which have been modified to refer to the last week, e.g. "*I generally feel confident in myself over the past 7 days*". Respondents answered on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) according to the modified instruction "*Please answer how much do you agree with each statement, thinking about the last week*". Cronbach's alpha coefficient across three measurement points ranged from .85 to .88 (Table 4.2).

High activated positive affect was measured using three items from the Warr et al., (2014) measure, in a Polish adaptation by Mielniczuk and Łaguna (2018). Participants were asked how often during last week sport training made them feeling *enthusiastic, optimistic,* and *joyful*. Participants responded on a 6-point scale (1 = never, 6 = always). Cronbach's alpha coefficient across three measurement points ranged from .87 to .92 (Table 4.2).

Psychological training engagement was measured using the shortened version of the Sport Engagement Scale (Guillen & Martínez-Alvarado, 2014), Polish adaptation by Stolarski et al., 2020). Nine items were selected by choosing three items for each of three dimensions of engagement (vigor, dedication, and absorption) with highest factor loadings (e.g. "*I am absorbed in my sport activity*"). Participants rated the frequency with which specific states accompanied their training activities during last week on a 7-point scale (1 = *never*, 7 = *always*). Cronbach's alpha coefficient across three measurement points ranged from .92 to .95 (Table 4.2).

Behavioral engagement was measured using a single question pertaining to the past week of training. Participants were asked to respond: *How many of all the workouts in the last 7 days were running workouts?* indicating the number of running workouts

conducted within the last week. This is a typical period during which runners can easily remember and record their training sessions (Nigg et al., 2020).

#### 4.2.5. Data analysis strategy

Prior to the main analysis, we conducted a confirmatory factor analysis (CFA) for the measurement models at each measurement point using Amos v. 28 software. To test the models we applied Maximum Likelihood (ML) estimation (Arbuckle, 2005). To evaluate if models fit to the data, we utilized several metrics: the chi-square goodnessof-fit statistic ( $\chi^2$ ), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), the standardized root mean square (SRMR), adhering to established guidelines (Browne & Cudeck, 1993; Hu & Bentler, 1998; Kline, 2011). In the case of CFI, values equal to or greater than .95 are indicative of a good fit, values from .90 to .95 point to an acceptable fit, and those below .90 indicate a poor fit. For RMSEA and SRMR, values at or below .05 indicate a good fit, while values ranging from .06 to .08 suggest an acceptable fit, and those exceeding .10 signal poor model fit.

Establishing measurement invariance across time is a prerequisite for testing cross-lagged relationships between variables in longitudinal research (Little, 2013). Taking into account the triple measurement with the same measures, we checked the invariance of the measurement model across measurement points following the three steps. Firstly, we tested configural invariance by estimating the same model at three measurement points without cross-time constraints. Secondly, we tested equivalent factor loadings across measurement points to assess metric invariance. Thirdly, we tested for scalar invariance by examining the equality of intercepts. For the purposes of further analysis, we expected to meet the assumptions of at least metric invariance, which would allow us to test relationships between variables across measurement points. To check the differences between the models, we calculated changes in CFI ( $\Delta$ CFI), according to Cheung and Rensvold (2002) recommendations that measurement invariance exists when absolute differences in CFI is lower than .01.

According to similar studies where data comes from three measurement points (Laguna, et al., 2017; Laguna & Razmus, 2019), we conducted cross-lagged structural equation modelling analysis (Little, 2013). Four alternative longitudinal models were compared. For each of them, latent factors from CFA measurement models were used as observable variables. At the outset, before analyzing three theoretically proposed models (M1, M2, M3), we tested the stability model (M0), which assumes autocorrelations

between the same variables but does not posit cross-lagged paths (Pitts et al., 1996). Subsequently, we examined the M1 model, which adds cross-lagged paths between variables to the previous model. These relationships led from positive orientation via enthusiasm to psychological engagement and behavioral engagement. The next model (M2) posited reverse directions of these relationships (from engagement via enthusiasm to positive orientation). Ultimately, we tested the M3 model, which posits reciprocal relationships between study variables. We tested first model fit of each of these models. For comparing alternative models, we also calculated the Akaike information criterion (AIC) and the Bayesian information criterion (BIC), where lower values indicate better model fit (Burnham & Anderson, 2004). Next  $\Delta$ AIC and  $\Delta$ BIC was calculated for comparisons of models M1, M2 and M3. Taking into account relatively small sample size, we report paths coefficients with less restrictive *p*-value (*p* < .10, Cohen, 1994).

#### 4.3. Results

#### 4.3.1. Confirmatory factor analysis

To assess the factorial validity of the constructs and ensure that the measurement model accurately represented the underlying structure of the data, we conducted CFA in separate measurement points for each model. All of the three measurement models proved to have at least acceptable fit to the data (Table 4.1). CFI for each model at the consecutive measurement points ranged from .911 to .930, RMSEA from .079 to .084, and SRMR from .057 to .067. Across all models, standardized factor loadings for positive orientation ranged from .42 to .85 (M = .69), for enthusiasm from .77 to .95 (M = .86), and for psychological engagement from .66 to .89 (M = .79). These results allow us to use estimated underlying factor scores from as variables in the cross-lagged analyses.

#### Table 4.1

Measurement	$\chi^2$	df	р	CFI	RMSEA	SRMR
Time 1	296.76	166	.001	.911	.079	.067
Time 2	314.00	166	.001	.927	.084	.058
Time 3	296.95	166	.001	.930	.079	.059

Confirmatory factor analysis for separate measurement points
#### 4.3.2. Measurement invariance

To verify whether the measurement model with all variables functions consistently across three measurement points, we assessed its invariance. For the first configural unconstrained model, we obtained good fit indices ( $\chi^2_{(498)} = 940.83$ , p < .001, CFI = .936, RMSEA = .042). Next, the difference between the configural model and the model with equality constraints on all factor loadings across measurement points ( $\chi_{(532)} = 980.24$ , p < .001, CFI = .935, RMSEA = .041) was analyzed and we obtained  $\Delta$ CFI = .001, which indicates full metric invariance. Next, the scalar invariance model ( $\chi^2_{(572)} = 1039.04$ , p < .001, CFI = .932, RMSEA = .040,) with equality constraints on all item intercepts was compared with the metric model, showing  $\Delta$ CFI = .003. So, the full scalar invariance was also demonstrated. These results allows to meaningfully analyze the relationships between variables and to compare the mean scores between constructs across measurement points (Meredith, 1993).

#### 4.3.3. Descriptive statistics and correlations

Table 4.2 displays the means, standard deviations, range, internal consistency, and Pearson *r* correlations between all study variables at each of three measurement points. As expected, the scores of the same variable were strongly positively correlated across subsequent measurement points. These moderate to strong test-retest correlations demonstrate that the study variables are relatively stable over time. Moreover, positive correlations were observed among positive orientation, enthusiasm, and psychological training engagement across all measurement points. It's important to note that behavioral training engagement was correlated only with certain variables in some of the measurement points. For instance, correlation between behavioral engagement and psychological engagement at each measurement point was observed, but positive orientation positively correlated with the behavioral engagement at T2 and T3. Additionally, enthusiasm at T2 was correlated with behavioral engagement at T3.

## Table 4.2

	Variable	α	М	SD	range	1	2	3	4	5	6	7	8	9	10	11	12
1	POS <sub>T1</sub>	.85	3.71	0.61	1.75 - 5.00	1											
2	POS <sub>T2</sub>	.88	3.70	0.66	1.88 - 5.00	.67***	1										
3	POS <sub>T3</sub>	.88	3.79	0.65	1.75 - 5.00	.63***	.70***	1									
4	$\mathbf{PA}_{\mathrm{T1}}$	.87	4.63	0.90	2.00 - 6.00	.47***	.53***	.44***	1								
5	$PA_{T2}$	.92	4.45	1.19	1.00 - 6.00	.32***	.58***	.48***	.56***	1							
6	$PA_{T3}$	.90	4.54	1.09	1.33 - 6.00	.47***	.59***	.60***	.59***	.68***	1						
7	PsychENG <sub>T1</sub>	.92	5.32	1.02	1.89 - 6.00	.46***	.52***	.48***	.51***	.45***	.52***	1					
8	PsychENG <sub>T2</sub>	.95	5.20	1.20	1.00 - 7.00	.25***	.56***	.47***	.34***	.76***	.52***	.61***	1				
9	PsychENG <sub>T3</sub>	.94	5.23	1.14	1.00 - 7.00	.31***	.47***	.58***	.39***	.59***	.68***	.60***	.66***	1			
10	BehENG <sub>T1</sub>	-	4.72	2.38	0 - 14	.11	.13	.13	02	.11	.18*	.22*	.22*	.24**	1		
11	BehENG <sub>T2</sub>	-	4.73	2.72	0-15	.12	.25**	.18*	.10	.25**	.17	.21*	.34***	.28***	.71***	1	
12	BehENG <sub>T3</sub>	-	4.77	2.76	0 -17	.09	.19*	.22*	.14	.20*	.26**	.21*	.32***	.38***	.64***	.69***	1

*Descriptive statistics and correlations between study variables* 

Note. \* p < .05; \*\* p < .01; \*\*\* p < .001, POS – positive orientation, PA –positive affect (enthusiasm), PsychENG – psychological training engagement, BehENG – behavioral training engagement, T – measurement time.

### 4.3.4. Comparison of alternative longitudinal models

Next, we moved to the main analyzes, testing alternative models, to determine which one best reflects the relationships between study variables. The comparison aims to identify the model that provides the most accurate representation of the data and underlying theoretical assumptions (Little, 2013). The fit indices and comparisons between alternative longitudinal models are presented in Table 4.3. Only the M2 model obtained good fit as indicated by CFI and SRMR indices, and acceptable fit in RMSEA. The M0, M1, and the M3 models attained a good fit in terms of CFI, but poor fit in case of RMSEA and SRMR. Thus, only the M2 meet all the fit indices criteria and resulted the best fitting model.

### Table 4.3

Model	χ2	df	р	CFI	RMSEA	SRMR	AIC	BIC	ΔAIC	ΔBIC
M0	73.82	36	.001	.966	.091	.125	157.82	277.61	-	-
M1	39.93	18	.002	.980	.098	.076	183.93	331.05	36.72	12.72
M2	27.21	18	.075	.992	.063	.043	147.21	318.33	-	-
M3	106.43	4	.001	.907	.449	.086	254.43	465.48	107.22	147.15

Comparison of the alternative models

*Note.* The  $\Delta AIC$  and  $\Delta BIC$  calculation was made for comparison with the M2 model.

To further test differences in model fit between non-nested alternative models, we compared them with the best fitted M2. This comparison, again, demonstrated that this model fits the data better than other models, obtaining the lowest AIC and BIC values (Table 4.3). This means that associations between variables are the best explained by the paths leading from behavioral engagement to psychological engagement, enthusiasm and positive orientation (Figure 4.4). Summing up, the *Run and Be Positive* model (M2) assumptions were best supported by the data.

In the best fitting M2 model the autocorrelations were .48 (T1–T2), .36 (T2–T3), and .32 (T1–T3) for positive orientation; .34, .44, and .23 for high activated positive affect; .55, .43, and .34 for psychological training engagement and .71, .47, and .31 for behavioral training engagement, respectively. The statistically significant paths observed in this model show that psychological training engagement (T1) predicted enthusiasm in the next following measurement points (T2 and T3). Psychological engagement at T1 predicted also positive orientation at T2. Enthusiasm at T1 predicted positive orientation

at T2. Additionally, behavioral engagement in training at T1 predicted high enthusiasm at T3, although this path was statistically significant at the level of p < 0.1.

### Figure 4.4

The relationships between study variables in run and be positive model



*Note.* The figure presents a simplified model with hidden T1-T3 autocorrelations and non-significant paths. \* p < .05,  $\dagger p < .10$ , T – measurement point.

### 4.4. Discussion

### 4.4.1. Summary and discussion of the results

The main aim of our study was to verify the relationships between positive orientation, positive affect and training engagement. For this reason, we conducted a longitudinal study in real-life training context, in which in three measurements 128 recreational runners took part. We measured their weekly level of positive beliefs (positive orientation), high activated positive affect (enthusiasm), and training engagement evaluated both in psychological and behavioral dimensions. Thanks to three measurement points with 7-day interval we were able to test three alternative mechanisms explaining relationships between these variables. By doing so, we aimed to verify two assumptions of the COR theory (Hobfoll, 1989) in sport context, which postulates (1) the occurrence of cycles of resource gains and losses during running training and, (2) emergence of resource caravans, which are formed by interconnected resources, such as positive orientation and enthusiasm. We tested three alternative theoretical propositions. The first was the *Be Positive and Run* model, which proposed that positive

beliefs and enthusiasm would provide the motivational energy to engage in training, both psychologically and behaviorally (M1). The second was the *Run and Be Positive* model, which assumed that training engagement stimulates enthusiasm and positive beliefs about oneself, one's life, and future (M2). The third was the *Reciprocal Model*, considering the cycles of gains and losses, which proposed reciprocal relationships between these variables (M3). We used cross-lagged model analysis to verify and these models.

Our results supported the Run and Be Positive model (M2) proposing that engagement in training predicts enthusiasm and positive orientation along time. This model was therefore the best explanation of the mechanisms linking engagement in training to the development of personal resources in the following weeks. However, it is worth noting that the relationships in this model pertained only to psychological engagement. Although Nezlek et al. (2018) showed that training frequency predicted positive experiences (affect and beliefs), our analyses did not demonstrate such effect and links between behavioral engagement and positive outcomes were not supported. However, we observed statistically significant relationships between psychological engagement, enthusiasm, and positive orientation. This result aligns with the findings of Llorens et al. (2007), which demonstrated that engagement predicts efficacy beliefs. In our study, we observed a positive relationship between psychological engagement and enthusiasm after one and two weeks of training. Moreover, after one week, psychological engagement was related to the increased positive orientation level. Moreover, contrary to previous research (Alessandri et al., 2014), our study demonstrated that positive affect strengthens positive beliefs one week later, which is consistent with the latest research findings on the relationships between these variables (Caprara et al., 2025).

Our results support the hypothesis that positive orientation and enthusiasm are more likely outcomes of running rather than its antecedents (Pereira et al., 2021). Furthermore, enthusiasm also serves as a predictor of positive orientation, what supports the formation of resource caravans integrating affective and cognitive resources (Hobfoll, 2011) of runners. However, our results stay in opposite to previous studies concerning reciprocal relationships between engagement and positive beliefs and positive effective experiences, conducted mostly in work context (Laguna, 2019; Laguna & Razmus, 2019), which not allow us to support assumptions of gains and loses cycles.

The present study provides new insight into theory of positive orientation. Until now, the focus has primarily been on the impact of positive beliefs on health, job performance, or social adjustment (Caprara et al., 2019). Only one study has demonstrated an increase in positive orientation following participation in a marathon (Gorczyca et al., 2016). Our study allowed to identify predictors of positive orientation, namely training engagement and enthusiasm associated with training. Caprara and colleagues (2019) concluded that future research on positive orientation will be more focused on the factors that introduce variability in positive orientation rather than on stability of this phenomenon. We demonstrated that this perspective is particularly important in the context of running training, where positive beliefs about the future, life and oneself may change depending on the training engagement.

Moreover, taking into account not only valence but also the activation of affect (Russell, 1980), our results showed that psychological training engagement is a significant predictor of high activated positive affect. This result is consistent with previous research (Bonham et al., 2018; Hall et al., 2002) and is in line with the reasoning that positive affect is more likely to occur as a result of sport engagement rather than being a predictor of it (Nezlek et al., 2018). This means that the sense of being engaged in training reinforces positive experiences, but activity itself does not lead to positive emotions or positive beliefs. Only the psychological sense of dedication, absorption, and perceived vigor predict an increase in such positive experiences. Frequency of training occurred not as crucial, even though single weak correlations between behavioral engagement and positive orientation and enthusiasm were observed (see Table 4.2). Potential explanation could be that for recreational runners, positive affective experiences and beliefs may come from the sense of engagement itself rather than from an increase in the number of workouts done (McCormick et al., 2019).

Our study brings also new insight to the debate on the role of physical activity in maintaining well-being (Giles et al., 2020; Peris-Delcampo et al., 2024). It is well established that well-being contains a broad spectrum of variables, for example life satisfaction, optimism, self-esteem and positive affect (Lyubomirsky et al., 2005). Our results demonstrate the role which engagement in physical activity plays in maintaining positive beliefs and experiencing positive affect associated with sport participation.

### 4.4.2. Study limitations and future directions

Despite the procedural and methodological standards applied to longitudinal study design (Little, 2013), our study has several limitations that should be mentioned when interpreting the results. One of these is the issue of causality, which means that the longitudinal nature of the study allows us to compare the alternative models and analyze

the links between variables but does not fully guarantee causal inferences (Kuiper & Ryan, 2018). A direct impact analysis would only be feasible in an experimental study, where the influence of engagement on personal resources could be examined. However, such a design loses ecological validity (Lochbaum et al., 2022) that was important for our study, which was conducted in a real-life context.

Taking into account the latest summary of research on the common method bias (CMB; Podsakoff et al., 2024), which indicates significant limitations and inadequacy of using statistical analysis methods (such as the Harman's technique) in preventing CMB, we did not perform such an analysis in our study. However, following the recommendations of the authors, we applied procedural solutions aimed at eliminating CMB. These included the separating research tools in measurement, the use of diverse response scales, and temporal spacing between measurements. The research instrument was also constructed with caution to avoid causing difficulties and significant fatigue for participants, and to be neither too short nor too long, which could lead to low effort. Nevertheless, self-reports of psychological constructs through questionnaires may be affected by CMB.

As in many longitudinal studies (e.g., Salanova et al., 2011), we observed a decrease in the sample size, although the dropout analysis demonstrated a lack of significant differences between participants who dropped out and those who remained in subsequent measurements. Considering that the sample size was not large but sufficiently adequate to conduct SEM analyses, it can be stated that testing the model on a larger sample would likely yield more stable parameters (Little, 2013). This might also enable the detection of statistically significant relationships between behavioral engagement and positive outcomes, which were observed only at p < .10 level. With regard to the sample, it is also important to consider its specificity; we based our conclusions on the sample of recreational runners. Generalizing the results to professional runners or to other sports should be done cautiously. Future research is needed to determine whether the mechanisms demonstrated by our results work similarly in other samples.

### 4.4.3. Practical implications

Given the growing popularity of running among amateurs and the increasing number of individuals training in organized groups, our findings may be valuable for both, coaches and runners themselves. The study results indicate that psychological training engagement contributes to higher positive affect and higher positive beliefs. This may be particularly important for individuals who, for various reasons (e.g., injuries), are unable to complete a specific number of training sessions but can still nurture their sense of engagement and in fact increase their well-being. Therefore, regardless of the number of training sessions, amateurs should focus on maintaining mental engagement to enhance their well-being. Coaches, on the other hand, can focus not only on ensuring the completion of specific training sessions but also on fostering psychological engagement to help their athletes feel better overall.

# Chapter 5. General discussion

The main objective of this dissertation was to investigate the role of positive beliefs and positive affect in training engagement and how the relationships between them translate into sport performance. To accomplish this goal, I formulated three research questions and conducted three independent studies, which were discussed and analyzed in the previous chapters. This chapter summarizes the key findings and attempts to integrate the obtained results. It also outlines general practical implications, highlights the main limitations, and proposes future research directions in this area.

## 5.1. Summary of the three studies' results

In summary, the three studies examined the relationships between positive orientation, positive affect, and training engagement, which were analyzed together in a sport context for the first time. In the conducted research we differentiated behavioral and psychological aspects of engagement, as two dimensions crucial in endurance training (Smith, 2003). Moreover, we used a high-activation positive affect, which is important for engagement in sport (Reed & Buck, 2009).

Study 1 (Chapter 2) was conducted to examine the role of positive orientation in training engagement and race performance. It answered the research question:

*Research question 1:* What is the role of positive beliefs and positive affect in training engagement and sport performance?

In this study, we verified theoretical model in which behavioral training engagement serves as a mediator between positive orientation and race performance. We expected these effects based on previous research that tested the associations between positive orientation, work engagement, and success in business (Laguna & Razmus, 2019). In this study, we used the behavioral dimension of engagement in the form of training frequency and examined the objective running performance in a specific race. The results revealed that positive orientation is positively associated with training engagement, which in turn predicts sport performance. The hypothesized mediating effect was also supported, demonstrating that training engagement plays a mediating role between positive orientation and race performance. In this study, BMI was a significant predictor of race performance.

In Study 2 (Chapter 3), the relationships between positive orientation, positive affect, engagement, and sport performance were tested. This study aimed to answer the second research question:

*Research question 2:* What is the role of positive orientation and positive affect (as a trait and as a state) in predicting training engagement and sport performance?

Based on Study 1 and the postulates of the B-A-E model (Laguna, 2019), we expected that positive orientation and positive affect would predict training engagement and pre-race positive affect. Next, the path from training engagement to performance and pre-race affective states was expected. Furthermore, in line with research on the role of affect in sport performance (Hanin, 2000), we expected that pre-race positive affect would

translate into the achieved running results. The research findings supported most of our expectations and showed that positive orientation is a significant predictor of training engagement, while positive affect (as a trait) predicted affective states before the race. Furthermore, engagement predicted both race performance and pre-race positive affect. Contrary to expectations, pre-race positive affect was negatively associated with performance. Two mediation effects were also observed. The first one was pre-race affect mediating the relationship between training engagement and performance. The second one involved training engagement mediating the relationship between positive orientation and pre-race affect. Finally, it is worth noting that BMI was also a significant predictor of performance.

In Study 3 (Chapter 4), multidirectional relationships between positive orientation, positive affect, and training engagement were explored, answering the third research question:

*Research question 3:* What are the relationships between the states of positive orientation, positive affect, and training engagement?

Our assumption was that positive orientation, positive affect, and training engagement might change over time among individuals who train. Therefore, we hypothesized dynamic relationships between these variables. The aim of the study was to determine the direction of these relationships. Based on the B-A-E model (Laguna, 2019), we posited that positive orientation predicts positive affect and training engagement. However, other studies suggest that reverse relationships may also be expected (Hallgren et al., 2010; Nezlek et al., 2018). We also anticipated the possibility of multidirectional relationships, which have already been tested in research on positive orientation, engagement, and affect (Caprara et al., 2025; Laguna, Razmus, et al., 2017). The results of the longitudinal study with three measurements demonstrated that the relationships between the variables are best represented by a *Run and Be Positive* model in which training engagement fosters positive affect and positive orientation.

## 5.2. Theoretical contributions

The main contribution to academic research presented in this thesis is the expansion of knowledge about the significance of positive orientation and positive affect in the process of training engagement and endurance performance. The findings also bring

new knowledge to the emerging field of positive sport psychology (Mann & Narula, 2017).

The results of the studies contribute to the theory of positive orientation, which remains a relatively novel construct requiring further validation in various contexts of human activity (Caprara et al., 2019). Previous studies have identified that positive orientation is relatively stable and a moderately inherited variable (Caprara et al., 2010), related to positive affect and activity engagement (Alessandri et al., 2012, 2015). In Study 1 and Study 2, positive orientation, treated as a stable trait, positively predicted training engagement, both psychological and behavioral. This emphasizes the significance of positive orientation in fostering motivation, energizing actions, and enabling individuals to take on challenges with expectations of positive outcomes. Furthermore, training engagement was shown to mediate the relationship between positive orientation and performance (Study 1) or pre-race affect (Study 2). In this case, positive orientation acts as a resource that can, in the long term, contribute to better results and well-being. In contrast, in Study 3, the state level of positive orientation was revealed to be influenced by positive affect and psychological engagement in training. This supports the idea of the variability of positive orientation (Alessandri et al., 2014), which remains underexplored in existing research. The combined results suggest that while positivity as a trait serves as a predictor of training engagement, as a state it is an outcome of such engagement. This distinction sheds light on the dual nature of positive orientation: as a stable disposition encouraging positive actions and as a dynamic state that can be reinforced by the evaluation of one's experiences.

The studies conducted shed new light on the role of affect in sport engagement and performance. Studies on engagement across various fields have shown that positive affect enables the prediction of engagement in activities and goal realization (Fredrickson et al., 2020; Laguna et al., 2016) as well as effort and efficiency (Barsade & Gibson, 2007). In line with the broaden-and-build theory, positive affect broadens attention and cognition (Fredrickson, 2003), which runners can utilize to cope with training challenges. However, in Study 2, we did not find an association between trait positive affect and training engagement. This aligns with the assumption that affect tends to increase after activity rather than serving as its predictor (Nezlek et al., 2018; Reed & Buck, 2009), a finding that was further supported by our Study 3. In Study 2, training engagement predicted pre-race positive affect, which, in turn, was negatively associated with running performance. Hanin and Stambulova (2002) noted that emotions prior to sport participation are crucial for performance in such activities. However, according to Hanin (2000), their intensity must be appropriate for the situation. When engaging in a specific sport activity, athletes are influenced by numerous psychological factors (Sankowski, 2001). Some of these factors may positively impact training engagement and performance (e.g., enthusiasm), while others may act as hindrances (e.g., tension; Behnke et al., 2020). Based on this assumption, positive affect should correlate positively with performance. However, in our Study 2, it emerged as a negative predictor of sport outcomes. This suggests that beyond motivational factors and building the right mindset, overly intense high activation positive affect may, in fact, negatively impact performance. Our longitudinal investigation (Study 3) of states of positive affect showed that it was predicted by training engagement and, in turn, predicted positive orientation. Previous studies have demonstrated that affective responses during physical activity were linked to future physical activity (Williams et al., 2012). The novelty of our study lies in showing that psychological training engagement, assessed in the context of the previous week, increased positive affect, which subsequently enhanced positive orientation.

The conducted studies also provide insights useful for the development of theories of training engagement. In our research, we utilized measures of training engagement that incorporated both objective (behavioral) and subjective (psychological) indicators. Behavioral indicators are often used in analyses of training structure, particularly training load (Nigg et al., 2020; Smith, 2003), although they are rarely combined with psychological parameters. The application of this approach allowed us to create a single factor encompassing both feelings and behaviors and enriched the debate on the dimensions of engagement (Busseri et al., 2011). The results demonstrated that behavioral training engagement is a significant predictor of marathon performance (Study 1). Additionally, when combined with psychological engagement, it also predicts halfmarathon performance and is positively related to pre-race positive affect (Study 2). Thus, this conceptualization of engagement contributes not only to performance prediction, which aligns with previous research (Nikolaidis & Knechtle, 2023), but also to shaping pre-race affect. Moreover, the psychological state of engagement predicts positive affect and positive orientation in subsequent training weeks (Study 3). This is particularly important, as these personal resources are known to be crucial in the long term for maintaining engagement, providing energy, and ultimately enhancing performance (Alessandri et al., 2015; Fredrickson et al., 2020).

The research allows us to extend empirical base of the resource theories. According to the COR theory (Hobfoll, 1989), individuals strive to acquire, maintain, and protect valuable resources, as their loss can lead to stress, while their accumulation fosters well-being and performance. In our study, positive orientation and positive affect function as key personal resources, forming resource caravans associated with engagement and performance outcomes. Moreover, our findings suggest that engagement in training not only predicts performance but also contributes to building and sustaining these psychological resources. This aligns with the gain spiral mechanism proposed by the COR theory (Hobfoll, 2011), where the accumulation of resources increases resilience and motivation, further reinforcing engagement and positive experiences in sport.

The studies presented in this dissertation also contribute to the field of positive sport psychology, which is gaining increasing popularity (Mann & Narula, 2017), particularly with regard to positive interventions in recreational settings (e.g., Day, 2019). Participation in mass races can be considered a positive intervention that enhances wellbeing (Cypryańska & Nezlek, 2019; Malchrowicz-Mośko & Poczta, 2018), but it also requires positive thinking and emotions when dealing with challenges before and during the race (Stanley et al., 2012). From the broader perspective the results of our studies demonstrate the relationships between the cognitive and affective spheres that occur in the training process and in sport performance. Therefore, the conducted research deepen understanding of the role of positive orientation and positive affect in motivating action and building the right attitude for performance.

## 5.3 Limitations and future directions

It is important to mention several limitations from the perspective of all the conducted studies. Due to the fact that specific limitations were discussed in detail in the summary of each study, I will focus here on those that are common to all the studies and seem the most important.

One of the elements that connects all the studies is the specificity of the sample. Although running is one of the most popular sport activities, which is still gaining popularity especially among amateurs (Andersen, 2020), the research conducted may not fully reflect the mechanisms that may occur in every sport. The tested mechanisms seem to be significant from the perspective of recreational endurance sports, where the responsibility for training and results primarily rests on the athletes' effort. Thus, it is not excluded that similar relationships between variables may occur in other sports (e.g., cycling; Meijen, 2019). Therefore, to extend our results, it would be valuable to conduct research considering the recreational level of athletes who usually manage training volume by themselves.

Another limitation arises from the methodology of the conducted studies. When analyzing the relationships between variables, we decided to apply longitudinal models, in which there are at least two measurement points, which allows for drawing conclusions about the direction of relationships between variables, however, it does not provide evidence of causal relationships. In order to further develop and better understand the relationships between variables experimental research design in real-life setting would help to determine the direct influence.

In our study, we tested a specific set of variables whose importance for engagement has been confirmed in other areas of human activity (Fredrickson et al., 2020; Laguna, Razmus, et al., 2017; Van Cappellen et al., 2018). However, it is not excluded that expanding the model with additional personal resources could yield also valuable results (e.g. self-efficacy; Alessandri et al., 2015). The study focuses on the measurement of positive orientation as a higher order variable that encompasses optimism, life satisfaction, and self-esteem (Caprara et al., 2010), allowing for the examination of the combined effect of these variables captured as a single construct. However, it does not account for other personality factors relevant to sport activity engagement (e.g., Big Five personality traits, Sato et al., 2018). Similarly, regarding affect, in line with the recommendations from previous research, in our study we applied the circumplex model of affect (Ekkekakis & Petruzzello, 2002), more specifically, paying attention to high activated positive affect (Reed & Buck, 2009). However, it is possible that including the remaining quadrants of the circumplex model could allow for a more comprehensive analysis. Concerning engagement, we measured its two dimensions, psychological and behavioral. Despite being recommended as the best parameter of engagement (Borresen & Lambert, 2006; Janssen et al., 2020), other behavioral indicators such as duration or intensity, may be used in future studies.

## **5.4 Implications for practice**

The presented results of three studies can be applied in sport practice twofold: for professionals working with athletes and for recreational endurance athletes themselves, who face various demands related to participating in sport (McCormick et al., 2018). In sport psychology, it is common practice to combine an academic career with practical

work with athletes. This approach can bring many positive effects, such as implementing methods based on research findings into practice (Poczwardowski et al., 2024). So, the research problems addressed could be also significant for professionals who working with athletes, especially trainers and psychologist. Preparation to achieve a satisfactory result or to successfully complete a long-distance race requires, above all, regularity in training (Gordon et al., 2017). Taking part in numerous competitions during the season, competitors are particularly exposed to problems with training motivation (McCormick et al., 2018). This problem also concerns amateurs, who derive no tangible benefits (financial or other) from engaging in physical activities and who therefore give up easily and find themselves unable to resume running. Many amateur runners use the advice of professional trainers and participate in organized training activities (Meijen, 2019). It is well known that interventions concerning athletes' well-being are important in strengthening their performance (Giles et al., 2020). Therefore, understanding how positive beliefs and positive affect are linked to training engagement and sport performance can be useful in developing appropriate interventions aimed at improving athletes' well-being and supporting their performance. Increasingly popular interventions used among recreational runners, which have so far focused on goal setting, imagery, selftalk, and mindfulness (Day, 2019), could also incorporate the role of positive beliefs and positive affect. These factors may be key components of coping strategies that strengthen runners after their trainings and before their races (Stanley et al., 2012). This knowledge can be utilized both by athletes to enhance their performance and by professionals working with recreational athletes.

### 5.5 Conclusions

The aim of this thesis was to explore the role of positive beliefs and positive affect in training engagement and sport performance. The dissertation consisted of three studies designed to examine theoretical models on a sample of recreational runners. It was demonstrated that positive orientation and positive affect are predictors of engagement and running performance, but also that psychological training engagement contributes to the increase of states of personal resources. This work makes a contribution to the understanding of motivation for recreational sport participation and the importance of individuals' factors in achieving performance outcomes. The results of these studies provide new insights for researchers, athletes, and coaches by broadening the understanding of the role of positive psychological factors in sport.

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# Appendix 1

#### Author contribution statement

Article entitled:

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Author contribution:

Michał Kędra (70%): conceptualization, methodology, formal analysis, investigation, resources, writing (original draft), visualization, project administration. Mariola Łaguna (30%): supervision, writing (review and editing), methodology, formal analysis.

## **Appendix 2**

### Details of moderation analysis in Study 2

Variable	β	SE	t	р	LLCI	ULCI
Constant	.03	0.06	0.42	.672	-0.096	0.148
Pre-race positive affect	39	0.13	-3.04	.003	-0.649	-0.140
Pacing strategy	.02	0.01	5.05	<.001	0.010	0.022
Interaction	01	0.01	-0.25	.807	-0.010	0.007
Positive orientation	31	0.17	-1.79	.075	-0.647	0.032
Positive Affect	.23	0.16	1.39	.166	-0.096	0.553
Training engagement	.62	0.13	4.92	<.001	0.371	0.868
BMI	27	0.07	-4.12	.001	-0.401	-0.142

Moderation analysis coefficients

*Note.* 95% confidence intervals were calculated. Interaction = pre-race positive affect x pacing strategy.

#### The Johnson-Neyman plot



*Note.* Analysis of significance regions showed that the negative impact of pre-race positive affect on race performance occurs when pacing strategy score range form -31 to 41 seconds. This means that the significant negative effect of positive affect on performance occurred in situations where participants maintained a slower pace of 0 to 31 seconds in the second half and faster pace of 0 to 41 seconds per kilometer in the first half. However, it is worth to note that the interaction effect was nonsignificant.